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Vol. VIII

1965-'66



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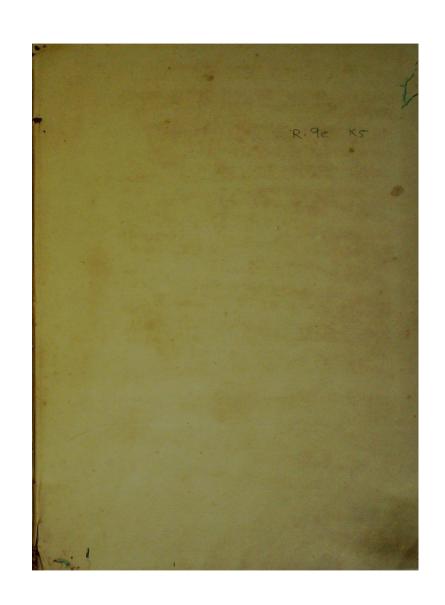
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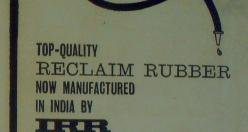
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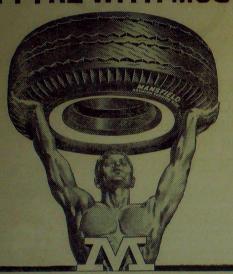
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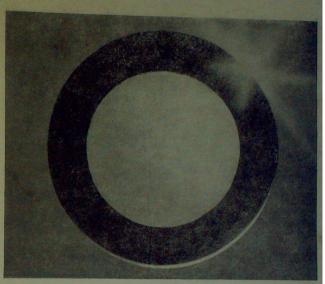
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## rubber board bulletin

Vol. VIII, No. 1.

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#### An Urgent Problem

The urgent necessity of replanting old, uneconomic rubber areas has been engaging the attention of the Rubber Board ever since its inception, though a concrete scheme could be drawn up only by 1957. This problem is a vestige of the Second World War, when the estates were overworked for the successful prosecution of the war. The Board's Replanting Subsidy Scheme was put into operation in 1957. Since then, the Board has been giving cash subsidy to rubber planters to take up replanting in earnest. As it was felt that the subsidy granted in the beginning did not provide sufficient incentive for large scale replanting, the scale of subsidy was raised to Rs. 1000 per acre in 1960. Still, the progress of replanting has not been satisfactory.

In addition to the cash subsidy, the Board has been giving other forms of assistance to small holders, who replant under the Subsidy Scheme. Small holders whose total area under rubber does not exceed 15 acres are given planting materials free of cost, manure at half the cost, subsidy for contour terracing and construction of edakayyalas and subsidy for making silt pits or silt trenches. By these, a planter would benefit to the extent of over Rs. 300 per acre. In the Replanting Subsidy Rules for 1965, the clause regarding the number of other trees that may be retained by small holders in replanted areas has also been liberalised.

The total area replanted during the eight years from 1957 to 1964 comes to about 35,000 acres, though the

target fixed has been higher. However, it is gratifying that from 1964 onwards, the replanting programme has been gathering momentum. In that year the target has almost been attained. A target of 10,000 acres has been recommended for 1965 and for each year of the Fourth Plan period, by the sub-group on rubber of the Working Group for Plantations.

Those in the rubber plantation industry should know that the future of the industry depends largely on replanting of old, low-yielding areas with modern high-yielding clones, within the shortest possible time. Only in that way can the cost of production of natural rubber be lowered to a level to compete successfully with synthetic rubber, at the same time maintaining rubber plantations as a profitable industry.

The Rubber Board is rendering all necessary assistance to rubber planters to carry out replanting on a large scale. The Board reviews the progress of replanting frequently and makes necessary amendments in the rules and regulations governing the implementation of its Replanting Scheme to remove any impediments that may retard its progress. It is hoped that the rubber planters in the country would come forward in ever larger numbers to avail of the liberal assistance provided by the Government and the Rubber Board for the rehabilitation of old estates, to attain the targets fixed for the industry and thus to put the natural rubber industry in India on sound basis.

# Distant Future Belongs to Efficient Producers

Friends,

It is with great pleasure that I welcome you to the 48th meeting of the Board. This is the first meeting of the Board in which I am participating and I would request you to extend your co-operation in continuing the good work done by my predecessor Dr. Rama Varma. I may extend a special welcome to the new members of the Board, Shri Sankaranarayanan, Managing Director of the Plantation Corporation of Kerala, Ltd., and Shri Nambiar, Additional Secretary to Government (Agriculture).

#### Finances

First, I may tell you briefly about the collection of cess which goes to the General Fund and the collection of the price difference between indigenously produced natural rubber and imported natural rubber which goes to the Pool Fund. You are aware that the collection of cess had been suspended for some time pending the decision of the High Courts of Punjab and Kerala, where the manufacturing firms had filed petitions challenging the validity of the collections. The High Court of Punjab and recently the Kerala High Court have dismissed the petitions filed by the manufacturing firms, and we have taken steps for recovery of the cess due to us from the

by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, Speech delivered at the 48th meeting of the Board held at the headquarters of the Board on the 8th October, 1964.

manufacturing firms. The collections to the Pool Fund have dwindled considerably, as a result of the removal of the element of sales tax and cess from the prices fixed by the Government and the increase in duty on imported natural rubber. There are also some other reasons for the poor collections to the Pool Fund. The Pool Fund can be utilised only for the rehabilitation of small growers, i. e. growers of natural rubber up to 50 acres.

#### Expansion of Cultivation

Since the last meeting of the Board, some developments of significance have taken place. You may be aware that the Board has sent a delegation to Andamans to select a suitable site for the Pilot Plantation to be established in that island. The expenditure for the project will be met by the Home Ministry. A total area of 500 acres is proposed to be brought under rubber in the first instance. The continued effort of the Board to expand rubber cultivation has brought about good results. The Government of Mysore have decided to plant rubber at 1,000 acres per year during the 4th plan period through Forest Department. They have so far planted an area of 870 acres. Experimental plantings have been started in Goa during 1964.

#### Budget

The Budget Estimates of the General Fund for 1964-65 provide for an expenditure of Rs. 92,86,600. This provision has been approved by the Board. However, the Government have reduced this provision to Rs. 65,66,800 by making ad hoc cuts under various heads. The revised estimates have been approved by the Executive Committee and are being placed before the Board for approval.

#### Production and Consumption

Certain facts about the world production of natural rubber are relevant here. In 1963, the world production of natural rubber was 20,55,000 tons. The world consumption of natural rubber during 1963 was 22,20,000 tons. In regard to consumption of natural rubber, U. S. A. stands first followed by Japan and U. K.

I may now say something on the position of natural rubber industry in India. At the end of March 1964 the area under rubber in the country was 378,000 acres. The structure of the industry continued to be divided between small holdings and large holdings. The small holdings occupy an area of 234,000 acres. This would come to 62 per cent of total area under rubber. The large holders occupy 144,000 acres to-day. Their percentage share comes to 38 during the period. The average yield per acre in the country has been increasing. The average yield during 1963-64 was 159 kg per acre according to available information. corresponding figure for 1962-63

There has been considerable increase in the production of natural rubber. As you

know, during 1963-64 production of natural rubber increased by 16% over the production of 1962-63. During the first four months of this year the production of natural rubber was 12,255 tonnes. This is higher by 6% over the production in the corresponding months in the previous year. I may observe here that the production of natural rubber during the four months has not been upto our expectation. This has been due to the unfavourable weather conditions prevailing during the period. However, 1 have no doubt that we will be able to achieve the target of 46,000 tonnes fixed for the year.

Consumption of natural rubber has also shown substantial increase. In 1963-64 consumption of natural rubber reached 61,155 tonnes. This is higher by 14% over the consumption in 1962-63. However, during the first four months of 1964-65, consumption of natural rubber decreased slightly compared to the corresponding period in 1963-64.

#### Production of Synthetic Rubber

Production of synthetic rubber in the country was started in 1963. As reported by the Synthetics and Chemicals, Ltd., the production of synthetic rubber in the country during 1963-64 aggregated to 9,149 tonnes. The stock of synthetic rubber with the firm at the end of March 1964 was 5,284 tonnes.

You are aware that the Rubber Board had at its 46th meeting passed a resolution that the Board felt that issue of licences for starting new factories or for expansion of existing capacity for production of synthetic rubber would affect adversely the interest of the rubber plantation industry and would defeat the efforts of the Board to develop

the industry and requested the Government that such licences should be issued only in consultation with the Board. Though no specific communication has been received from the Government regarding consultation with the Board before licensing of factories for production of synthetic rubber, it has been generally agreed that the Chairman of the Rubber Board may be invited to meetings in the Department of Technical Development when matters relating to the establishment of synthetic rubber manufacturing plants are discussed and recently they have been inviting representatives of the Board for such meetings held with the Planning for any apprehension that there may be indiscriminate issue of licences for starting factories for the production of synthetic

#### Import of Rubber

The Board had passed a resolution at its last meeting expressing our apprehension that the present system of linking imports of raw rubber with the purchase of indigenous synthetic rubber by rubber goods manufacturers will adversely affect the future of natural rubber industry.

There has been reduction in the price of synthetic rubber produced and the revised prices have been announced from August 1964, by the Company. Now synthetic rubber of top grade is being sold at Rs. 3.85 per kg even after the reduction and it appears that due to the high price, the manufacturers have been finding it difficult to use synthetic rubber. It appears that the Indian Rubber Industries Association, Bombay, has taken up with the Government

the question of reducing the price synthetic rubber produced in this country to the level of the minimum natural rubber prices fixed by Government. We are watching the developments. It appears besides that Government have taken the following steps for increasing the offtake of indigenously produced synthetic rubber.

Import of SBR synthetic rubber to actual users has been stopped since April 1963. The import of natural rubber was linked to the offtake of indigenously produced SBR in the ratio of 1:1 during the licensing period October 1963 to March 1964 and also continued during the current licensing period till the end of September, 1964, ing company has been complaining to Government that there was heavy accumulation of stocks with them. The main reasons for the low offtake of synthetic rubber as indicated by the rubber goods manufacturers were the high price of indifor its use in the various products. In fact the Indian Rubber Industries Association had sent up a representation to the Government about the difficulty in implementing synthetic rubber, and while admitting the need to conserve foreign exchange and that the Government policy did not take SBR synthetic rubber in rubber goods varied from product to product. It remains to be seen whether this policy will be continued by the Government during the current year also. It also appears that there was a meet-

attended by the representatives of the automobile tyre and other manufacturing industries and Messrs Synthetics and Chemicals, Ltd., where various difficulties in the offtake of synthetic rubber by the manufacturers were discussed and later on based on the information collected from the manufacturers about the extent to which SBR synthetic rubber could be used in various products without undue technical difficulties, the quantity of SBR that was to be used for users of the rubber had been worked out, which added up to roughly 16,000 tons during the year 1964-65. Therefore there is a noticeable trend to encourage progressive use of synthetic rubber produced in this country.

It may also be remembered that the Board had passed a resolution at its 46th meeting that the Central Government be requested to stop the present system of granting licences direct to the manufacturers for import of natural rubber and to direct that import licences for rubber be issued in favour of the Rubber Board and that the Board be authorised to allocate and recommend to the Government against applications from consumers such quantities as may be assessed as necessary from time to time.

Government have not found it possible to allow the Board to handle the imports of natural rubber according to a recent decision communicated to us. In this connection certain facts about the responsibility of the Board about marketing of rubber will be relevant. You are aware that under Section 8 (2) (d) of the Act it shall be the duty of the Board to promote measures for improving the marketing of rubber and under Section 8 A it shall be lawful for the Board

with the previous approval of the Central Government to import rubber for sale or purchase rubber in the internal market at such prices as the Central Government may fix. According to Section 25 of the Act, rules may also be framed which shall among other things provide for the manner in which rubber shall be graded and marketed. Therefore the statutory provisions are there for the Board to step into the marketing field and it may be mentioned that in 1956 the Board had been authorised to arrange imports of natural rubber to meet the requirements of manufacturing industry, but somehow this arrangement was later given up. The present system of importing rubber is to give Actual Users' licences for rubber manufacturers on condition that the difference between landed cost of imported rubber and the Indian controlled price of raw rubber shall be paid by the licensee to the Rubber Board. Before 1962 both quantity and value were mentioned as ceiling in the import of natural rubber. Since then only the value is made the limiting factor and the Board has pointed out the unfavourable implication of this decision to Government as this arrangement will give scope for the import of larger quantities of rubber when the world price is low.

You will also note that the removal of the element of sales tax and cess from the price of natural rubber in this country is an incentive for the manufacturers to import natural rubber because they do not have to pay to the Rubber Board the amount equivalent to the cess etc. which previously was not the case when the controlled price of Indian rubber contained the element of cess. The decision of the Government to link import of natural rubber to the internal

purchase of synthetic rubber as mentioned above has also caused serious apprehension among the producers of natural rubber.

It is also noticed that the Seminar on Trade with Malaysia organised by the Institute of Foreign Trade of the Commerce Ministry had recommended that the scope for increasing the quantum of rubber import from Malaya should be pursued. Our reply to this recommendation was that the import of rubber into the country should be restricted to the gap estimated by the Import-Export Committee of the Board between the production and consumption of natural and synthetic rubbers.

However, though the trends as mentioned above appear to encourage unrestricted import of natural rubber a dispassionate study of the facts shows that there is no cause for alarm. The import of natural rubber during the first four months of 1964-65 has actually fallen by 1966 tonnes. The stock at the end of July 1964 was 16,609 tonnes. The corresponding figure at the end of July 1963 was 14,824 tonnes. The offlake of natural rubber by the manufacturers during the first four months of 1964-65 has also increased considerably. It is higher by 796 tonnes, over the corresponding period in 1963-64. From these vital statistics it would be seen that there is no cause for alarm.

As things stand, therefore, it can be said that the present channels of marketing are not likely to be disturbed, that means, internal purchases will be regulated by the system of licensing of dealers including cooperatives, the import licence applications being processed by the Directorate of

Technical Development. It is important, however, that we achieve our objective of protecting natural rubber producers by keeping a close watch on the import, stock and offtake of natural rubber and also the production and disposal of synthetic rubber. But if and when the analysis shows any alarming position we have to press our case very strongly before Government. It is also known that the timing of the purchasing by the manufacturers is important and sometimes there is a tendency to go slow with purchases when the productivity of natural rubber in this country may be at its peak. I can assure you that we are keeping a close watch on these tendencies.

#### Market Intelligence

We propose to strengthen the staff and create a strong market intelligence section. The main duty of the section will be to investigate any complaints that may come up on the non-receipt of the statutory price given to growers. Cases of violation of the conditions in the licence will be dealt with by the section. The purpose is to stop unlicensed dealing and also evasion of excise duty payment. I am sure that these steps will ensure the full benefit of the minimum price fixed by the Government to the smallholder. Subject to the review of the production and disposal of synthetic rubber and its price policy and the import of natural rubber, which will now be made periodic by strengthening the statistical and which the Board should do to encourage the productivity and yield per acre and reduce the production costs. We can legitimately do a lot about replantings, strengthening of our advisory services and organisation of the small holdings sector.

Research activities have also to be intensified

#### Replanting

You will be aware that the replanting scheme was brought into force in 1957. A target of 70,000 acres was fixed for a period of 10 years in the beginning. The scheme had to be modified in 1960 due to the poor response and the subsidy was enhanced to Rs. 1,000 per acre from 1960 onwards. The area covered by the scheme from 1957 to 1963 was only 30,000 acres against the target of \$4,000 acres. Compared to Ceylon and Malaya, our achievements are very modest.

#### Loan Schemes

The Board has now two loan schemes, for small holders of rubber, financed from the Pool Fund viz. the New Planting Loan Scheme, and the Immature Area Upkeep Loan Scheme. Both these schemes cater to the needs of planters whose rubber areas are below 15 acres. The New Planting Loan Scheme was introduced in 1962. The annual target is 2,500 acres. So far the Board has received 426 applications, for an area of 3,125 acres. Sanction has been accorded to 60 cases covering an area of 320 acres. This scheme has not made much progress because of two difficulties. In the first place, in the Travancore-Cochin area, land is not available for expansion Secondly, small-holders generally experience difficulty in finding land for security.

The Immature Area Upkeep Loan was introduced in 1963. During 1963-64, 292 applications covering an area of 1865 acres have been received. Of this 58 applications

have been rejected because of ineligibility. So far sanction has been given for 10 cases covering an area of 54 acres. The main reason for the poor progress is the difficulty experienced by small holders to find land for security.

Another scheme is being implemented by the Land Mortage Banks. Under the scheme, loan at the rate of Rs. 750 per acre is given to persons undertaking planting of rubber in areas not exceeding 15 acres. This scheme, it is understood, has not achieved much progress.

Recently the Board has drafted a new scheme in place of all the three schemes referred to above, to be implemented with financial assistance from Land Mortgage Banks. Loans will be granted under the scheme for new planting and extension of existing rubber areas and also replanting areas which are not eligible for the Board's subsidy.

The Rubber Board has in consultation with the Agricultural Refinance Corporation prepared a scheme for extending agricultural refinance facilities to the Rubber Plantation Industy in the shape of long term loans through scheduled banks. The scheme is intended to cover 50,00) acres over the next 5 years. The amount of loan is Rs. 1,600 per acre in the case of individual planters and Rs. 2,100 per acre in the case of companies. The loan will be admissible only to planters undertaking new plantation of rubber in 15 acres or above. scheduled banks will be responsible for implementing the scheme with the technical assistance of the Board. When the scheme was formulated, the Agricultural Refinance rantee should be given for the full repayment

of the loans. The Corporation has now waived this condition. Planters who wish to avail of the loan will have to prepare their own schemes, and present them to the banks of their choice.

#### Planting Materials

The Board's scheme of distributing planting material at subsidised rates has become much popular in recent years. By the close of 1964 seed distribution season, about 30,000 growers have taken advantage of the scheme. In 1964, the Board got applications for planting material for 4,425 acres. But we could supply only for about 2,200 acres. To meet the increased demand, four 10-acre nurseries are suggested to be established soon.

#### Advisory Service

The Advisory Services of the Board have to play an important role in the development of the industry. Without touching upon their present and future role, I do not think that a resume of the industry would be complete. With a view to increasing efficiency, the routine duties of Rubber Instructors have been separated. It is our desire to reorganise the Advisory Services on Malayan pattern with specialised services for estates and small holders. Necessary steps are being taken to issue a number of advisory pamphlets incorporating up-to-date scientific developments affecting rubber cultivation and processing.

#### Co-operatives

The small growers generally do not have sufficient knowledge and means to follow scientific methods of cultivation and processing. To extend the help to each individual

grower is neither possible nor feasible, only way in which the Board could exter assistance to growers is through co-operatives.

The Plantation Enquiry Commission had made the observation that co-operatives had to play an important role in rubber plantation industry. The Estimates Committee and the Tariff Commission have repeated the observation of the Commission. The Board has been earnestly encouraging the establishment of co-operatives. At present the Board is rendering assistance to small growers through the distribution of plant protection equipments on loan, supply of plant protection chemicals at subsidised rates, and distribution of formic acid. During 1964, 252 sprayers have been issued to 55 societies, for spraying an estimated area of 14,000 acres.

The most important assistance given by the Board for small grower is for improving the processing and marketing of rubber. You will be aware that, for these purposes, the Board is subsidising 50% of the cost of construction of smoke houses, subject to a maximum of Rs. 5,000 for a smoke house. The target fixed is for the construction of 20 smoke houses in different localities. In all, the Board has given sanction for the construction of 14 smoke houses. Only 8 societies have been able to complete construction. Others are at various stages construction. Proposals for the construction of the remaining units are under sorutiny.

The question of improving the marketing of small holders' rubber has always attacted our attention. A scheme for establishing marketing societies has been in existence. The scheme provides for the grant of Joan

organissciety, limited to Rs. 30,000 to each and use of polythene materials for budding, Resermarketing society. So far a sum of Rs. fie 1,50,000 has been disbursed to five societies.

It is our sincere wish to make co-operative societies which undertake marketing and processing, the focal points in a rubber growing area. I am prepared even to allot the services of a Rubber Instructor if it is felt desirable for the efficient running of the society. If the societies can submit worthwhile schemes for the development of the Industry, we are prepared to accept them. I may add here that we are not encouraging exclusively marketing or processing societies. I am happy to inform you that a number of rubber marketing societies are working satisfactorily. The question of strengthening marketing and processing cooperative societies is being examined, in consultation with the Registrar of Cooperative Societies. We are consulting the Registrar of Co-operative Societies and the State Government, about working funds available to the co-operatives, either by way of share capital or working capital. The question whether the Rubber Board can participate in the share capital structure or sanction working capital loans, is under

#### Research

The useful work done by different divisions of the Rubber Research Institute of India has been strengthened during 1964. The work on soil analysis and field experimentation, done by the Agronomy division has been intensified during 1964.

Studies on green-budding technique have been taken up by the Botany division.

5 times of the share capital of the Experiments on spacing in nursery beds, undertaken by that division have given

> The Pathology division could report two new diseases on rubber hither-to unrecorded in Asia, viz. Leaf Spot disease and Thread Blight.

The Chemistry and Rubber Technology division started functioning only from June 1963. This division is investigating problems relating to the processing techniques. A detailed study on the physical characteristic and behaviour of sheets coagulated by acetic acid is in progress. With a view to standardising the metrolaes, the dry rubber content (D. R. C.) of the field latex is being regularly determined.

I have given a resume of the studies that are being done by the various divisions of the R. R. I. of India. The divisions propose further studies. The problems of foliar feeding, hormone trials, weed control and allied studies are proposed by the Agronomy division. Soil test crop correlation studies, soil management, growing of cover crops and nitrogen fixation studies are also programmed, by that division. The present four factorial manurial experiments will be continued for a period of seven years. The Botany division proposes to undertake cyto-anatomical studies for the proper understanding of the problems connected with rubber breeding and tapping. Large scale testing is proposed for the newer and proved materials like. RRIM new series, PB fractional clones and S. American clones received in this country. Testing of the newly imported RRIM clones (20 nos.) in various planting districts will be

continued. Breeding and selection work carried out for producing high yielding and disease resistant materials suitable to our soil and climatic conditions, will be continued.

Fundamental studies on the causative agencies, determining their life histories, morphological and physiological characters, host range, host parasite rotationship and study of different plant materials with reference to degree of disease resistance and susceptibility to the major diseases are programmed by the Pathology division.

Chemistry and Rubber Technology division proposes to undertake investigations on problems relating to the preservation of concentrated latex with multi-component systems as preservatives, effective separation of rubber from skim latex and maximum purification of scrap rubber from sand and dirt particles, studies on the biochemistry of rubber latex, biosynthesis of rubber, latex particle size, grafting, oil extension, and oil black masterbatch will also be undertaken. It is also envisaged by the division to investigate the preparation of rubber by the extrusion methods.

#### Contact with Growers

In a plantation industry like rubber, it is most essential that, we should continue to have contact with the growers. Our information service is doing its utmost to achieve the object. Public complaints are promptly locked into. The snag in registration, and the frequent delay are being got over by strengthening the sections. We have set up an enquiry office, for the convenience of the public coming for various purposes, in the office.

We have taken steps to prepare a 1. so as to be a guide to the officers and of the Board. It will also serve a use, purpose by giving to the public a gist of the work done by the Board.

#### Labour Relations

I need not emphasise the fact that labour plays an important role in an industry like rubber plantation, where labour cost constitutes about 45% of the total cost. Good employee-employer relations are essential for the continued increase of production. You are aware that the Board has been granting educational stipends to the children of rubber plantation workers. During 1963–64, the Board has sanctioned stipends to 1,220 students and payments so far made in respect of 1,077 cases amount to Rs. 1,19,054.42.

You may also be aware that the Labour Research Unit of the Board has recently undertaken two studies covering certain aspects of rubber plantation labour. We intend to place the reports before the Board shortly. Some useful studies have also been done by the Cost Accounts division covering the financial aspect of the industry. There is much scope for further researches on the economic aspect of the industry. It is intended to strengthen economic research, as the Rubber Act explicitly states that improving the conditions of labour and carrying out economic research are also objects of this Board.

#### Rehabilitation Allowance

I need not mention that the State Governments of Kerala and Madras have already implemented the recommendation of the Tariff Commission by allowing the rehabiliorganiscietetion in the computation of agriculRese maral income. We had some corresponfile 1 - ence with the Mysore Government, which
has not implemented the decision. They
have informed us recently that the Government have proposed to amend the Agricultural Income Tax Act further. We are
pursuing the matter.

#### Fourth Plan Targets

I am happy to inform you that the subgroup on rubber of the Working Group on Plantation Crops has finalised its report. The Working Group has estimated production of natural rubber at 72,000 tonnes by 1970-71. The Group expects the proif the various development schemes are fully implemented. It may perhaps go over one lakh tonnes under favourable conditions. The demand of rubber of various varieties is estimated at 224,000 tonnes by that time. The total extent of land likely to be available for extension of rubber cultivation is estimated at 85,000 acres, of which 50,00) acres may be available from Malabar. The Group recommends for the continuance and intensification of replanting programme in the remaining years of the Third Plan. As the replanting programme depends upon submission of schemes by the Board and annual sanctions, it is difficult to say about the duration of its continuance in the Fourth Plan. A target of 50 smoke houses recommended for the Fourth Plan period. As an experimental measure, the Group has recommended the establishment of crepe mills by small growers' co-operatives with subsidies from the Board for converting rubber scrap into crepe grades. To enable the industry to obtain essential items of import, a block foreign exchange allocation of Rs. 30 lakhs a year has been suggested by the team,

#### Joint Central Team

The Joint Central Team on Agricultural Programmes 1964-65, on its visit to Kerala had raised certain points against the expansion of rubber plantations by converting forest lands. We have taken up the matter with the Government and have pointed out that rubber is a strategic material and top priority will have to be given to its development. Cultivation of rubber brings more income than many of the forest species. We have also pointed out that even if a lakh of acres of land were to be utilised for rubber cultivation, Kerala's precentage area under forests will still be higher than the all India average.

#### Natural Vs Synthetic

Without touching upon the burning problem facing the industry, namely, the controversy of synthetic Vs natural rubber, I feel that my speech will be incomplete. I must make it clear that as an all purpose rubber, natural rubber has no equal till now among the marketed synthetic rubbers. Some of the synthetic rubbers are specialised rubbers and others are general purpose rubbers, while natural rubber is an all purpose rubber. The Development Committee of the International Rubber Study Group, which met in Tokyo, had observed that as far as natural rubber was concerned its vitality continues to be evident and its future assured provided producers continue their efforts in the direction of reducing production costs through rejuvenation programmes, through more systematic manuring and yield stimulation, through exploitation of fundamental research and improving technical qualities of production, through simplification of the grading system, through control of cleanliness and uniformity of the products, through improved methods of packing and presentation and through strengthening technical contacts with man -(continued on page 29)

## Manuring of Rubber

#### An Outline

K. C. Ananth\*\*

#### Introduction

Rubber does not appear to make many specific demands, provided the physical requirements of the soil are fulfilled, unlike other plantation crops, namely Coffee and Tea. The soils in rubber areas are mainly lateritic. They are poor in available phosphoric acid, potash and other bases and are acidic in reaction. It is therefore to be expected that rubber grown in such a situation may respond to fertiliser treatments comparatively more than other plantation crops. Further, the importance of manuring rubber is accentuated with the rapid expansion of this crop into areas already exploited by coconuts, tapioca etc., and is also interrelated with the organised programme of replanting rubber with high yielding clones.

The immediate object of fertiliser recommendation is mainly to increase the know-ledge and understanding of planters so that they can make suitable decisions as to choice of fertilisers, their rate, time, and method of application. Some scientific workers are searching for ways to simplify manuring recommendations. However, as far as one can visualise, such recommendations are likely to become more complex, but probably more precise for individual fields and blocks. The basic goal aimed at

is to define soil situation with greater precision based on the available soil test data and thereby help the growers to adopt scientific fertiliser use most suited to their location. The so-called specific recommendations have an inherent weakness in that they are necessarily general, since the person making them rarely has an opportunity to get all the correct background information that is needed to make them specific in the individual estate, holding or block. Further, the limited applicability of pot and glass house trials, the variation in results due to soil heterogenity factor and diversified cultural practices in field trials, the poor correlation between arbitrary laboratory chemical extracts and field responses on the one hand, and between plant analyses and soil deficiencies on the other, have all come in the way of specific fertiliser recommendations. Deficiency symptoms due to lack of magnesium, potassium, and in some isolated cases, of zinc and manganese have been observed under field conditions. Generally speaking, however, diagnoses of mineral deficiency should be considered in the light of the emergency procedure and not as a dependable soil replenishment, because by the time deficiency symptoms are apparent, growth has already suffered. The effects of manuring rubber have been

<sup>\*</sup> Paper presented at Eleventh UPASI Annual Scientific Conference, Cooper.

<sup>\*\*</sup> Deputy Director (Agronomy), RRII, Rubber Board, Kottayam-9, Kerala State,

studied in long-term field experiments in all important rubber producing countries, to determine the types and quantities of fertilisers to be applied, the best time and method of application and the optimum plant food ratio of the three major elements, viz, Nirogen, Phosphorus, and Fotash. Results of these field experiments conducted elsewhere as well as those in progress in Kerala and Madras States, have been varying from location to location, but the general trend indicates the use of well balanced complete fertilisers for rubber.

With the above background, the fertiliser recommendation for rubber in India is detailed in the following pages.

#### Fertiliser Recmmendations

The object of applying fertiliser to rubber varies according to the crop stage and it may be conveniently divided into (a) nursery stage, (b) immature rubber in the field in its pre-tapping stage, and (c) mature rubber under tapping.

(a) Nursery Stage. In applying fertiliser to the nursery beds, the main object is to obtain planting material of the maximum possible vigour but not a forced growth. Although the plants are set in beds laid out on virgin soil, the experimental results have shown that the addition of fertilisers have significantly contributed to the reduction in nursery period by one year in relation to our planting season along with the maximum availability of transplantable or buddable seedlings in 10 months period from the date of sowing. From this, one can see the economic advantage of manuring which almost eliminates the upkeep of nursery for another season, extending to more than

14 months. To achieve the objectives mentioned above, it is necessary to incorporate in the soil one tonne of compost or well rotted cattle manure and 200 kg of mineral rock phosphate per acre. Plants in the nursery are to be manured with 8. 12: 10 NPK mixture at the rate of 1000 to 1400 kg per acre in two split applications. Fertiliser is applied in between rows and raked in with a hand rake.

(b) Immature Rubber in the Field at its the young rubber, during the pre-tapping stage, is for accelerating the growth. By suitable treatment, the immature period of rubber trees can be considerably reduced and this is an important contribution to the profitability of a plantation. Manuring of rubber during the immature period should be so regulated that a balanced growth results. To achieve this end, every planting hole is given 12 kg of compost or well rotted cattle manure and 225 gm of rock phosphate, while closing the pit just prior to planting. Afterwards, regular application of 8: 12: 12 NPK fertiliser mixture is recommended as detailed in the schedule given on next page.

Under average conditions, it may be noted that adopting the above schedule, it is possible to get the desired girth to commence tapping (22" at a height of 20" from soil level for seedlings; 20" at a height of 50" from bud union for buddings), within a period of 6 to 7 years against the usual period of 9 to 10 years with no application of fertilisers. Thus, reduction of 2 to 3 years in the immature period of rubber by fertiliser application should be considered economically advantageous.

Fertiliser Schedule-8: 12: 12 NDV Mixture

Months after trans- Time of anting into the field application		Dose plant with 180 plant points per acre (gm)	Rounded of quantity per acre				
Water State of the Control of the Co			Mixture (kg)		P <sub>2</sub> 0 <sub>6</sub> (kg.)	K <sub>2</sub> 0	
	months	September/Octobe	r 225	40	3.2	4.8	4.8
9	"	March/April	225	40	3.2	4.8	4.8
15	11	September/October	450	80	6.4	9.6	9.6
21	33	March/April	450	80	6.4	9.6	9.6
27	2.5	September/October	450	80	6:4	9.6	9.6
33	**	March/April	550	100	8.0	12-0	12.0
39	"	September/October	550	100	8.0	12.0	12.0
45	.,,	March/April	680	120	9.6	14-4	14.4
51	29	September/October	680	120	9.6	14-4	14.4
57	"	March/April	910	160	12.8	19.2	19.2
63	33	September/October	910	160	12.8	19.2	19.2
69	"	March/April	910	160	12.8	19.2	19-2
75	"	September/October	910	160	12.8	19.2	19-2
(UI	oto 75 mo into ti	nths from transplanti	ng 7900	1400	112.0	168.0	168.0

Note: The dose of 910 gm per planting point twice in a year may be continued till the area is put under tapping.

#### Mature Rubber under Tapping

Fertiliser treatment of rubber trees which are under tapping is designed to increase the productivity of the tree. Healthy and rapid renewal of the bark are vital problems in the rubber plantation and this depends very greatly on the nutrient supply. Therefore in any fertiliser schedule, the requirements of such mature and old trees for latex production, bark renewal and extensive annual dry matter production at its extremities, should be taken into consideration. the rate of girth increment is retarded while the canopy and roots continue to grow. During this period, if the balance between the stem and canopy is upset, susceptibility to wind damage increases. Manuring should be so adjusted that this balance is not upset. Application of a fertiliser mixture (8: 10: 12

at the rate of 320 kg per acre) may help to achieve this object. Here, it may be pointed out that a dose of 4 lb or 1.82 kg of the above mixture per tree in a progressively reducing stand of rubber, decreasing rate of manuring over a unit area is obtained, according to the tree stands, which may not give the desired result always. Therefore, it is suggested that while undertaking fertiliser programme for mature and old rubber with average and economic stand, the rate of fertiliser mixture application should be calculated on the basis of acre unit than on plant number.

#### Time and Method of Application

The yearly dosage recommended is preferably given in two split applications, one in March/May and another in September/ October. The March/May fertiliser application should be undertaken after the first few pre-monsoon showers and before the outbreak of the monsoon, thus giving an interval of 4 to 5 weeks of light showers between fertiliser application and the regular monsoon rains. The September/October application should be timed to synchronise with the usual break in the monsoon during this period.

For the first three years, fertilisers may be applied around the base of each plant in annular bands to the extent of root development and lightly forked in. The forking in of fertilisers may not be necessary, wherever adequate mulching, to cover the applied fertilisers, is carried out.

From the fourth year onwards, application in annular bands may not be an effective method as the leguminous ground covers would have grown and spread by this time and these would be badly disturbed by circular band application. Therefore, broadcasting the fertiliser in square or rectangular patches in between rows, each patch serving four plant positions, appears to be advantageous and economical. The fertilisers thus applied may be lightly forked in wherever the ground is exposed, without proper cover.

#### Conclusion

NP and K factorial long-term experiments on young rubber trees, numbering four,

being run at different locations, have once again demonstrated the importance of manuring rubber for shortening the immature period. From the general trend of the data collected so far, it may be pointed out that the increase in girth of rubber trees appears to be associated with the application of phosphatic fertilisers. In most locations, linear response was obtained for applied nitrogen (maximum level 60 lb/acre) and phosphoric acid (maximum level 80 lb/acre) and a quadratic response to the potash for a maximum level of 80 lb per acre. Therefore, in due course, the results from the existing and new field experiments properly correlated with soil test crop data, may give us still more precise basis for formulating fertiliser schedule for rubber grown in Southern India.

Although the fertiliser mixtures recommended provide a wide range for the requirements of rubber grown in our country, there are certain areas which may still be in need of special fertiliser mixtures. This may be indicated by the results of soil and plant analyses, and wherever there are such problems, the Rubber Research Institute will willingly investigate and assist to find suitable remedial measures for the problem pockets of any rubber estate or holding.

res 2

Soil differences occur, in varying degrees and sampling sites should be selected in each of the main soil types that can easily be detected by eye. No hard and fast rules can be given for the best manner of soil sampling. Some general procedures, however, are given below for proper soil sampling.

- 1. Sample each block separately. When areas within a field differ distinctly in growth, cover crops, intercrops, in the appearance of the soils, in elevation or are known to have been manured differently, sample each block separately.
- 2. Take composite samples. Select at random 10 spots in each block. After removing the surface litter and mulch, dig pit using a spade or a suitable tool up to 24 inches. Remove all the earth from the pit, cut a vertical slice of soil about one to two inches thick by means of a sharp-edged tool from top to 12 inches and 12-24 inches collecting sample from each depth separately. Mix samples of the same depth from the particular block and take representative one pound samples for two depths.
- Avoid sampling unusual areas. Do not sample road margins, labour line sites, cattle shed neighbourhoods, areas recently fertilised, old bunds, marshy spots, very near trees or stumps, compost piles or other nonrepresentative locations.
- Dry the sample under shade and pack it in clean cloth bags and never in manure contaminated gunny or alkathene bags.
- 5. Label each sample with the following particulars:

Give identification or Block no.

Depth of sampling.

Date of collection.

\*ed for
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\*cs

Put one label inside and tag another one on the bag. Write the label with pencil and never in ink.

#### Note:

- 1. Complete information regarding the crop and field should accompany each sample. The value of soil analysis depends entirely on the soil sample, the true representative nature of which is most important if conclusions drawn from its analysis are to be applicable to the whole area about which advice is sought.
- 2. All enquiries should be addressed to the Director, Rubber Research Institute of India, Rubber Board, Kottayam—9.
- 3. The analyses are undertaken free of cost.

#### Case History Sheet of the Sampled Area/Estate

- 1. Name of the estate with postal address.
- 2. Name of the block sampled along with area in acres.
- 3. Sample No.
- 4. Depth of sampling: 0-12"/12-24".
- 5. Date of sampling.
- 6. Planting material used with spacing.
- 7. Age of the tree in the sampled area.
  - Average girth of the trees in the sampled areas. In the case of seedlings the girth at the height of 20" from the base and for buddings the girth at 50" from the bud-union may be given.

(contd. on page 34)

# pre-mony break owth Performance of fellonal Seedling Families Under Test on Estates

V. K. Bhaskaran Nair\*

#### Introduction

Six clonal seedling families obtained locally were planted in 1954 with the object of testing their performance in different agro-climatic zones of Kerala. They are derived from monoclonal and polyclonal blocks of the older clones (illegitimate sorted for mother tree type). The vegetative representatives of these older clones are widely planted in this country and their suitability as a planting material is more or less known. On the contrary their seedling progeny with the exception of Tjir 1 is normally not recommended for large scale planting as we have no proof of their performance, even though timited plantings with similar materials are available in this country. The early yield records and other results of the clonal seedling families trial undertaken by the Board is now becoming available. It is felt that a critical study of the above may help a great deal in elucidating the comparative merits of the different seedling progeny for planting on a commercial scale. A further object contemplated in this study is the choice of parents in selection work. However, an attempt is made in this short paper to outline the

recorded performance of the different seedling families in relation to their vigour measured in terms of stem girth during the immature period.

# The Material Under Test

In the groups of clonal seedling families that are being tested there are about six families.

Tjirandji 1 (Tjir 1) Hillcroft 55 (H C 55) Prang Besar 86 (P B 86) Pilmoor B 84 (Pil B 84) Bodjong Datar 5 (B D 5) Bodjong Datar 10 (B D 10)

Tjir I seedlings used in the trial in all the estates may be taken as control as the legitimate seedlings of Tjir I have been long recomended for large scale planting (on commercial scale).

However in this case the seed is sorted for mother tree type only.

#### Location of Trial

Three estates situated in different agroclimatic zones of Kerala have been selected for testing the materials. They are:

<sup>\*</sup>Deputy Director (Botany), Rubber Research Institute of India, Rubber Board, Kottayam-9, Kerala.

- 1. Rajagiri Estate-Quilon district
- 2. Periyar Estate-Ernakulam district
- 3. Edivanna Estate-Kozhikode district

On two estates all six families have been planted, while in one estate only five families could be planted.

The experimental plots are of one half tapping task size. The initial stand proposed was as high as about 200 with a spacing approximating to  $20^{\circ} \times 10$ .

# Planting and General History

The planting was done in all the estates in 1954 and was carried out in one planting season. Out of the three cases two were replantings and one newplanting. Land preparation for planting was undertaken as per the local practice. Contour planting on steep slopes and rectangular or square planting on flat areas was undertaken. At the time when recording was started the stand was roughly over 160 per acre.

Co-operating Estates	District	Planting Re- or New	Topograph	
Rajagiri estate	Quilon	New	Steep	
Periyar estate	Ernakulam	Re	Flat	
Edivanna estate	Kozhikode	Re	Flat	

Seedling stumps, 21 months old, were planted on all the estates, the diameter of the seedling at the collar being 1". All the three estates belonged to big companies and therefore it was expected that husbandry would be available at the appropriate time.

# Recording and Records

Basically planting material is selected for its yield which should be considered as its primary character. Vegetative characteristics though important are termed secondary. The growth attribute which has been summarised in this paper is mainly the girth increment of the plants during the immature period, since vigour of various planting materials of Heyea has been defined in terms of comparative girth increment. This is because the relative time taken by the different plants to reach tappable size is one of the most important criterions in the commercial exploitation of Heyea.

Girth measurements have been recorded at 50° height from the ground annually from he second year of planting. The girth records taken from the three estates for the period covering the immature period of the plants have been statistically analysed. The analysis of variances has revealed significant differences in certain clonal seedling families.

#### Daiogiri Fotate

	Obs: 114 101 66 97 93 coord- an in 21.69 21.21 21.06 18.23 18.16				
Varieties No of Obs:					
1960 record- ing-mean in inches	21.69	21.21	21.06	18.23	18.16
Standard error of the means in inches		0.218	0.34	0.278	0.282

In Rajagiri estate there is no significant difference in the girth measurements of the varieties BD 10, BD 5, and Tjir 1. These three can be considered as superior to Pil B 84 and PB 86, since each of them is significantly different from Pil B 84 and PB 86. It may therefore be concluded that BD 10, in Rajagiri estate ranks first along with BD 5 and Tjir 1,

#### Periyar Estate

 Varieties
 BD 10
 BD 5
 Fill B 84
 HC 55
 PB 86
 Tijir 1

 No. of Obs.
 75
 72
 78
 88
 80
 62

 1960
 recording mean in inches
 21.11
 20.29
 20.10
 19.80
 19.26
 18.95

 Standard error of the means in inches
 0 323
 0.361
 0.334
 0.319
 0.320
 0.498

In Periyar estate there is no significant difference in the girth measurements due to the treatment BD 10 and BD 5 since the girth measurements due to BD 10 are significantly different from the girth measurements of Pil B 84 or H C 55 whereas there is ments due to the varieties BD 5, Pil B 84 and HC 55. In a similar way BD 5 can be classified as the second best since the girth measurements due to BD 5 are significantly different from girth measurements due to the varieties PB 86 and Tjir 1 whereas the varieties Pil B 84 or HC 55, PB 86 and Tjir 1 are all not significantly different among themselves. It may therefore be concluded that in Periyar estate the performance of BD 10 seedlings ranks first and

#### Edivanna Estate

		Luivan	He List	ate		
Variety	BD 10	Pil B 84	HC 55	BD 5	Tjir 1	PB 86
No. of Obs.	91	98	84	97	84	86
1960 recording mean in inches	18.31	18.20	18.13	17.79	17.20	16,98
Standard error of the means						

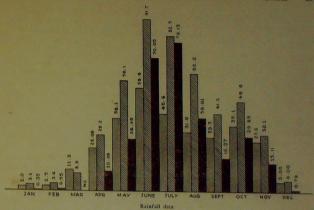
in inches 0,246 0,227 0,233 0,267 0,260 0,303

In Edivanna estate there is no significant difference in the girth measurements due to the treatment BD10, Pil B 84, and HC 55 and BD 5. However BD 10, Pil B 84 and HC 55 can be considered as superior to BD 5 since the girth measurements of BD 10, PilB 84, and HC 55 are significantly different from the girth measurements of Tjir 1 and PB 86 whereas BD 5 is not significantly different from Tjir I. Similarly BD 5 can be considered as superior to Tjir 1 since the girth measurement due to BD 5 is significantly different from PB 86 whereas Tjir 1 is not significantly different from PB 86. It may therefore be concluded that BD 10 in Edivanna estate ranks first along with Pil B 84 and HC 55.

Thus BD 10 seedlings rank first in girth measurement in all the three estates. PB 86 seedlings are found poor growers in all the three estates. The rate of girthing of Tjir I seedlings is also poor when compared with BD 10 and BD 5.

### Comparison of Growth on Different Estates

It is to be recorded that planting in all the three places was carried out simultaneously and the materials used were similar in origin. Still it is significant to note that the growth rate at one estate (Edivanna) has been comparatively slow in the case of all the clonal families. This may be attributed to factors like soil difference, climate variations and difference in cultural practices. It may be stated that the soil type in all the three estates is lateritic, and a reasonable standard of maintenance in



agreement with estate practices is expected from the collaborating plantations. No other exhaustive studies could be made on these factors. However, the rainfall data collected from these three estates covering the immature periods of the planting (1954-1960) reveal the following.

Rainfall Figures Average for 7 Years 1954-1960 in cms

	Rajagiri Estate (Mid. Travancore)	Periyar Estate (N. Tra- vancore)	Edivanna Estate (Malabar)
January	2.0	3.1	0.35
February	2.5	3.6	0.55
March	11.3	8.9	Nil
April	22.06	29.2	10.08
May	38.1	58.1	26.35
June	55.8	91.7	70.05
July	40.6	82.5	79.13
August	31.6	62.2	38.61

September 29.3 41.0 16.27 October 35.1 48.6 29.25 November 27.6 30.1 15.11 December 5.0 6.0 0.79 Total 300.96 465.0 286.56

In the total receipt of rainfall the first and third estate are more or less similar, while in the second estate the annual precipitation is much higher. But in the pattern of distribution of rainfall the third estate is singled out from the other two in as much as the climate there is marked by a heavy rainfall season of about six months, alternating with prolonged drought period of an equal duration. This seasonal variation is less pronounced in the other two estates. Correlating this factor with the slow rate of growth of the plants at Edivanna it may be safe to conclude that one of the important (continued or page 31)



Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, addressing the 71st UPASI Conference

#### Mr President and friends

I thank you very much for giving me an opportunity to meet you and speak to you on the problems of the rubber plantation industry. I am particularly grateful for having been given this opportunity as this is the first occasion I am speaking to a conference of the UPASI, since I took over charge in July last. I must also thank the UPASI for giving me an idea of the points relating to the rubber plantation industry in which the members of the UPASI are interested. Before, however, I come to the specific points, I would like to give a brief resume of the present state of the industry and the progress of the schemes implemented by the Rubber Board.

#### Area Under Rubber

The area under rubber has increased to 3.78 lakh acres by the end of 1963-64 showing an increase of 5 per cent over the preceding year's area. The total number of holdings of 50 acres and below in extent increased from 66,000 to 70,000 and their acreage from 2.21 lakh acres to 2.34 lakh acres. The number of estates above 50

# Present State of the Rubber Industry\*

P. S. Habeeb Mohamed \*\*

acres has risen from 600 to 618 and their acreage from 1.40 lakh acres to 1.44 lakh acres. It will be noticed that the increase in acreage has taken place mostly in the non-corporate sector of the industry and especially in the small holding sector.

#### Production

The trend in increase of production of natural rubber is being maintained. The total production during 1963-64 has been of the order of 37,487 tonnes showing an increase of 16 per cent over the previous year's production. The current year's production is estimated at 46,000 tonnes.

#### Demand

The demand for rubber in India is increasing at a much faster pace than the production of the natural rubber industry. The total consumption of natural and synthetic rubbers in the country in 1963-64 had been 73,114 tonnes of which 61,155 tonnes were natural rubber and 11,959

<sup>\*</sup> Speech delivered at the 71st UPASI conference held at Coonoor on 1st September, 1964.

<sup>\*\*</sup> Chairman, Rubber Board.

tonnes synthetic rubber. A total quantity of 26,275 tonnes of natural rubber and 9,000 tonnes of synthetic rubber was imported into the country to meet the growing demand and though the production of natural rubber continues to rise, the indigenous production by itself will not be able to meet the rapidly increasing demand. By 1970-71 the demand is estimated to increase to 167,000 tonnes while the domestic production of natural rubber may reach 62,000 tonnes and therefore a considerable gap will exist between the production and consumption of natural rubber and this will have to be filled up by imports of natural and synthetic rubber from abroad and by the indigenous production of synthetic rubber.

One synthetic plant with a capacity of 30,000 tonnes has already been established in the country to manufacture SB rubber. A second plant is likely to be set up by 1968, by which time the demand for rubber is expected to increase to 148,000 tonnes. Even if both these synthetic plants are in full production in 1968, the gap between the total demand for rubber and the production of synthetic rubber will be 93,000 tonnes, whereas the domestic production of natural rubber may be only 57,000 tonnes. There is no need to get concerned about the market for natural rubber in the country in the near future.

#### Future Prospects

I have explained the supply and demand position of rubber in some detail because there is a widespread apprehension among natural rubber producers about the future prospects of the industry.

Firstly, as I said earlier, the rubber manufacturing industry in India is developing and

expanding at a rapid pace with the consequent increase in demand for raw rubber. So, the marketing of natural rubber produced in the country would not pose a problem.

Secondly, the price of synthetic rubber at present produced in the country is much higher than that of natural rubber and is unlikely to come down in the near future. The SBR produced by the Synthetics and Chemicals Ltd. is now being sold at about Rs. 4 per kilogram, whereas the minimum price, exclusive of cess, fixed for natural rubber produced in the country for Group I is only Rs. 3.23. This shows that with regard to price, the synthetic rubber produced in the country will not be in a position to offer direct or immediate competition to natural rubber.

Though synthetic rubber can be used in the manufacture of a variety of articles, the demand for natural rubber as a general purpose rubber will continue to last, and there are still many fields where synthetic rubber is not able to replace it.

But even though there may not be any immediate threat to the natural rubber producing industry from synthetic rubber, it would be advisable on the part of natural rubber producers to be alert and not to ignore the likely impact of synthetic rubber on natural rubber in the long run. The International Rubber Study Group, at its 17th meeting held in Tokyo last May, expressed the opinion that there was every prospect of increasingly severe competition between natural and synthetic rubbers. But the Group had no doubt that an efficient producer of natural rubber could compete with (contd. on page 29)

No. 1]

# Meeting of the International



The Sixth General Assembly of the Inter-national Organisation for Standardisation met at Vijnan Bhavan in New Delhi from on the countries participated in this Assembly. Problems of vital interest to international trade and commerce were discussed at

this conference to find out ways and means of promoting co-operation in the sphere of intellectual, scientific. technological and economic activity.

The Indian Standards Institution played host to the delegates from

# 150/TC 45-Rubber

The ISO Rubber Technical Committee (ISO/TC 45-Rubber) which started its work in 1948 with its Secretariat resting with U. K., has so far held 11 meetings and published as many as 19 Recommendations covering methods of sampling and and natural, vulcanized and synthetic

The 12th meeting of the ISO/IC 45 was held at Delhi from 14th to 21st November along with the following Working Groups:



Mr. J. E. Morris with Dr. N. H. Sivaramakrishnan and Shri A. K. Rajapadmanabhan

Working group A-Chemical tests Working group B-Latex

Working group C-Natural rubber

Working group D-Physical proper-

Working group E-Visco-elastic

Elastomers Working group F-Degradation tests

Working group J-Classification of Vulcanised Rubber

# rganisation for Standardisation

Dr. N. H. Sivaramakrishnan, Deputy Director (Chemistry/Rubber Technoogy), Rubber Research Institute of ndia, who was a member of the Indian delegation and also leader of the Indian delegation for the Working groups A and B of ISO/IC—45 and Shri A. K. Rajapadmanabhan, Deputy Rubber Production Commissioner, who was a member of the Ratural Rubber Task Group, represented the Rubber Board in the ISO/IC—45 meetings.

# Statement of Results of the 12th Meeting of the ISO/TC-45 Rubber

57 delegates from 12 countries participated in the meeting. Observers were present from the International Rubber Research and Development Board. The Committee primarily concerned itself with methods of lesting latex, raw rubber and



Mr. Poulton (U. K.), Prof. e Group and Dr. N. H. en (acing the camera)

vi canized rubber, both natural and synthetic. Additionally work was commenced in connection with specifications for natural rubber and a Task Group specially constituted to deal with this problem laid the pattern for such specifications.

Altogether, 13 draft ISO Recommendations were approved for submission to ISO Council, eight of these being concerned with testing latex and five with the mechanical testing of rubber, Additionally, one Draft



Shri Manubhai Shah, Minister of Commerce, being met by Shri A. K. Rajapadmanabhan at the Rubber Board's stall.

Proposal for latex testing was approved as a Draft ISO Recommendation.

In connection with the methods of test which were in an earlier stage of preparation, eight chemical methods, two latex methods and two mechanical methods were approved for circulation to the member bodies of the Technical Committee as



Shri A. M. Thomas, Minister of State for Defence Production at the Rubber Board's stall.

#### ISO Draft Proposals

The Working Group which had been entrusted with the preparation of a classification for natural rubber has also submitted a draft which has been approved for circulation as a ISO Draft Proposal.

The Committee expressed their appreciation of the very excellent arrangements which had been made by their Indian hosts for the meetings of the Technical Committee and its Working Groups which were held in conjunction with the Sixth General Assembly of the International Organisation for Standardization (ISO). They also extended their warmest thanks to the Indian Standards Institution and all others concerned for the very lavish and enjoyable hospitality which had been offered.

## Technical Seminar Organised by IRMRA

In connection with the meeting of the ISO/TC 45-Rubber, the Indian Rubber Manufacturers' Research Association organised a Technical Seminar at the India International Centre, Delhi, on 12th and 13th November, 1964

Prof. Humayun Kabir, Union Minister for Petroleum and Chemicals, inaugurated the seminar on the 12th. Nearly 20 papers on raw materials, testing, evaluation and standardisation in the rubber industry were presented. Foreign delegates from Germany, Holland, Malaya, U. K. and U. S. A. also participated.

Dr. A. Seetharamaiah, Industrial Advisor, Directorate General of Technical Development and Prof. S. R. Palit, Professor and Head of the Department of Physical Chemistry, Indian Association for the Cultivation of Science, Calcutta, acted as Chairman on 12th and 13th respectively. Dr. L. Bateman, Controller of Research and Chairman of the Malayan Rubber Fund Board and Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, gave lectures on the improvements in the plantation industry in Malaya and India respectively.

Shri P.S. Habeeb Mohamed, in his speech, laid stress on the co-operation that is being extended by the Rubber Board to the Rubber Manufacturing Industry in India.

Dr. N. H. Sivaramakrishnan, Deputy Director, Rubber Research Institute of India, presented a paper on the probable improvements in collection, processing, smoking etc. of natural rubber.

Under the auspices of the IRMRA, an exhibition of rubber products manufactured in India was arranged from 18th to 26th November at Asaf Ali Road, New Delhi. The Rubber Board had put up a stall in the exhibition wherein the salient features of the Rubber Plantation Industry had been portrayed with the aid of suitable posters, charts, panels, paintings and models.

Shri Manubhai Shah, Union Minister of Commerce, inaugurated the exhibition. Those who witnessed the exhibition included all foreign delegates who had come for the ISO Meeting and the general public.

The position of natural rubber producers in India vis-a-vis the producers in other countries may also be mentioned here. In-Malaya and Ceylon, the natural rubber producers have to sell their products in a competitive world market. In those countries, practically there is no internal market for natural rubber. The price of their product meets with violent fluctuations frequently. The present price of top grade natural rubber in Singapore is Rs. 119.17 per 50 kg. The Colombo price of similar grade and quantity is only Rs. 110.87. You will note from these facts that our price is higher by Rs. 42 to 51 per 50 kg. We should utilise to the utmost, the comparatively favourable situation in which our industry is placed,

to modernise it at the earliest. The challenge of synthetics has come to stay. In the face of the challenge, it behoves us to increase the production and reduce the cost of production.

This can be done by replanting with high yielding material, and bringing science to the aid of rubber cultivation. We should strengthen the advisory services of the Board. So far as small holders are concerned, finances would not be a serious problem. The future definitely belongs to a producer of natural rubber but the distant future belongs to an efficient producer of natural rubber. We should, therefore, take up our activities on the right spirit.

#### (contd. from page 25)

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The Development and Trade Committee of the International Rubber Study Group observed that the vitality of natural rubber is evident and its future assured provided

the producers continue their efforts by reducing production costs through rejuvenation programmes in both estates and small holdings through more systematic manuring and yield stimulation and through exploitation of fundamental research.

#### Replanting Programme

The problem facing the natural rubber industry in India is how it could replant low yielding old areas with high yielding planting material within the minimum possible time. Of the total area of 378,000 acres under rubber in our country, about 57 per cent is planted with ordinary seedlings. It is desirable that the whole of this area is replanted with high yielding planting material during the next few years on a phased programme. The yield from ordinary seedlings even under ideal conditions seldom goes beyond 500 lb per acre, while with the

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high yielding planting material available here at present it is not difficult to reach an average yield of 1,500 lb per acre.

The present Replanting Subsidy Scheme is intended to assist planters of rubbet to effect replanting with approved planting materials on areas planted with low yielding unselected rubber in or prior to 1956 and registered with the Board prior to April, 1958. It must be admitted that the progress of the Replanting Subsidy Scheme has not been as good as expected. The areas replanted under the Subsidy Scheme would be only of the order of 35,000 acres from 1957 to 1964. The immensity of the problem can be understood when it is known that the area requiring replanting would be of the order of 142,400 acres.

We are grateful to the UPASI for having studied the problem of rubber replanting in improving the organisational set up and the detailed implementation of the scheme in one of their memoranda. It can now be said with confidence that the programme of replanting has been put on a firm basis with a separate development organisation under the Board in charge of a Development Officer. This is a distinct organisation and entrusted with the work of carrying out the replanting programmes, under the supervision of the Board and separate from the Research and Extension Wings. We have to this extent partially met one of the important suggestions given by the UPASI for strengthening the organisation for carrying out the replanting programme. The extension staff required for carrying out the message of replanting is also being suitably strengthened.

Some of the reasons for the earlier slow progress of the Replanting Scheme were mentioned in the speech by my predecessor during the Seventieth UPASI Annual Conference. They were, the unattractive subsidy in small holdings and reluctance of the small holders to replant, non-availability of good delays in completing the inspection and making payments. The slow progress in the implementation of the scheme had attracted the notice of the Board and it had appointed a committee to go into the entire question and suggest concrete measures to step up the tempo of replanting. The present rules are being liberalised in the light of the recommendations of the committee. The fixation of targets for estates and small holdings, apart from the question of fixing the annual targets for the rubber plantation industry for replanting has not met with the desired success. However, it must be said that the programme is now gathering momentum and from 1965 onwards the target fixed for each year is likely to be exceeded. This year the Board has received applications for replanting 8,788 acres which is slightly lower than the target fixed for the year.

## Other Schemes

The following schemes are financed from the Pool Fund:

#### (1) Supply of Fertilisers at Half Cost

Upto August, 1964, about Rs. 6 lakhs have been disbursed. Half of the amount is being recovered. The benefit of the scheme is at present confined to small holders owning 10 acres and below who are replanting under the Subsidy Scheme.

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#### (2) Newplanting Loan Scheme

The scheme is applicable to all small holders owning less than 15 acres to increase the area from 5 acres upto 15 acres. The loan instalments so far disbursed amount to about Rs. 76,000.

### (3) Upkeep of Immature Area Loan Scheme

This is applicable to small holders owning less than 15 acres for upkeep of the immature area planted with high yielding material.

#### (4) Soil Conservation and Reimbursement of Cost of Seeds

These are applicable to small holders owning 10 acres and below and who have

replanted under the Subsidy Scheme. The amount disbursed so far is about Rs. 15,000.

#### (5) Subsidy for Purchasing Copper Sulphate

This is applicable to all small holders. 25 per cent of the cost is given as subsidy. The scheme was initiated only during this year.

# Marketing

Marketing is a very important aspect on which more attention will have to be given. The big problem is concerning standardisation of natural rubber. I would like to quote from the speech of Dr. Bateman (Controller of Rubber Research, Malayan Rubber Fund Board) at the Annual Meeting of the International Institute of Synthetic

#### (contd. from page 23)

considerations for successful rubber planting, besides the actual quantity of rain, is the absence of prolonged dry periods. The shorter the dry season the better, as otherwise initial growth is retarded.

# Summary and Conclusion

The clonal seedling families trial in estates is examined. Their vegetative characteristics in relation to annual girth increase recorded for the immature period has been discussed. Significant differences have been noticed in certain clonal seedling families in the rate of girth increase.

There is around to believe that different climatic zones, chiefly the rainfall pattern of the given areas, have a modifying influence on the growth of the planting materials in general.

#### Acknowledgement

The author is indebted to late Shri K. N. Kaimal and to Shri K. M. Joseph for their active participation in this experimental work during the initial periods. Thanks are also due to Shri S. S. Swaminathan, the erst-while Statistical Officer, Rubber Board, for help in the analysis of the girth data. He is also grateful to Dr. K. T. Jacob, Director, R. R. I. I., for necessary help in the preparation of this manuscript. The different estate managements are also thanked without whose co-operation it would not have been possible to accomplish this work.

#### References

Rubber Board Half-yearly Report 1963-64 Burkill, H. M., 1953

Performance of clones and clonal seedling families in large scale experiments on estates, Archief voor de Rubber Culture, Mei 1953, p. 107.

Rubber Producers; "Suffice to say that in an age of progressive technical rationalisation in industry, including the rubber manufacturing industry, the quality assessment of natural rubber remains an art not a science." The Development and Trade Committee of the International Rubber Study Group also recommended that the producers should improve technical quality of their production through simplification of the grading system, through better control of cleanliness and uniformity of the products, through improved methods of packing and presentation and through strengthening of technical contacts with manufacturers.

in other countries in the development of the presentation of natural rubber. It is understood that the Rubber Research Institute of Malaya has started a Pilot Plant to develop rubber in a new form which enable it to be classified according to technical instead of visual properties. The Malayan Institute is also working on a practicable technical specification of rubber and secondly on a new method of preparing general purpose natural rubber in crumb form that could be dried quickly etc. These experiments could be of use to us. The sampling, physical and chemical testing and grading of rubber is a matter which has now been taken up by the Rubber Board in close co-operation with the I. S. I.

The Rubber Board has already implemented certain schemes to improve the quality of rubber, particularly in the case of production by small growers and also its marketing. It is financing from the Pool Fund a scheme of subsidy for the construction of smoke houses by co-operatives and about Rs. 27,000 has already been disbursed to co-operative societies as subsidy for the

construction of smoke houses. From reports received, the scheme has been of benefit to the small growers.

There is also another scheme financed from the Pool Fund, of financing the cooperative marketing societies. It may be remembered that the Plantation Enquiry Commission had recommended in 1956 that steps should be taken to form multi-purpose co-operatives for the benefit of small growers. The Tariff Commission in its report on the revision of raw rubber prices in 1960 had also suggested that there is of rubber. In consultation with the Registrar of Co-operative Societies of the States the Board is now implementing a amount of Rs. 120,000 has been disbursed so far to four co-operative societies as working capital. The results reported so far are

#### Finances

Members are already aware that the Government of India have set up a Committee to go into the finances of the Tea The financing of the rubber plantation industry is a matter which requires careful thought and study. The consultation with the Agricultural Refinance Corporation and the State Land Mortgage Banks. The Agricultural Refinance Corporation have since issued a scheme for financial accommodation for the plantation industries from the Corporation and is proposing to hold a conference of all interested scheduled banks to explain their role in financing agriculture and to discuss (contd. on page 41)

# NEWS AND NOTES

# Inauguration of Smoke Houses

#### Karikkattoor

Declaring open the rubber smoke house constructed by the Karikkattoor Multipurpose Co-operative Society at Karikkattoor, on 12-9-'64, Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, appealed to rubber growers to organise themselves on co-operative basis. If the growers unite at village levels, he added, the Board would consider implementing all the development schemes through such representative organisations, which ultimately would be of great administrative advantage to the Board.



Shri P. S. Habeeb Mohamed, Chairman, Rubber Board,

Shri K. V. Thomas, Vice-Chairman, Rubber Board, presided over the function and Shri K. E. Dominic spoke on the occasion.

The Society received a sum of Rs. 5000 from the Board towards subsidy for the construction of the smoke house.

#### Thirumarayoor

The Thirumarayoor Service Co-operative Bank has constructed a smoke house with subsidy from the Board, at Thirumarayoor. The formal inauguration of this smoke house was done by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, on 30-9-1964 at a simple function held at Thirumarayoor. Speaking on the occasion, the Chairman expressed apprehension at the increasing feeling of dependance found among rubber growers. He added, that unless the latent abilities inherent in human beings are encouraged, guided in the proper direction. and pooled together, many a problem confronting the rubber growers will remain unsolved. Rubber growers, he exhorted, should think in this direction and make self-help efficient.

Shri K. Madhava Marar, Manager, Ernakulam District Co-operative Bank presided over the function and Shri P. V. V. Iyer spoke on the occasion.

#### Edamon

Declaring open the smoke house constructed at Edamon by the Edamon Service Co-operative Society, Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, said that modernisation of rubber cultivation has become imperative and that the growers should bestow more attention on this. The



Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, lighting a bhadradeepam to mark the opening of the

Rubber Board, he added, was prepared to help growers to any extent in their task. The unorganised and inefficient producer, the Chairman stressed, is posing the biggest threat to natural rubber than any synthetic polymer. Rubber, the Chairman said, had an expanding domestic market in India

(contd. from page 19)

- 9. Elevation above mean sea level.
- 10. Rainfall—Average for last 5 years.
- 11. Slope-Level/Gentle/Medium/Steep.
- 12. Cover crops:
  - Pure—Pueraria-Calopogonium

    Centrosema—Desmodium.
  - 2 Mixture
  - 3. Others
- 13. Previous history of the sampled area.
- 14. Manuring history:

(Here state the rubber mixtures used specifying the various ingredients and composition and quantity applied per tree or per acre etc., for the past 3 seasons)

and the growers should utilise this favourable situation to the best of their advantage.

Shri T. V. Thomas presided over the meeting and Shri P. M. Joseph, President of the Society, welcomed the gathering. Messrs. P. L. Sebastian, T. K. Kuruvilla, T. N. V. Bhattathiripad, M. Thomas and K. Pappu spoke on the occasion. Shri Kuttan Pillai proposed a vote of thanks.

The Edamon Service Co-operative Society was given a subsidy of Rs. 5000 for the construction of this smoke house.

# Trivandrum Rubber Marketing Societu

Addressing the general body meeting of the Trivandrum District Rubber Growers' Co-operative Society at Mascot Hotel, Trivandrum, on 28-9-'64 the Chairman, Rubber Board, advised rubber growers to lay more stress on improving the quality of

- 15. Time of application: April—May, September—October.
- Tapping system adopted with average yield for the past 3 years, with initial tapping height.
- Please state whether the sampled field is with rubber or mixed with coconut, arecanut or inter-cultivated with tapioca, banana, etc.
- 18. Stand per acre.
- 19. Protective measures adopted against diseases.
- 20. Any other information.

Place :

ate.

their produce by resorting to scientific processing methods. The processing and marketing aspect of the natural rubber industry, he said, had to improve considerably.

Stressing the necessity for growers' unions, he said, in future the Board proposed to execute all its developmental activities through co-operatives. He requested the growers' organisations to come forward with definite programmes for the development of rubber cultivation for which he was prepared to give preference.

Dr. V. R. Narayanan Nair welcomed the gathering.

### Delegation to Andamans

A six member delegation headed by Dr. K. T. Jacob, Director, Rubber Research Institute of India, visited Andaman and Nicobar islands in September, 1964, to explore the possibilities of taking up rubber cultivation in this centrally administered



Members of the delegation at the Cochin airport

territory. The delegation included Messrs. A. K. Rajapadmanabhan, Deputy Rubber Production Commissioner, P. P. Cherian, Assistant Development Officer, P. Mukundan Menon, Field Officer (Officers of the Board) and Messrs. George John, Ancheril and Chacko Kallivayalil (Planters).

The team surveyed several places in south Andamans and some of the surrounding islands like Rutland. Neill & Kidel, with a view to selecting a suitable site to start a pilot project and also to assess the area that can be brought under rubber plantations, especially those areas not surveyed by the previous delegation (the Board had sent another delegation to Andamans in 1962). Three sites have been tentatively selected for starting the project in a phased manner. Initialy an area of about 500 acres is expected to be made available to the Rubber Board at Ferror Gunj, 18 miles away from Port Blair in S. Andamans. Shri P. Mukundan Menon is staying back at Andamans to take over charge of the land to take necessary steps for raising a nursery there.

From the data and records available as a result of the "on the spot study", the delegation feels that there is good scope for establishment of rubber plantation in the island.

# **Upasi Exhibition**

The Rubber Board participated in the 71st Annual Conference and Exhibition of UPASI held at Coonoor from 31st August to 2nd September, 1964.

At the scientific conference held on 31-8-1964, Shri K. C. Ananth, Deputy

Director (Agronomy), Rubber Research Institute of India, read a paper on 'Manuring of rubber' (reproduced elsewhere in this issue).

On 1-9-1964, addressing the general session of the UPASI, Shri C. Subramoniam, Union Minister for Food and Agriculture, suggested that to evolve uniformity in the principles of taxation of plantations, the UPSAI with the help of the Union Finance Minister could convene a meeting of State Finance Ministers.

Mr. J. R. Henshaw, the outgoing President of UPASI, while welcoming the Union Minister expressed the opinion that the Government's desire to see an increase in production and exports must be matched by a willingness on its part to modify fiscal, land and labour policies as well as administrative procedures to suit the purpose. Mr. Henshaw extended a special welcome to the new Chairman of the Rubber Board, Shri P. S. Habeeb Mohamed.

In the afternoon Shri S. V. Ramaswamy, Union Deputy Minister of Commerce, addressing the general session stressed the point that out of the world's total production of natural rubber of 2-3 million tons, India produced only 37,200 tons in 1963. which is only 1.78 per cent of the total of world production. But in 1965-66, the minister said, it was hoped to produce 50,000 tons of natural rubber and by the end of the 4th plan 72,000 tons. It was also proposed, he added, to replant 10,000 acres every year. Of these, 3000 acres would be by small growers. Financial assistance was being given to rubber growers as subsidy for replanting, the minister added.



The panels exhibited at the UPASI Exhibition by the Rubber Board

The minister, referring to his recent visit to the Rubber Board and Rubber Research Institute at Kottayam, expressed satisfaction at the good work that was being done by the Board and the Institute.

Shri A. S. Bam, Chairman, Tea Board, speaking after the minister, analysed the Tea situation in India and the various steps taken by the Tea Board to promote exports and to encourage planters.

Shri H. Seetharama Reddi, Chairman, Coffee Board, also spoke on the occasion. He dealt at length with the facilities made available by the Coffee Board for encouraging the Coffee Plantation Industry.

Shri P. S. Habeeb Mohamed, the new Chairman of the Rubber Board, speaking on the occasion, made an assessment of the present state of the Rubber Plantation Industry in the country. (The speech is published elsewhere in this issue).

A three day exhibition had also been arranged at Coonoor in the upper lawns of 'Glenview' in connection with the UPASI's annual conference. The Rubber Board had



Shri C. Subramaniam, Union Minister for Food and Agriculture, showed keen interest in the panels put up by the Rubber Board

put up three colourful panels depicting the various activities of the Board. The participants in the exhibition included Messrs FACT, Tea Board, Coffee Board, the French Trade Commission for South India and several other private organisations.

# Rubber Growers' Seminar at Ranni

A Seminar and Exhibition was held at Ranni on 10-10-1964 under the joint auspices of the Ranni BSS Unit and the Rubber Board.

Over 100 delegates participated in the Seminar. Declaring open the seminar in the morning Shri Habeeb Mohamed, Chairman, Rubber Board, stressed the necessity of resorting to intensive cultivation practices to increase production of natural rubber.

Shri Cyriac Pothen, Divisional Forest Officer, Ranni, presided and Shri K. S. Mathai welcomed the delegates.

Soon after the inaugural meeting, study classes on topics from planting to tapping

of rubber were conducted by experts of the Rubber Board.

# Science Exhibition at Kanjirappally

The Science Exhibition arranged at Kanjirappally from 12th to 18th October by the A. K. J. M. English Medium School there, had attracted a large number of people including rubber growers.

The Rubber Board had put up a small stall in this exhibition with a set of instructional posters. In addition to this there were 20 stalls, wherein very attractive exhibits had been displayed. The theme of the exhibition covered natural science, physics and chemistry.

Over 7000 people witnessed the exhibition though a gate fee of 20 P per head was charged by the organisers.

## Planters' Conference at Calicut

The Malabar Rubber Growers' Association convened a conference of rubber planters at the Calicut Beach Hotel on 27-10-1964 to discuss the scheme of the Agricultural Refinance Corporation to issue loans for large scale new planting of rubber.

Shri V. Sivaraman, Managing Director of the Corporation, while addressing the planters, explained the ARC's scheme in detail with special reference to the conditions stimulated.

Shri Habeeb Mohamed, Chairman, Rubber Board, speaking to planters on the occasion, explained in detail the present schemes of the Board. He added that the absence of such a scheme as contemplated by the A. R. C. had made the expansion of the area under rubber difficult. Paucity of

capital, the Chairman said, had been the main handicap for enthusiastic planters to of Police, Kerala, presided. Shri Olappamake use of the land available for rubber

Shri Joseph Jacob, member, Rubber-Board and Hon. Secretary of the Malabar-Rubber Growers' Association, in his welcome speech, drew pointed attention to many a problem confronting the natural

Shri K. C. Ninan presided.

On 29-10-1964, the Sub-Committee of the Rubber Board, appointed for expediting the implementation of the A R C's scheme met at the Tourist Bungalow and discussed the steps to be taken for executing the

# Palghat District Rubber Planters' Association

The Palghat District Rubber Planters' Association was formally inaugurated by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, on 10-11-1964, at a public meeting held at the V. P. P. High School,

Speaking on the occasion, Shri Habeeb Mohamed said that to expand the area under rubber in Kerala, new areas were available only in Malabar. The Board, he added. had chalked out a programme to make available the loan facilities of the Agricultural Refinance Corporation for large scale rubber planting and the Corporation had approved the scheme. The Chairman suggested that the planters' associations could play a vital

Shri M. Krishna Menon, Retired I. G. manna Subramanian Namboodiripad welcomed the gathering.

# Dy. Minister's Visit

Shri S. V. Ramaswamy, Union Deputy Minister of Commerce, visited the office of the Rubber Board and the Rubber Research Institute of India on the 26th August, 1964. The Minister went round the Research Laboratories and he evinced keen interest in the research work carried on there. The Minister also held discussions with the Chairman, members and officers of the Board about the problems of the rubber plantation industry in India.



# Meeting on Aerial Spraying of Rubber

A meeting was convened on 9th October 1964 at the conference hall of the Rubber Board for discussing aerial spraying of rubber for control of Phytophthora leaf fall.

The main objective was to bring together the various concerned interests, viz. planters, aerial spraying agencies and ground organisers, and fungicide and oil manufacturers, and co-ordinate their services so as to draw up a consolidated, comprehensive programme for aerial spraying of rubber. Messers K. V. Thomas and T. J. Joseph and representatives of Messrs, Harrisons & Crosfield, Travancore Rubber and Tea Company, A. V. George & Co., Malankara Rubber Produce Co., Cambata Aviation, Peirce Leslie & Co., Darragh, Smail & Co., Tata-Fison, Imperial Chemical Industries, Rallis India, Burmah Shell, Esso Standard Eastern and Indian Oil Co. participated. Sri P. S. Habeeb Mohamed, Chairman, Rubber Board, presided. Dr. K. T. Jacob, Director of Research and Sri K. V. George, Deputy Tirector (Pathology), Rubber Research

As a result of the deliberations, it was agreed that aerial spraying would be continued on roughly 40,000 to 45,000 acres during 1965 season, for which M/s. Cambata Aviation agreed to provide four helicopters. Bearing in view the necessity to keep down the cost of production of rubber, the Chairman stressed that every effort should be made to keep the cost of aerial spraying as low as possible. He appealed to the interests concerned, to make an earnest effort to explore the possibilities of reducing the charges for aerial spraying and if this was found to be absolutely impossible, then, at least to keep the cost at the present level. The representatives of the various firms appreciated the Chairman's view point and assured their fullest co-operation in not only making the necessary materials in time

but also in ensuring and maintaining high quality standards and a reasonable cost structure.

It was agreed that since this meeting, the first of its kind so far, had been so successful in fulfilling its objectives, that it should become an annual feature. It was decided to hold such conferences during October each year, so as to draw up the programme for the ensuing year. The necessity for conducting continued research to find out more effective and economic aerial spraying techniques was emphasized.

#### Visit of Mr. J. E. Morris

Mr. J. E. Morris, Advisory and Development Officer, Rubber Research Institute of Malaya, visited the Rubber Board and the Rubber Research Institute of India on the 25th November, 1964. He spoke at a conference of the technical staff of the Rubber Board in the forenoon.

Mr. Morris delivered a public lecture on "Some of the recent advances in the processing of natural rubber" at 3 p. m. on the same day at the A. V. George Hall, Y. M. C. A., Kottayam. Shri K. C. Sankaranarayanan, Managing Director, The Plantation Corporation of Kerala Ltd., who had been on a study tour of Malaya recently, also addressed the gathering on "Rubber plantation industry in Malaya." The public meeting was presided over by Shri K. V. Thomas. Shri P. S. Habeed Mohamed, Chairman, Rubber Board, welcomed the gathering and Dr. K. T. Jacob, Director, Rubber Research Institute of India, proposed a vote of thanks

A large number of rubber planters and other prominent persons connected with the industry had gathered to hear the lectures.



Mr. Morris delivering a public lecture at the Y. M. C. A.,

# Appointments

Shri R. Gangadharan Unni, Statistical Assistant, Rubber Board, has been appointed as Statistical Officer under the Board.

Shri S. Purushothama Baliga has been appointed as Cost Accountant under the Rubber Board.

Smt. V. Omana has been appointed as Comptist under the Rubber Board.

Shri M. R. Sethuraj has been appointed as Research Assistant (Agronomy/Plant Physiology) in the Rubber Research Institute of India, Rubber Board.

Shri M. Abdul Kalam has been appointed as Technical Assistant in the Rubber Research Institute of India, Rubber Board.

Shri K. Jayarathanam has been appointed as Research Assistant (Pathology/Entomology) in the Rubber Research Institute of India, Rubber Board.

Shri V. K. Bhaskaran Nair, Senior Research Assistant (Botany), Rubber Research Institute of India, has been appointed as Deputy Director (Botany), Rubber Research Institute of India, Rubber Board.

# Long Term Loans for Rubber Planting

The Agricultural Refinance Corporation. Bombay, has approved a scheme drawn up by the Rubber Board to extend long term loan facilities to rubber planters who cultivate rubber in an area of 15 acres or above. The loan scheme is intended to finance the first year cost of planting and also its upkeep and maintenance for the succeeding six years. The cost of planting rubber has been worked out to be Rs. 1,600 per acre for individuals and Rs. 2,100 for companies. The loan facilities under the scheme will be available to (1) those who new plant rubber in 15 acres or above, to whom the total cost of planting will be given as loan, (2) those who have already planted rubber in an area of 15 acres or the bearing stage. The loan will include instalments due for the remaining part of the pre-bearing period and also an amount As security for the loan, the land brought out therein, bank guarantees, Government will be accepted. During the first seven

The physical target fixed under the scheme is 50,000 acres in 5 years with 10,000 acres each year. The scheme is to start operation from 1964-65 and to end in 1978-79.

(contd. on page 42)

(contd. from page 32)

the problems to be encountered by them in utilising the facilities offered by the Refinance Corporation. It is felt that when the scheme is fully implemented, it will go a long way in relieving the strain of financial burden on the plantation industry.

The Rubber Board has formulated another scheme in consultation with the State Land Mortgage Banks and the State Governments for subsidising the major portion of the interest payable to the Land Mortgage Banks by the loances who avail of the loan facilities offered to the newplanters and small holders of rubber by the Banks. It must, however, be said that the details of the scheme are yet to be finalised and approved by the Government.

#### Taxation

The Board has been informed of the representations from the Associations of Planters to Government for giving relief in the matter of taxation. The general practice in such matters has been to advise the Associations to send their representation for tax relief etc. directly to the Government. There should, however, be no difficulty for the Board to pursue any reasonable proposal wherever necessary with Government.

#### Research & Extension

We have now strengthened the Research Wing of the Board and a very experienced officer has been appointed as Director of Research. We are re-organising the Rubber Research Institute attached to the Board. The Extension Wing has also been brought under the control of the Director of Research for better co-ordination and the

extension staff has been separated from the staff meant for replanting activities etc.

As I mentioned earlier, one point which stands in the way of replanting on a large scale, is the non-availability of good planting material. The difficulty has been solved to a great extent by the production in the nurseries of the Board and also by collection of seeds from the seed collection centres approved by the Board.

I have briefly covered the position of the rubber plantation industry today and the various problems which the Board is coming across and also the progress of schemes implemented by the Board.

#### The Future

It must be stressed once again that there is no fear of any excess capacity for the synthetic rubber in the country being created to jeopardise the prospects of natural rubber. However, there is no reason to be slack and the rubber plantation industry must be willing to take advantage of the latest scientific advances for increasing the yield per acre and reducing the costs.

I may conclude by quoting from the address of Mr. George R. Vila, President, United States Rubber Company at a symposium organised by the International Rubber Study Group in 1962.

"First, in natural rubber you have a marvelous product. It has withstood the onslaught of synthetic rubber research and is the preferred material alone or in blends for many applications. Second, I believe the producers of natural rubber must recognise a new responsibility. Prior to World War II, every rubber laboratory in the world

concentrated its compounding and processing and engineering research principally on one product—natural rubber. Today most of that research is spread over a variety of synthetics as well. I believe the natural rubber industry must step up its compounding and engineering research to fill the gap and to show the consumer newer, better and more efficient ways to use this basic material.

"Third, I believe the inherent properties

of natural rubber are good enough to assure it a steady and expanding market for decades to come, provided it can be produced and sold at a low enough cost. I shall not try to guess just how low this cost can be. However, from information which has been published over the years, it would appear that high-yielding plantations can continue to compete at a profit. I also suspect that in the process of collecting and processing natural rubber, just as in any other process, new ways can be found to cut costs."

(contd. from page 40)

The loans are to be channelised through scheduled banks. Details of the scheme are being worked out.

# Nominations to the Rubber Board

In exercise of the powers conferred by clauses (b), (c) and (d) of sub-section (3) of section 4 of the Rubber Act, 1947 (24 of 1947), read with sub-rules (2), (3) and (4) of rule 3 of the Rubber Rules, 1955, the Central Covernment has notified the nomination of the following persons as members of the Rubber Board for a period of three years with effect from the 17th November, 1964, to represent the various Governments and interests as shown against their names:

Nominated by the Government of Kerala to represent that Government.

 Shri K. C. Sankaranarayanan, Managing Director, Plantation Corporation of Kerala, Ltd., Kottayam, Kerala State.  Shri A. K. Kunhikannan Nambiar, Additional Secretary to Government (Agriculture), Agriculture and Rural Development Department, Trivandrum.

Nominated by the Government of Madras to represent that Government.

 Shri T. Jayadev, Chief Conservator of Forests, Madras.

Nominated by the Central Government to represent the small growers in the State of Kerala.

- 4. Dr. V. R. Narayanan Nair, Convent Road, Trivandrum-1.
- Shri J. C. Chaly,
   P. O. Vettical, Via Tripunithura,
   Kerala State.
- 6. Shri Joseph Mangara, Vice-President, Thadikkadavu Panchayat, Chepparapadavu Post, Cannanore Dist., Kerala.

Nominated by the Central Government to Madras State represent the rubber manufacturers.

- 7. Shri A. T. Mathyoo, Secretary, Association of Rubber Manufacturers in India, 57-B, Free School Street,
- Shri K. M. Philip, Madras Rubber Factory Ltd., Dr. D. N. Road, Bombay-1.

Nominated by the Central Government to

- 9. Shri C. H. S. London, M/s. Harrisons & Crosfield, Ltd., Quilon, Kerala State.
- Dr. A. Seetharamiah. Udyog Bhavan, New Delhi.

#### Elections to the Board

Elections to fill up four seats of representatives of Large Growers of rubber in the states of Kerala and Madras on the Rubber Board were held on the 28th December, 1964 and the results were declared by the Chairman, Rubber Board, who was the Returning Officer, on the 29th December, 1964. The following candidates were

#### Kerala State

- 1. Shri P. K. Ali, Messrs. Ummaya Greens (Private) Ltd., Palaparamba P. O.,
- 2. Shri George John,
- 3. Shri Michael A. Kallivayalil, Peruvanthanam,

Shri Mathew Abraham, Mahendragiri Estate, Nagercoil (declared elected unopposed).

# Visit of Mr. B. C. Sekhar

Mr. B. C. Sekhar, Head of the Chemical Division, Rubber Research Institute of Malaya, visited the office of the Rubber Board and the Rubber Research Institute of India on the 31st December, 1964. He delivered a lecture at a conference of the research officers of the Board in the afternoon of the 31st.

# Rubber Production Commissioner

In exercise of the powers conferred by Act, 1947 (24 of 1947), the Central Government have appointed Dr. K. T. Jacob, Director of Research, Rubber Board, Kottayam, as Rubber Production Commissioner, Rubber Board, with effect from the 4th January, 1965.





Question: Is there any harm if the union of the budded rubber plant is not covered by earth? If so what are they? If it is to be covered what should be the height

On the contrary, if the budpatch is kept below the soil the union is liable to be affected by soil organisms. Budding is usually done just above the collar of the plant. Wherever transplanting of the budded stumps are practised this should be done at nursery level, neither deeper nor higher. However, a considerable part of the stock below the union should not be left to be developed above the ground level as this may maximise the occurrence of pronounced 'elephant foot,' occasionally seen in a budded tree. The initial budgrafting of the stock at ground level will help to prevent the development of this pronounced 'elephant foot' and the attendant defects.

Question: Can chemical fertilisers be mixed with compost? If so what is the proportion to be incorporated with compost?

Answer:

Answer:

Yes. Almost all the organic waste products becoming available on the holding should, as far as possible, be used for enriching the compost. The value of compost can be considerably increased by adding to every to and of dry matter the following chemical fertilisers prior to application.

Sulphate of ammonia 10-20 kg Rock phosphate 15-20 kg Muriate of potash 10-15 kg

Question: Lime, cowdung, ash and sheep dung—whether they can be incorporated with compost? If so in what ratio?

Addition of lime and ash to the compost may have to be restricted on a dry matter basis. It may be advantageous to add 20-25 kg of agricultural lime and wood ash to every tonne of dry matter in the compost. With regard to other materials mentioned no specific ratio can be indicated. While adding fresh cowdung and sheep dung to compost avoid mixing lime.

Question:

When and how to establish cover crops?

Answer:

In new clearings, a natural cover develops by regeneration of local flora especially after the first few showers. The natural covers may be vigorous in the earlier years and have to be carefully controlled if rubber tree growth is not to be affected. However, it has been found that establishment of creeping leguminous covers has helped to reduce the immature period of rubber trees when compared with the above. Leguminous cover crops have to be established simultaneously with rubber planting. A very popular and vigorous creeper in India is Pueraria phaseoloides. This can be propagated by seed and cuttings. The seed rate is 3 to 4 lb per acre. The seeds of cover crops often contain a high percentage of hard seeds which do not germinate quickly. Storage of seed under constant damp conditions depresses the viability and increases the hard seed fraction in Pueraria phaseoloides, Centrosema pubescens and Calopogonium mucunoides. Pre-treatment of seeds with hot water at 50-70°C increases the germinability. The pre-treated seeds are mixed with sufficient quantity of rock phosphate and sown in rows or in equidistant patches between the plant rows. The sowing should be in May or June when the plants have greater chances of establishing.

In areas where cover plants fail to grow vigorously an application of rock phosphate and muriate of potash may be helpful.

For the first two to three years regular weeding should be undertaken. The weeds collected should be placed in a heap for drying and not thrown over the growing covers. Such an act will create many more patches and present further problems.

Question:

Let me know, whether tar or Bordeaux paste should be applied on damaged bark of rubber trees.

Answer:

It is not advisable to apply any copper fungicide on the tapping panel of rubber trees in view of the possible copper contamination of latex. On the damaged bark of tapping panels it is preferable to give a swabbing with a mercurial fungicide like Aretan or Ceresan (Aretan 1 oz. in 2½ gallons of water and Ceresan 1 oz. in 1 gallon of water.) When the fungicide dries up a thin coating with a wound dressing compound like prowax, wax rex trescal or rubber kote may be given.

For treatment of damaged bark other than tapping panels, Bordeaux paste could be used. Some varieties of tar is observed to cause damage to the bark of rubber trees. Hence it is better that the use of tar is avoided.

Question:

Which type of sprayer will be suitable for spraying all the three crops, namely, Coconut, Arecanut and Rubber.

Answer

One single type of sprayer may not be suitable for spraying the three crops referred to. For spraying rubber, say up to 20 to 30 acres, a hand rocking sprayer of the double action type like Gator Kofi, Hightree, Sapperlot etc. would be useful.

Question

Whether intercultivation of crops such as ginger, sea island cotton etc. in rubber estates is injurious or beneficial to the rubber plants?

Answer .

Besides affecting the growth of rubber, the practice of intercropping may also retard the progress of establishing a suitable ground cover which is very essential for soil and organic matter conservation. However, small holders cannot afford to wait for income from rubber for seven or eight years on account of their economic condition; hence in many small holdings some food crop or other economic crops are planted. Ginger, elephant yam, bananas, pineapple, cotton etc., are found grown between the rubber rows, with varying results.

Question .

What is the facility now available to know about the benefits allowed by the Rubber Board to the small holders of rubber?

Answer:

To know about the benefits allowed from Rubber Board you may either contact the Sub-offices or request the Rubber Instructors of your locality to visit your estate. Any one of this source will give you the necessary information.

# Brown Bast of Rubber and its Control

Brown bast is a physiological disturbance of the latex vessel system in the tapping panel region resulting ultimately in stoppage of latex flow. This disorder is noticed in all rubber growing countries. In the earlier years of its occurrence, it was suspected that this disorder was caused by certain pathogenic micro-organisms, but later investigations have shown that no pathogenic organisms are involved and that it is primarily linked with the intensity of

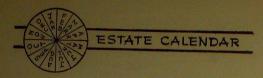
tapping adopted. All clones and seedling trees are liable to become affected by brown bast, some to a greater degree than others and the families of clonal seedlings are liable to a greater incidence of brown bast than clones. Usually, high yielding trees are observed to be more prone to the disorder than low yielding trees. Symptoms similar to those of brown bast have been observed occasionally, even on untapped trees.

The earliest symptom indicating the development of brown bast is the falling of the d. r. c. of latex. Late dripping of latex is also commonly observed in the early stages. This is followed by the drying of a part or whole of the tapping cut. Some\_ times only the outer rows of latex vessels alone may go dry while the inner rows continue to yield latex. A brown discolouration begins at these dry points and spreads along the latex vessels downward and laterally into the healthy cortex below the tapping cut. Later, the cortical cells in the region of the defunct vessels begin to multiply rapidly. This zone quickly enlarges. The spread of the disorder may be limited to a short distance below the cut or may extend to the base of the tree trunk. In advanced cases, cracks occur in the bark preliminary to scaling. In some cases, due to activity of a secondary cambium, hard woody burrs or plates of secondary tissues

In most mature areas, 3 to 5% of the trees may be found to be affected by brown bast and so long as the incidence is low, no particular measures are warrented. However, it is advisable to keep a close watch of the d.r.c. of latex from each field and clone and if it is found that the d. r. c. falls and the percentage of dry trees simultaneously increases, consideration should be given to a reduction in tapping intensity. The disorder is to be avoided by adjusting intensity of tapping. It has been observed that tapping of clonal seedlings through a half spiral cut alternate daily often results in a high incidence of the disorder, whereas when tapped third daily, the

incidence is kept low. In some holdings, daily tapping is followed with the result that brown bast appears within one year of commencement of tapping.

When it is obvious that d. r. c. is falling and the percentage of dry trees increasing to more than normal, say over 10%, the tapping practice will have to be completely. changed so that extension of the disorder may be checked. The length of the cut has to be changed from half to one third of the circumference. Alternate daily tapping system may be changed to third daily system. This will not cure brown bast, but have not reached the dry stage from becoming affected. The affected trees may be rested without tapping for three to six months or more depending on the intensity of the disorder. It is advisable to tap away the affected bark if it is limited so as to prevent spread to adjacent bark. When the affected area is extensive, isolate the affected area of bark by grooves on either side cut to tapping depth and the bark removed. The exposed area may be treated with an organomercurial fungicide like Aretan (1 oz. in 21) gallons water) and after drying, coated with a petrolatum wound dressing like prowax, wax-rex-treseal or rubber kote. When the bark is swollen and large burrs or swellings have developed at the base, such trees are beyond treatment. In such cases, tapping of the bark higher up the stem with the help of inverted cuts may be adopted. Tapping on the bark opposite the affected part may also give latex. Resting the tree is the most important factor in treatment.



# For Rubber Growers

#### January

In the northern regions wintering may commence. This is the time when annual tapping rest is to be adopted and the panels protected with prowax or rubber kote-prowax mixture. Felling and clearing for new planting or replanting is done at this time. Time for collection of *Pueraria* seeds is also on.

## February

Wintering spreads effectively in most of the areas. The trees wintered earlier will start to refoliate. This is the time when sulphur dusting against powdery mildew has to be commenced. Many of the estates are allowed to enjoy tapping rest. Marking for the next season tapping can be done. Preparation of the land for planting is continued. Collection of cover crop seeds can also be continued.

#### March

Tapping rest can be discontinued and tapping commenced. Young areas are opened for tapping. Sulphur dusting rounds against powdery mildew is to be continued. Weeding is done in immature areas. Manuring can be started. In nurseries budding is done. Towards the end of the month spraying of fungicides against abnormal leaffall is started in large estates. In areas where planting has to be done, terracing, lining, pitting etc. should be done. Stimulants may be applied on trees 20 or more years old.

#### Apri

Weeding and manuring are continued. Spraying against leaf fall also is continued. Budding in nursery and field is carried on. Preparation of land for planting is continued. The natural undergrowth is to be slashed. Dead woods should be removed from the garden.

#### May

Spraying may be be continued. Treatment to prevent pink disease is to be done. Budding can be continued if necessary. Slashing of undergrowth can be carried on. Sowing of cover crop seeds can be commenced.

#### une

New flushes of young plants have to be given spraying. Nurseries are to be sprayed. The pits are filled and planting started. The tapping panels should be disinfected with fungicidies and water proofing with prowax or waxrextreseal is to be done. If needed the beds for sowing seeds can be prepared. Cover crop seeds are to be sown or cuttings planted.

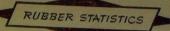


TABLE I

Area Under Rubber as at the End of Each Year

Year	Area in acres
1950-51	 170,506
1951-52	 171,191
1952-53	 172,786
1953-54	 173,643
1954–55	 176,647
1955–56	 207,239
1956–57	 234,351
1957–58	 261,998
1958-59	 286,567
1959-60	 305,452
1960-61	 321,002
1961-62	 348,121
1962-63	 361,142
1963-64	 377,938

TABLE II

Planted Acreage Under Different Planting Materials as at the End of 1963-1964

Planting materials		Newplanted area	Replanted area	Total area	
Ordinary Budded		209,822 40,614 88,942	4,228 18,914 15,418	214,050 59,528 104,360	
Clonal	Total	331,378	38,560	377,938	

TABLE III

Classification of Holdings and Estates According to Size as at the End of 1963-1964

(Area in acres)

		Groups	No. of units	Area	
A.	Small Holdings	(50 acres & belo	w)		
	5 Acres and be	low		60,957	118,640
	Above 5 acres	and up to and in	cluding 10 acres	5,679	41,897
	Above 10 acres			3,514	73,685
			Total	70,150	234,222
3,	Estates (above :	50 acres)			
	Above 50 and	up to & inclu	ding 100 acres	3 20	23,199
	,, 500	,,	500 ,,	235	47,291
	,, 100	"	1000 ,,	31	21,422
	,, 1000	,,	1500 "	19	23,328
	,, 1500	,,	2000 ,,	4	6,578
	,, 2000			9	21,898
		Total		618	143,716
		GRAND TOTAL		70,768	377,938

TABLE IV

Statewise Distribution of Area at the End of 1963-1964
(Area in acres)

	STATES		HOLDINGS (50 acres & below)		ESTATES Above 50 acres)	TOTAL	
		No. of units	Area	No. of units	Area	No. of units	Area
i.	Kerala	69,309	227,974	565	128,372	69,874	356,346
2.	Madras	815	5,836	41	10,977	856	16,813
3.	Mysore	25	392	11	3,945	36	4,337
4.	Andamans			1	422	1	422
5.	Tripura	1	20			1	20
	Total	70,150	234,222	618	143,716	70,768	377,938

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TABLE V
Statewise Production of Natural Rubber (In Metric Tonnes)

States	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
Kerala Madras	22,062 1,665	21,890 1,814	23,175 2,040	24,954 2,060	29,057 2,695	33,792 3,176
Mysore Andamans	425 17	437 32	452 30	402	447	468
Total	24,169	24,173	25,697	27,446	32,239	37,487

TABLE VI
Production, Import and Consumption of Natural and Synthetic Rubber

	(the Metric Tollnes)									
Production		Import			Consumption					
Year	Natural Rubber	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total			
1958-59	24,169	12,538	4,229	16,767	35,767	3,477	39,244			
1959-60	24,173	15.287	5,718	21,005	40,491	4,964	45,455			
1960-61	25.697	23,125	8,097	31,222	48,148	7,397	55,545			
1961-62	27,446	22,528	10,121	32,649	48,410	10,186	58,596			
1962-63	32 239	23,360	10,297	33,657	53,553	10,723	64,276			
1963-64	37,487	26,275	12,382*	38,657	61,155	11,959	73,114			

<sup>·</sup> Includes indigenous production also.

TABLE VII
Reclaimed Rubber Acquired and Consumed by Manufacturers
(In Metric Tonnes)

Year	Acquired	Consumed
1958-59	3,973	4,102
1959-60	5,177	4,969
1960-61	5,183	5,453
1961-62	6,422	6,046
1962-63	6,839	6,850
1963-64	8,251	7,982

TABLE VIII

Stock of Natural Rubber at the End of Each Month (In Metric Tonnes)

Month	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
April	8,723	10,035	. 8,571	9,696	11,003	12,818
May	9,106	9,067	8,186	9,716	10.937	12,816
June	8,756	8,138	8,128	8,462	12.193	14,003
July	8,710	8,545	8,067	8,256	12,475	14,824
August	8,619	8,968	8,489	9 235	12,218	14,239
September	8,322	8,995	9,157	9,744	12,723	14,302
October	9,523	9,810	10,265	11,291	13,917	15,605
November	11,007	10,467	10,742	12 120	15,059	17,142
December	11,587	10,793	12,993	13,359	16,334	18,314
January	11,715	10,496	13,036	12,990	15,940	18,381
February	10,438	9,533	11,185	11,511	13,879	16,437
March	10,233	9,201	9,875	11,439	13,485	16,437

# NOTE

During the period from April, 1964 to September, 1964, production of natural rubber in India was 19,435 tonnes. The quantity of natural rubber imported into the country during the period was 10,331 tonnes. 29,789 tonnes of natural rubber, 6,877 tonnes of synthetic rubber and 4,585 tonnes of reclaimed rubber were consumed during the six months. Stocks of natural, synthetic and reclaimed rubbers with rubber goods manufacturers at the end of Sept., 1964, were 16,069 tonnes, 3,725 tonnes and 1,650 tonnes respectively.

# NATURAL RUBBER PRICES

The Central Government has fixed, for all classes of business, the following minimum prices, exclusive of sales tax, for the various grades and qualities of rubber and latex of different concentrations, excluding the cost of container. These prices have come into force as from the 19th December, 1963.

Grade of rubber	F. O. B. Cochin for 50 kilograms	
	Quality of rubber	Minimum price
(1)	(2)	Rs. (3)
Group 1	R. M. A. IX R. M. A. 1	161.50 161.50
Group 2	R. M. A. 2 R. M. A. 3 Cuttings No. 1	159.85 158·20 149.93
Group 3	R. M. A. 4 R. M. A. 5 Cuttings No. 2	154.34 149.93 143.32
Group 4	Precoagulated Crepe Pale Latex Crepe IX Pale Latex Crepe I Pale Latex Crepe 2 Pale Latex Crepe 3 FA	167.57 165.36 163.16 162.06 Q 160.96
Group 5	E. B. C. Super IX Estate Brown Crepe IX Estate Brown Crepe 23 Smoked Blanket Remilled Crepe 2	156.54 152.13 ( 148.83 152.13 143.87
Group 6	Estate Brown Crepe 33 Remilled Crepe 3 Remilled Crepe 4	( 140.01 137.81 131.74
Group 7	Flat Bark	122.37
Normal latex up to 35% concentrates		Rs. 161.50 plus a premium of Rs. 19.29 per 50 Kilograms of D. R. C-
Latex concentrates of 36% to 50% (both inclusive)		Rs. 161.50 plus a premium of Rs. 36.38 per 50 Kilograms of D. R. C.
Latex concentrates of 51% to 60% (both inclusive)		Rs. 161,50 plus a premium of Rs 47.40 per 5) Kilograms of D. R. C.

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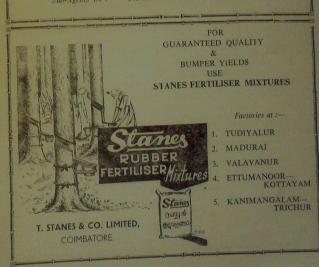
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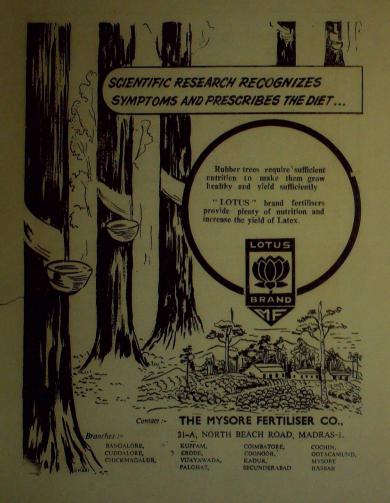
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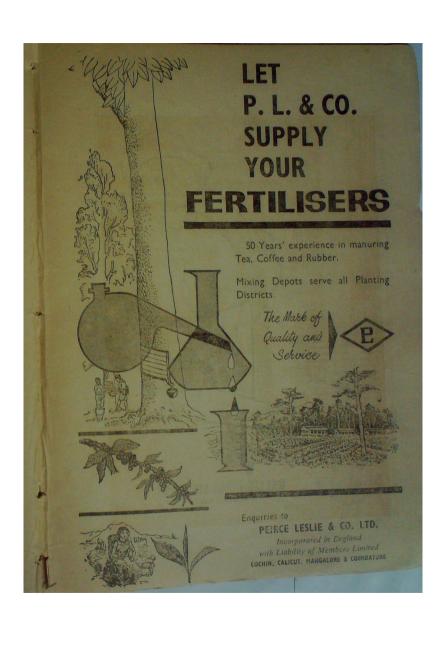
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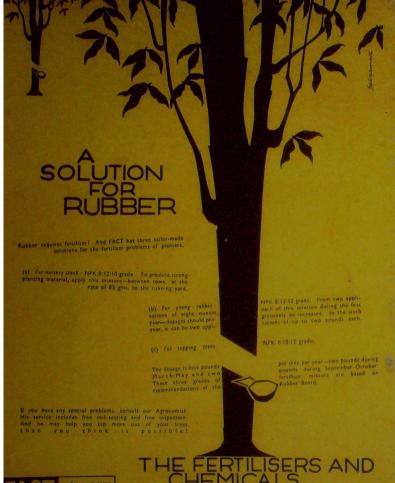
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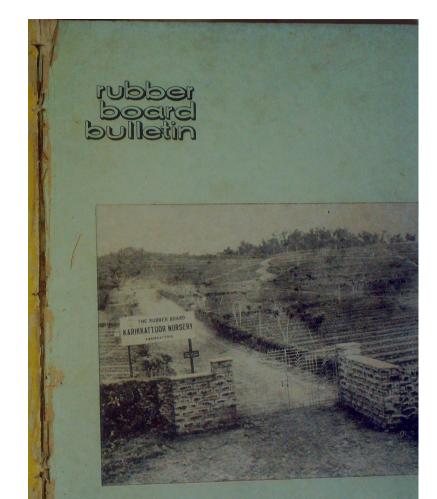
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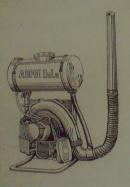
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### Commendable Progress

The year 1964—'65 bears special significance to the replantation industry in India, for, compared to previous of there has been substantial increase in the production of neubber in the country during that year. The total production of natural rubber during 1964—'65 was 45,616 metric to whereas it was 37,487 metric tonnes in 1963—'64 and 33 metric tonnes in 1962—'63. The production in 1964—'65 been 22% more than that in 1963—'64 and 42% more that in 1962—'63. The industry can legitimately take pric the fact that the production of natural rubber during 1964-has exceeded the original target fixed for the year.

It is true that even this record production does approach anywhere near the demand. But it has at least he to narrow the gap between production and demand to a lir extent. And to that extent, it has been helpful in relieving country of its foreign exchange difficulties.

It can reasonably be expected that the tempo of incr in production will not only be maintained in the coming y but also enhanced.

The trend of steady increase in production of natural rut in India obviously proves that the various development sche drawn up and being implemeted by the Board for the indu have begun to bear fruit. Of these, the most important is Replanting Subsidy Scheme started in 1957. The areas replanted with high yielding planting materials under the sch have now come into tapping and their yield figures are q promising. It may safely be presumed that these replanestates have contributed their share in increasing the total production. Though the progress of replanting was tardy in first few years, it has now got into stride and in the comyears, we may expect that the target for each year will achieved or even exceeded.

Large scale new planting of rubber has taken place recent years in the public and private sectors. And in n ases it has been done with high yielding planting materials. he relevant rules have been amended to ensure that planting cences are given only for planting with high yielding materials. uch large scale new planting will begin to show its result on roduction in the next few years. The financial and other ssistance rendered by the Board have helped to boost the ew planting of rubber.

Planters have now come to appreciate the importance of plant protection and improved cultural practices in rubber ultivation. The Board is providing all necessary facilities and elp to them in this regard. Subsidies and equipment are given a small rubber growers through rubber growers' co-operative ocieties for plant protection. Manure is being distributed at all the cost. Assistance is being given for soil conservation neasures. Planting materials are being distributed free of cost a small growers who replant or newplant under the Board's chemes. All these must have their cumulative effect in ncreasing production of rubber as is now becoming evident.

Rubber planters in India are now more alive to the various problems confronting the plantation industry and they have some to realise that the future of the industry depends on nereased production at a lower cost. With all the facilities provided by the Government and the Rubber Board, it must be essible for the plantation industry to attain a target of production of 100,000 tonnes of natural rubber in India by 970—71. The nation expects the rubber plantation industry o strive to attain the target.

### PROBLEMS AND PROGRESS

Speech delivered by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, at the 49th meeting of the Board held on 20-3-1965 at Kottayam,

#### Friends,

I have great pleasure in welcoming you to the 49th Meeting of the Board. This is the first Meeting of the Board, since it was reconstituted in 1964 and I welcome all the new members of the Board.

First I may say something about the finances of the Board. Some of the writ petitions filed in the High Courts against the collection of Excise Duty by the Board, have been disposed of by the High Courts but most of the parties have gone up in appeal. However, due to the efforts made by the Board, collection figures of Excise Duty for the year 1964–'65 have shown an upward trend. The following figures will show the collection of Excise Duty during the past 3

1962-'63 Rs. 75,33,785/-1963-'64 Rs. 51,53,750/-1964-'65 (upto 12-3-1965) Rs. 1,10,13,009/-

The Government of India have sanctioned our Revised Estimate of Expenditure for 1964–65 at Rs. 76,11,800/- including a provision of Rs. 55 lakhs for replanting subsidy. The Budget Estimate for 1965–66 have been sanctioned by the Government at Rs. 85,29,700/-, including a provision of Rs. 60 lakhs for replanting subsidy.

The collection to the Pool Fund has been The collection is mainly on account of the price difference between imported rubber and indigenous rubber. During 1963'64 the collection was Rs. 5,84,808/-During the year 1964-'65 up to date, the collection has been only Rs. 52,660/- This is mainly due to the fact that the duty on imported rubber was increased from 10% to 22% from March 1963 and also the reduction in the quantity of imports in 1964-'65. It is also noticed that the duty on imported rubber has been further enhanced by 10% from April, 1965 and it is unlikely that we will get any substantial amount on account of the price difference in the coming years.

The area under rubber at the end of February, 1965 was 3,82,614 acres. The figure at the end of 1963–'61 was 3,77,938 acres. There has been an increase of 4,676 acres during the year 1964–65.

The production of natural rubber during the year 1964–165 has been satisfactory. The production of rubber till the end of January 1965 was 41,682 M. Tonnes. The figures of February and March are not readily available but it can be confidently stated that we will reach our estimated production figures of 46,000 M. Tonnes of rubber by the end of March, 1965. There has been no

complaint during this year of accumulation of natural rubber produced in the country at any level nor of the non-receipt of the statutory price fixed by the Government. The stock figures at the end of January, 1965 were 17,950 M. Tonnes with estates, dealers and manufacturers. For the corresponding period 1963–'64 the same was 18,381 M. Tonnes. It shows that there has been no undue accumulation of stock as compared with the stock of the previous year. It is true that there has been some complaints from the manufacturers about non-availe bility of latex concentrates in sufficient quantity and this situation will have to be remedied in

The import of natural rubber has shown a considerable decline during the year 1964-'65. The import figures for the first 10 months of 1964-'65 were 12,749 M. Tonnes only as against 21,414 M. Tonnes during the corresponding period in 1963-'64. The total imports of natural rubber during 1963-64 was 26,275 M. Tonnes. The import of synthetic rubber during the first 10 months of 1964-'65 was 2,800 M. Tonnes as against 8,000 M. Tonnes for the corresponding period in 1963-64. You may remember that the Government of India had not accepted the Board's recommendation to import natural rubber on its own account but it will be noticed from the above figures that the import of natural rubber has not in any way upset our production programme of natural rubber. The main reason why the Rubber Board pressed for the import of natural rubber on its own account was to effect easy realisation of the price difference between imported rubber and indigenously produced natural rubber. But in view of

the increase in import duty there is no particular point in pressing our case and it will be in the interest of all concerned for the existing arrangements to continue, so long as the total quantity of natural rubber licensed to be imported is within the estimate of imports made by the Rubber Board.

The production of synthetic rubber in this country has shown a noticeable improvement during the year 1964-'65. In 1963-'64, the production of synthetic rubber by M/s. Synthetics & Chemicals Limited was 9,149 M. Tonnes as against the production of synthetic rubber during the first 10 months of 1964-'65 of 12,320 M. Tonnes. The consumption of synthetic rubber during the first 10 months of 1964-'65 (including imported synthetic rubber) was 12,331 M. Tonnes as against 9,795 M. Tonnes during the corresponding period in 1963-'64.

About the setting up of the second Synthetic Rubber Plant, it appears that preliminary assessment of the chemicals for the production of synthetic rubber has been made by the Government and the final decision would be taken when the details of petro-chemical complex have been clearly established which would permit accurate estimate of manufacturing cost, etc. of synthetic rubber.

The policy of the Government of India with regard to production and disposal of synthetic rubber produced by M/s. Synthetics & Chemicals is allotting specified quantities of synthetic rubber to the various manufacturing units and the linking of off-take of synthetic rubber by the manufacturing units with the processing of their import applications for raw materials and spare

parts. There has been no change in the policy of the Government since the last Meeting of the Board. You are aware that the Board at its last Meeting had decided to send a deputation to explain the views of the Rubber Board and the Plantation Industry to the Government about the present policy of Government on the off-take of synthetic rubber. But, however, since the Board was reconstituted in the meantime, it was not possible to do so. The Government have informed us that they had to take suitable steps to see that indigenous production both of natural rubber and synthetic rubber was fully consumed before the balance of requirements is allowed to be imported and therefore the steps taken by the Government to see that the indigenous production of synthetic rubber is fully consumed would not in the present circumstance har n-the interest of the natural rubber industry. The Government have also made it clear that there is no rubber plantation industry would be fully the Board may consider whether any further

However, certain facts have to be taken into consideration. You are aware that the price of natural rubber has been statutorily fixed by the Government but there is no statutory price fixation for synthetic rubber. It is true that at the moment the price of synthetic rubber in this country is higher than the price of natural rubber. But with progressive increase in production and increased off-take of synthetic rubber, it should be possible for a manufacturing industry to reduce its production costs and offer synthetic rubber at a competitive price.

At present we do not have the details of the cost of production of synthetic rubber with us, though the indications are that it may not be possible for the manufacturing industry to reduce the price of synthetic rubber in the near future. At the same time we have to appreciate the fact that the growth of synthetic rubber industry has to take its own course, so long as there is a widening gap between our requirements of rubber and the production of natural rubber in this country. But once this fact of meeting the widening gap between our requirements and the production of natural rubberis appreciated, we have to think of the accelerated momentum generated by a manufacturing industry like the synthetics and its repercussions on the price fixed for natural rubber and the requirements of the manufacturing industries which were so far almost exclusively using natural rubber. It is also gathered that some of the manufacturing industries have had to go in for new machinery to process the synthetic rubber and though the details of the foreign exchange involved in the setting up of the new machinery are not available with us it is undoubted that this machinery may not have been necessary, if natural rubber alone were utilised. I am subject to correction in this, but the information gathered by us from a number of manufacturing units is that the extra machinery would not have been necessary but for the processing of synthetic rubber. Besides the plantation industry cannot be as well organised as an synthetic rubber and the reduction of production costs which would be possible. will not be possible, in plantation industry which is again split up between small

holdings and large estates. The plantation industry has therefore to take into account these facts and organise itself in the most modern and efficient way. Unless this is done and the natural rubber industry is able to stand up to any competition from the point of view of the quality of its presentation and price, there may be difficult times ahead. It is also to be remembered that the production cost particularly on labour in rubber plantations is likely to go up and not come down and this, therefore, is to be kept in view by the plantation industry along with competition from synthetics in future. It should not be difficult to modernise the plantation industry, because research and the extension methods in the major rubber producing countries like, Malaya and Ceylon have shown that natural rubber can compete at any time with synthetic rubber in production costs, price and the quality of presentation. It is also likely that with sales promotion techniques of an established manufacturing industry, synthetic rubber may exert pressure for reduction in the imports of natural rubber and also create inroads into the major consumers of natural rubber, thereby forcing the natural rubber plantation industry to find a market among the smaller consumers only, though there is no substitute for natural rubber as an all purpose rubber and in the present pattern of production of giant tyres, etc., S B Rubber has only limited application. It is against these trends that we have to be very vigilant and this vigilance can only come by way of increasing our production of natural rubber and reducing the over-all production costs.

The increase in production of natural

rubber can come in two ways-by way of increasing our acreage under rubber and by most up-to-date and scientific plantation in the existing areas. The presumption is that in the proposed new areas under rubber, the most up-to-date methods of planting, manuring, tapping and processing will be followed. This presumption need not be always correct, as we have been noticing very unscientific and haphazard methods of cultivation, in the newly opened up areas in Malabar, particularly by small growers. However, with Research and Extension Wings of the Rubber Board taking particular care of these new areas, the chances of unscientific planting, tapping and processing should be eliminated. What I am stressing here is that for effecting increased production, in areas to be newly opened up, one need not fear the drawbacks involved in the plantings in the past, which have been very unscientific and therefore necessitated large scale replanting. I may now mention the steps taken by the Board either directly or indirectly in increasing the area under rubber.

The excellent work done by the Plantation Corporation of Kerala, is too well-known to be mentioned here. But, however, it may be stated that till the end of December, 1964 they incurred an expenditure of two crores and planted approximately 10,200 acres. The Government of Madras is doing rubber plantations through its Forest Department and raising plantations in Kanyakumari district. The total provision for the 3rd Five Year Plan is 57 lakhs out of which the Government of Madras has incurred an expenditure of 38 lakhs and planted 2,159 acres, against the target of 3,0/5 acres. The Government of Mysore is also doing rubber

plantations through its Forest Department and against the plan provision of 10.76 lakhs, it has incurred an expenditure of 2.67 lakhs and planted nearly 900 acres against the target of 960 acres. The expansion of rubber cultivation by the Government of Mysore was discussed by the Chairman of the Rubber Board with the Development Commissioner and other Senior Officials of the Mysore Government in December 1964 and it has been agreed that the Government would take up 15,000 acres for rubber cultivation during the 4th Five Year Plan and would sanction special staff during the current Five Year Plan itself. It was brought to the notice of the Government of Mysore that the Government of India had a provision of more than one crore of rupees, which would be available to the States which would undertake rubber cultivation, as loan. It would be remembered, however, that these funds do not pass through the accounts of the Rubber Board, though we are kept informed by the Central Government of such schemes where the money is passed on

I had mentioned in the last meeting of the Board about the expansion of rubber cultivation in Andamans. There was a meeting with the senior officials of the Home Ministry and the Chief Commissioner of Andamans in December 1964 and it was agreed that the Andamans Administration would meet the complete expenditure on a Pilot Project of 500 acres to be started in Andaman Islands. A scheme has been prepared and sent to the Ministry of Home Affairs, which has yet to be sanctioned. A part of the expenditure incurred by the Rubber Board which is executing the scheme

on behalf of the Home Ministry, has already been reimbursed to the Board. A nursery has been set up and the results have been extremely encouraging. Clear felling of the area taken over by the Rubber Board has already been started and planting of 100 acres will be completed, during the next planting season. We are extremely hopeful of the results of the Pilot Project and the expansion of rubber cultivation in Andamans. As you will notice, the expenditure on the project will be borne by the Ministry of Home Affairs as a special scheme.

The results of the experimental plantations in Assam and Tripura are very encouraging. These plantations were visited by the Chairman of the Rubber Board and senior officers of the Rubber Board during this month. In fact, in Assam some areas are under tapping and smoked sheets have been produced. The yield in some of these experimental plantations compared favourably with the yield in the plantations in Kerala. The Chairman had detailed discussions about the expansion of rubber cultivation particularly in the tribal districts of Assam, with the Director of Soil Conservation and the Finance Minister, Assam. The results in Tripura State were also encouraging and excepting for the problem of transport of natural rubber to the nearest serious trouble for expansion of rubber cultivation. The Chairman had discussions of Tripura and the Minister for Development and the Deputy Minister for Development of Tripura State, about expanding the area under rubber. The technical officers of the Rubber Board have just completed a survey

of Orissa and some experimental plantations will be started in Orissa during the next planting season. There is some scope for expansion in Goa and Maharashtra also. These possibilities are being explored and will be followed up by personal discussions with the authorities in those States. We are also completing the survey of other States which have not been taken up so far for rubber expansion like Madhya Predesh etc.

I had mentioned in the last meeting that the Joint Central Team on Agricultural Programmes had made some observations about restricting the expansion of rubber cultivation in forest areas. This matter was subsequently discussed at a meeting convened by Planning Commission and attended by the representatives of the Ministry of Commerce, and the Rubber Board and the Kerala Government. The decision was that Reserve Forests will not be available for expansion of rubber cultivation. However, as the 4th Plan sub-group on the rubber plantation industry had taken into account mainly the private forests in Malabar area for expansion of rubber in the 4th Plan, this decision is not going to affect us adversely.

I had mentioned at the last Meeting of the Board about the scheme prepared by the Rubber Board in consultation with the Agricultural Refinance Corporation for extending long-term loan facilities to rubber planters to cultivate rubber in an area of 15 acres or above. The loan scheme is intended to finance the first year cost of planting and also its upkeep and maintenance for the succeeding 6 years. The Agricultural Refinance Corporation subsequently made it clear that this loan which will be routed through Scheduled Banks would be available

for clearing old debts, constructing labour quarters and also for purchasing essential machinery. The Agricultural Refinance Corporation held a meeting in January, 1965, attended by the representatives of the Scheduled Banks and Commodity Boards and representatives of the plantation industry. This meeting was addressed by the Chairman of the Reserve Bank and it gave an opportunity for exchange of ideas among the representatives of the plantation industry, the Commodity Boards and the representatives of the Scheduled Banks. The results of this meeting have been encouraging and a number of applications have been received by the Scheduled Banks. The representatives of the Agricultural Refinance Corporation have come down to our headquarters and it has been possible to arrange joint enquiry by officers of the Rubber Board, the Agricultural Refinance Corporation and the Scheduled Banks. It is hoped that some of these applications for loans will be sanctioned shortly by the Scheduled Banks which will draw their finance from the Agricultural Refinance Corporation. We also intend to open a sub-section with technical staff of the Rubber Board for giving the necessary technical advice and for promptly clearing the applications at this

The second way in which the production can be increased and which will incidentally reduce the production cost is by modernising the existing plantation industry and putting it on very efficient basis. The scheme can be broadly divided under three categories, for effecting this modernisation. They are: (1) replanting, covering both large estates and small holdings; (2) expansion of our

research and extension activities; and (3) special schemes for small growers, for which a separate fund has been constituted.

Replanting is the only scheme of ours where we give direct financial benefit to the large growers, that is for plantations above 50 acres. In addition to the replanting subsidy the large growers are not getting any direct finance from us. Of course they

get the benefit of research and our advisory services.

The progress of replantation in the past years has not been very satisfactory but it has definitely picked up momentum and this year we hope to achieve much more than the targets prescribed. The following figures will show the progress of replanting —

Financial Year	No. of units replanted	Area replanted (acres)	Subsidy sanctioned financial year-wise Rs.	
1957—'58 1958—'59 1959—'60 1960—'61 1961—'62 1962—'63 1963—'64 1964—'65	445 689 775 607 978 1,239 617*	2,839.07 4,187.19 3,967.56 3,158.42 5,607.04 5,505.47 4,888.97*	4,40,576,45 5,09,255,5) 7,93,754,87 13,98,773.64 26,68,376,16 33,81,407,05 51,00,786,26	
February }	202*	3,652.46*	45,48,291.95	
Total	5,552	33,806.18	1,88,41,621.86	

<sup>\*</sup> Figures are incomplete.

In the last meeting of the Planting Committee we took certain decisions about accelerating the pace of replanting and made it clear to the plantation industry that the replanting programme cannot be continued indefinitely. It was considered in the beginning desirable to fix certain annual targets and break it up into estate-wise targets but there was opposition to this proposal. We are now prescribing annual targets making it clear that each estate must come into the programme within a specified period failing which the benefit of the replanting subsidy would not be available to such estates after the period. The rules for replanting for the small growers have been liberalised and it is expected that in the con-

text of the competition from the synthetic industry and increased production cost on certain items, the small growers will also take to replanting on a very large scale. In fact, the results in 1965 have been very encouraging. Against our target of 10,000 acres for the 1965 planting season, we received applications for 11,400 acres for replanting, comprising of 125 applications from large growers, totalling an area of 6,965 acres and 1203 from small growers, totalling an area of 4,433 acres. It is our intention to see that all these applications are sanctioned in time and fully spend the provision of Rs. 60,00,000/-in the next year's budget. It is likely that we may require

more funds under this head for replanting in the next year's budget.

The expansion of our research and extension activities acquires new significance in the context of the competition from synthetic rubber and the need to organise the plantation industry on a modern and efficient basis I think it should be mentioned here that the achievement by major rubber producing countries like Malaya and Ceylon is due to sion work in addition to extensive replanting. You may remember that though Malaya is producing about 8 lakhs tonnes of natural rubber, its internal consumption is only within 10.000 tonnes. The rest has to be exported and sold in the face of severe competition froms ynthetic rubber in the most highly industrialised countries. Ceylon has also been producing more than 1 lakh tonnes of natural rubber but its internal market is only about 1,500 tonnes and the rest has to be exported under the same conditions which Malaya is facing. There is no reason why we cannot strive to achieve the same efficiency in planting, manuring, tapping and processing which these countries have been able to achieve. The presence of an expanding market in this country should not blind us to the difficulties which we may have to face in future. The earlier we achieve modernisation through our research and extension

The research work undertaken by different divisions of the Rubber Research Institute of India has gained momentum due to the appointment of necessary staff as approved by the Board at its 47th and 48th Meetings.

Experiments on fertiliser requirements of nursery seedlings and young rubber, analysis

of soils collected from estates and holdings, standardisation of leaf analytical methods. and foliar feeding trials with nutrient elements and Vitamin-C formed the important items of work of the Agronomy Division. New fertiliser experiments numbering 3 were laid out at Madras Government Plantations (Kanyakumari District) in addition to the existing four factorial experiments, which have completed a period of 8 years. As a highlight of these factorial experiments, it may be mentioned that high level of potash (above 40 lb. K 20/ acre) appears to suppress the stem girth of rubber trees. These findings have revealed the need for further range of fertiliser mixtures for rubber, especially to regulate the potash nutrition according to the zonal/soil requirements.

To evaluate the Macro and Micro nutrient element needs of nursery seedlings, trials numbering six both at Rubber Research Institute of India and at Karikattoor were initiated during this season and are in progress. Likewise, the response of seedlings to foliar feeding of nitrogen and phosphoric acid is also studied by Agronomy Division. In another trial, the effect of Vitamin-C. applied through foliage to young nursery seedlings, is being studied with encouraging preliminary results.

The Division analysed 164 soil samples, involving over 650 determinations, during the 5 months' period ending 28 February, 1965. These soil analyses brought to the forefront high potash status of soil (so far collected from rubber estates/holdings) from Palghat District. This finding along with the contemplated survey of this region may help the Board to formulate a suitable fertiliser mixture specific to this district. With

these findings the magnesium nutrition of rubber becomes an important and integral part of any essential element study for rubber. Further, cases of calcium deficiency in young and mature rubber were recorded and later confirmed by leaf analyses.

The 'seed treatment' studies with cover crop brought out that Centrosema has brown and ash-coloured seeds and the ash coloured fraction consistently registered low germination percentage due to its hard seed-coat. Further studies are programmed to propagate the brown seeds by using plant selection techniques. The chemical weed control studies using pre-emergence, selective and contact herbicides are programmed to be undertaken by the Agronomy Division during the pre-monsoon period.

Out of about 34 acres planted with hand pollinated materials at Experiment Station a total of 18.40 acres are already under tapping and about 8.65 acres will be opened during this season. The growth data already available along with the yield performance may help the Botany Division to make a preliminary selection of our own future possible clones.

It may not be out of place to mention that at present polyclonal seeds are imported from abroad, involving a drain on our foreign exchange resources. To conserve the foreign exchange and to produce high yielding polyclonal seeds locally, a five clone polyclonal garden has been established by this Division at Madras Government Plantations, Nagercoil, with Tjir I, PR 107, LCB 1320, RRIM 605 and RRIM 623. Further, a three clone garden with RRIM 501, Tjir I and PR 107 is also proposed to be set up shortly.

New Experiments on the floral biology and sex distribution in *Hevea* has been initiated and the results of these studies are expected to furnish very valuable information for breeding work. Experiments to assess the optimum age, season etc. for budding were continued. The preliminary results of budding experiments indicated that the green budded plants were by far superior, in terms of plant vigour, than the conventional budded ones.

From the estate mother tree selections, established at our Experiment Station, at least one type is observed to possess the desirable growth attributes and reasonable yield potential.

Experiments conducted by Pathology Division to find out more economic/effective diluent spray oils resulted in the preliminary selection of the stock 615, supplied by M/s. Indian Oil Corporation. It was superior with good physio-chemical properties and at the same time did not cause any ph/totoxicity. Studies to determine the exact nature of infection and the cause of premature defoliation due to the fungus Phytophthora palmivora were initiated. Further laboratory trials were undertaken to study the disease tolerance of this fungus by growing the pathogen in artificial media prepared with petiole extracts. Life history studies and search for the occurrence of sexual spores of Phytophthora palmivora were also undertaken by this Division.

The testing of Minimicron 77 (stretcher model) assembled in India, was also undertaken by the Pathology Division. During the trials and actual use of the sprayer under field conditions, the modifications required to make the spraying more effective were suggested by the Pathology Division. The present model, after incorporating our suggestions, appears to be quite handy and efficient with a vertical range of 50 feet.

The field control of pink disease was satisfactory at the Experiment Station by using Bordeaux paste instead of copper sulphate, lime and linseed oil paste. Nursery trial, on leaf spot disease, employing shade as one of the major treatments was undertaken at the Karikattoor Nursery. The observations so far recorded indicate that by shading of the nursery seedlings, effective disease control is possible.

Consequent on the appointment of a Research Assistant in Entomology under Pathology Division, the organisation of the laboratory and preliminary assessment of entomological problems of rubber and associated cover crops have been initiated.

Pending the purchase of testing equip. ments for Chemistry and Rubber Technology Division, technological programme of work envisaged could not be undertaken. However, the Division tackled problems connected with latex collection, processing and other factory practices. From the trials conducted, using coconut shells as collecting cups it is revealed that percentage of cup scraps was increased due to the presence of water extractable acids in the shells. Hence latex collection was made with coconut shell pretreated with alkali, which resulted in considerable reduction in the percentage of cup scrap. This preliminary finding is proposed to be extended on a large scale to get confirmatory results.

The study regarding the use of Metrolae

and the correct interpretation of DRC of field latex are in progress.

Ribbed and smoked sheets are downgraded when they are accidentally contaminated with saltish backwaters while transported by country crafts. The Chemistry Division has demonstrated that the original grade of the sheets can be regained by washing them with pure water and resmoking them.

The Divisional Head represented the Board in the various committees of Indian Standards Organisation and assisted in the formulation of necessary standards for latex and rubber.

Steps to reorganise the Library to suit the requirements of research workers were undertaken. 322 books and 485 volumes of bound journals have been added to the reference section of the Library.

Seminars, press releases, publications and participation in exhibitions at all levels were undertaken by the Publicity Section.

One point where we have to give special attention is our processing technique and the quality of presentation of natural rubber. It is known to natural rubber producers all over the world that their ability to compete with synthetic rubber would be considerably enhanced if it could be sold on the basis of its technically important characteristics and if it could be presented in a more uniform and attractive manner and in a much smaller number of grades. With this object in view research has been started in many rubber growing countries. Recently a new process of preparing rubber has been reported by the Head of the Chemical Division of the Rubber Research Institute of Malaya.

process is known as Mechano-Chemical-Crumbling. This process which involves the use of castor oil is expected to be attractive to the industry since the existing equipment can be adapted for the purpose.

Certain developments in the same direction are also being tried out in our Research Institute. An important development of this year is the holding of a meeting of the General Assembly of the International Organisation for Standardisation at Delhi in November 1964. We are particularly interested in the deliberations of the Rubber Technical Committee of the I. S. O. which also met during the same month at Delhi. The meeting was attended among others by leaders of the natural rubber industry allover the world. We were represented at the meeting by Dr. Sivaramakrishnan, our Dy. Director (Rubber Technology) and Shri Rajapadmanabhan, Dy. Rubber Production Commissioner. The Committee primarily concerned itself with the methods of testing both synthetic and natural.

The Board was able to arrange a meeting on aerial spraying of rubber, in October, 1964, and though much could not be done about reducing the cost of aerial spraying, we hope we have achieved some reconcilitation among the various interests concerned in the aerial spraying of rubber. Special arrangements are also being made by the Board for obtaining micron sprayers from a manufacturer in India and distributing them to the planters.

We are pursuing with the Government of India about giving us bulk foreign exchange allotment for importing planting materials and equipment required by the Research Institute and by the plantation industry. In the absence of such a bulk allotment, each import licence application by the Rubber Board or by the plantation industry sponsored by the Rubber Board is being considered, on its own merits.

The Fertiliser Expert Committee headed by Mr. Sivaraman I. C. S., visited the office of the Rubber Board and the Rubber Research Institute in February, 1965, and the officers of the Board had the benefit of detailed discussions on fertiliser for rubber with the members of this Committee. No doubt, there is scope for extensive use of fertilisers in rubber plantations and there is an urgent need for increasing the use of fertilisers by the small growers. The Board is fully conscious of its role in this regard and it is proposed to extend substantial benefits to the small growers for encouraging them to go in for fertilisers.

The third important way in which the modernisation of the plantations can take place is by the organisation of the small holding sector. At present the main way in which we intend to organise the small holdings is through the co-operative movement. It may be that in special cases we have to think of organising them otherwise.

As you are aware we have got a special fund called the Pool Fund, for the rehabilitation of small holders. At present the main schemes for small growers, financed from the Pool Fund are;

- (1) New-planting loan scheme.
- (2) Loan for upkeep of immature areas.

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- (1) New-planting loan scheme.
- (2) Loan for upkeep of immature areas.

- (3) Grant for construction of smoke houses.
- (4) Assistance to rubber marketing societies.
- (5) Distribution of planting materials free of cost.
- (6) Subsidised distribution of copper sulphate.
- (7) Distribution of dusters and sprayers.
- (8) Subsidised use of fertiliser to small growers.
- (9) Subsidy for edakayyalas, etc.

We are laying out demonstration plots for the benefit of the small growers and have appointed special staff for training tappers. The general advisory service of the Board functions through its extension staff. Advisory leaflets are being distributed through extension staff and otherwise.

So far, though we have collected more than Rs. 1 crore towards the Pool Fund, we have not been able to utilise much of it. In fact it is only about a year back we put the money in the Bank and started earning interest on it. At present the annual interest on our Pool Fund collections comes to roughly Rs. 3. 5 lakhs.

The following will show the expenditure incurred on the various schemes in the Pool Fund.

Year	Receipts on acco- unt of price diff- erntial	Other receipts	Expenditure	Closing balance
	(In le	ikhs of Rupees)		
1956-'57 1957-'58	2.07 11.77		nîl	2.07
1958-'59	62.50		0.13	13.84 76.21
1959-'60 1960-'61	1.89	0.03	0.43	77.70
1961-'62	0.09 0.63	0.10 0.22	0.33	77.56
1962-'63	21.05	0.30	1.08 1.47	77.33 97.21
1963-'64 1964-'65 (up)	5.85	0.84	2.18	101.72
to the end of Feb., '65)	0.53	3.84	5.91	100.18
Total:	106.38	5.33	11.53	100.18

The figures of expenditure from the Pool Fund have not been very encouraging. There is particularly great scope for popularising the use of fertilisers among the small growers. It is with a view to speed up the expenditure from the Pool Fund on worthwhile schemes for the benefit of small growers, that the Board appointed in its last

Meeting a Sub-Committee for preparing schemes for the small growers. The deliberations of the members of the Sub-Committee and special schemes prepared by them are being placed now before the Board for approval. It is hoped that with the approval of the schemes, the figures of expenditure will improve. There need not be

any apprehension that after a few years such schemes cannot be financed from the Pool Fund because with the increased production we hope to get and the increase in excise duty collections, the Board can get some of these schemes transferred from the Pool Fund to the General Fund

The idea is that this fund of Rs. I crore is usefully invested so that it results in increased production and increased excise duty collection which again can be utilised for the continued rehabilitation of the small growers. It may not be out of place here to review the progress of the schemes at present being worked out, for the small growers.

The New-planting loan scheme which was started in 1962 has not proved popular. In 1962, against the target of 2,500 acres, the permits granted amount to only 206.00 acres and in 1963 and 1964 against the same targets, the acreage for which permits granted were 173.00 and 88.00 acres respectively. The yearwise expenditure also shows that in 1963-'64 it was Rs. 53,547/- and in 1964-'65 Rs. 66,701/-. For the year 1965 we have received applications covering an area of 854 acres. It appears that the scrutiny of title deeds etc. and the registration fee, stamp duty and other considerations have been discouraging factors to many parties applying for newplanting loans. We have been trying to liberalise the interpretation of our rules and to cut down the formalities to the minimum. The second scheme is for the upkeep of immature areas lar. The scheme was introduced in 1964 and we received 292 applications covering

an area of 1865 acres. But the permits issued amounted only to 256 acres and the expenditure incurred during the year 1964- '65 is only Rs. 9,972)- against the provision of Rs. 1,00,000/-. Here again the low amount of loan granted and formalities involved have deterred many parties from availing of the benefits of the loan. For the year 1965, we have received applications totalling an area of 568 acres. In this case also we have liberalised the interpretation of the rules but the scheme has not proved attractive.

I had mentioned at the last Meeting of the Board that we had drawn up a scheme in consultation with the Land Mortgage Bank combining the above two schemes. The scheme is yet to get the sanction of the Government of India, as there has been some correspondence with the Kerala State Government about obtaining its guarantee, etc. We hope to get the State Government guarantee but much has to done to make the scheme popular. Perhaps giving subsidy to the applicants for new-planting and upkeep of interactions of the scheme becoming popular.

17 smoke houses were sanctioned to 16 societies, but construction of 12 smoke houses has been completed so far, and the Rubber Board has paid a subsidy of Rs. 46,982/- towards the construction of the smoke houses. Excepting in three or four cases, these smoke houses have not been functioning well. This is due to the fact that many of these co-operative societies which have taken the subsidy for the smoke houses, did not have sufficient working capital for the running of the smoke houses.

or for the purchase of latex. We have therefore formulated a scheme for share capital contribution [to some of these societies so that their smoke houses can work.

of which one is general marketing society and the rest are registered exclusively for rubber marketing. Another society, the Marketing Society at Palai, has refunded the amount of Rs. 30,000/- which was sanctioned as working capital, as it was very busy with other activities. Generally the marketing societies have been working very well and they have marketed rubber sheets, scrap, etc; to the extent of Rs. 26,85,267/- in the course of an year. Considering the difficulties which these societies have been facing, the progress has been satisfactory and there are some proposals to strengthen the co-operative movement in rubber marketing and sanction additional working capital to the existing societies and working capital to more societies which have applied for the loan. Some of the rubber marketing societies are even interested in putting up crepe mills and these proposals are also being considered by the Board.

We have distributed sprayers to 57 cooperative societies and this scheme has been working well. The scheme for the subsidy on the distribution of copper sulphate is just becoming popular and there is a proposal to increase the percentage of subsidy upto 50 per cent which is being placed before the Board for approval.

There is another scheme now formulated for giving subsidy at 50 per cent for the purchase of rubber fertilisers to rubber growers through co-operative societies. The scheme is being placed before the Board. The scheme for the distribution of formic acid through co-operative societies is also becoming popular. In this case no financial aid is given to the co-operative societies. But quotas are being allotted by the Rubber Board and the societies are directly dealing with the distributors.

These are the measures undertaken by the Rubber Board to modernise the plantation industry.

I should mention something about the measures undertaken by the Rubber Board for labour welfare. An amount of Rs. 1,18,944/- has been paid as stipend during the half year of 1964-765. The Government of India have accepted the recommendations of the Wage Board for the Rubber Plantation Industry and issued the notification of the revised rate of wages for plantation labour.

The competition from synthetics, and increase on certain items of the production cost of natural rubber have necessitated the urgent need for modernisation of the industry. At the same time mention should be made of some of the factors which are very favourable for the growth of natural rubber industry in India. Natural rubber industry in India has been enjoying continued protection, a consistent price policy and an expanding market. These are advantages which are not available in full measure to the major rubber producing countries of Malaya and Ceylon where the rubber has to face a very highly competitive world market. There is practically no internal market for rubber in those countries. mation available shows that the ruling price

# The 49th Meeting of the Rubber Board

The 49th meeting of the Rubber Board was held at 10,30 AM on Saturday, the 20th March 1965, at the Board's Office a, Puthupally, Kottayam.

The following members were present. Shri P. S. Habeeb Mahamed, Chairman.

- ., P. K .Ali
- " George John
- " Michael A. Kallivayalil
- K. C. Sankaranarayanan

Dr. V. R. Narayanan Nair

Shri J. C. Chaly

- " Joseph Mangara
- " K. Karunakaran
- " B. K. Nair
- ., A. T. Mathyoo
- ,. Mathew Abraham
- ., A. K. Kunhikannan Nambiar

Dr. Seetharamiah

Shri P. C. Baby

" T. Jayadev

Dr. K. T. Jacob, Rubber Production Com-

The following gentlemen attended the meeting by special invitation.

of rubber in the Singapore market at the end of February, 1965 was Rs. 125/- per 50 kg. The ruling price at Colombo was Rs. 115/- per 50 kg.

Our price for the same at Cochin is Rs. 161.50. I think in other countries there are no special funds exclusively for the use of the small rubber growers just as we have, because this fund

Shri K. Srinivasan, Messrs. A. V. Thomas & Co., Ltd., Alleppey.

K. Narayanan, Registrar of Co-operative Societies, Kerala.

Nanavathi, Messrs. Synthetics &

The Chairman welcomed the members to the first meeting of the reconstituted Board. (The Chairman's speech is published elsewhere in this issue)

After the Chairman's speech, Shri K. C. Sankaranarayanan, with the permission of the Chair, pointed out that the total expenditure of the Plantation Corporation of Kerala Ltd., on their rubber planting scheme was only Rs. I. 5 crores upto February 1965 and not Rs. 2. 00 crores. Up to that date the expenditure might have gone upto Rs. 1. 75 crores only. He also said that there was no Pool Fund in Malaya for the rehabilitation of small growers but there was a special fund for their rehabilitation. The Chairman agreed that the latter position was correct.

Shri K. Srinivasan wanted to know why the production of synthetic rubber was being

indigenous rubber. We should, therefore, and at the same time take note of the trends uptodate. There is no need for any alarm and at the same time no room for compla-

encouraged in the country and preference given to it by the Government in marketing. The emergence of synthetic rubber held out a serious threat to the natural rubber industry, He said that the Government might confine its interests to the higher production of natural rubber. There was already a shortage of natural rubber in the country and various state Governments were spending money to bring more land under rubber. Shri Srinivasan felt that the serious competition from synthetic rubber would adversely affect the production, manufacture and consumption of natural rubber in the country. Even at the higher cost of production of synthetic rubber, the Government evinced greater interest in its marketing. He feared that if support were given to it by the Government without going into its cost of production as was done by the Tariff Commission in the case of natural rubber, it was very likely that within a few years synthetic rubber might be in a position to lower its cost of production. In three or four years the synthetic rubber industry might sell its product at 4 as, or 6 as per lb, he said.

Dr. Seetharamiah said that there was a great misapprehension among the planters that the Government was affording undue privileges to the synthetic rubber industry. He explained that even imported synthetic rubber could not be sold at less than Re 1 per lb c.i. f.

Continuing Shri Srinivasan said that in Germany the cost of production of synthetic rubber was only 52 P per lb. The cost in India was higher because synthetic rubber was produced from alcohol. Shri Nanavathi agreed that the use of alcohol was affecting

the cost of production and he could not see any possibility of the cost of synthetic rubber being brought down to a level of 6 as or 8 as per lb. Shri Srinivasan wanted the cost of production of synthetic rubber to be investigated by the Government. Shri K. C. Sankaranarayan said that it was possible that the cost of synthetic rubber might be brought down in future while at the same time, with the revision of the wage structure etc. under the various statutes, the cost of natural rubber might go up.

Dr. Seetharamaiah did not feel that it was a realistic view. The Chairman had laid stress on the need for modernisation of the natural rubber industry with a view to bringing down the cost of production for which research had to be intensified. What had been done in Malaya in this regard could be done here also. There need not be any fear of competition from the synthetic rubber industry in the foreseeable future. Natural rubber had many advantages over synthetic rubber, he said. Synthetic rubber could score over natural rubber only in certain uses. Neither could synthetic rubber completely replace natural rubber. There were many varieties of synthetic rubber each one with a particular advantage, but all the same they could not by themselves replace natural rubber which was suitable for the maximum percentage of manufactures. Government had so far licensed only one synthetic rubber manufacturing unit and that need not create any apprehension. Government was interested in increasing the production of natural rubber under the most favourable circumstances. The licensing of one unit for synthetic rubber was itself necessitated by certain important considerations.



Chairman addressing the 49th meeting of the Rubber Board

Explaining these considerations Dr. Seetharamiah continued, "There has been a widening gap between supply and demand of rubber. The gap can be met only by imports. It means so much more expenditure of foreign exchange. It was in this context that Government thought of licensing one synthetic rubber plant. Synthetic rubber plants are thought of only to supplement natural rubber production. Government want to give all possible protection and encouragement to the natural rubber industry. At the end of the Third Plan period, the consumption of natural and synthetic rubbers in the country would be a little above 100,000 tonnes while natural rubber production would be only about 45/50,000 tonnes. Against a shortage of 50,000 tonnes, only 20,000 tonnes of synthetic rubber could be 30,000 tonnes of natural rubber would exist and it may even go up to 50,000 tonnes.

"The gap between production and demand of natural rubber has been widening year after year. The industry could have improved its lot if it had envisaged these facts earlier. By the end of 1970-71, the

total requirement of rubber in the country would be about 200,000 tonnes. This is based on the number of vehicles that would be produced and put on the road. But by that time, the production of natural rubber may not be more than 75,000 tonnes. If the Board could devise ways and means to increase natural rubber production to at least 100,000 tonnes by that time, it would be doing a very real service. The Board expects a production of 75,000 tonnes by 1970-71. Synthetic rubber production would be 30,000 tonnes and reclaimed rubber 25,000 tonnes. To make up the shortage, with due regard to the foreign exchange position, there are proposals to put up a Butyle rubber plant capable of manufacturing 20,000 tonnes a year. This would serve the needs for making inner

Dr. Seetharamiah continued, "Hence the need of the hour is that production of natural rubber in the country should be raised to the highest possible level. Compounding natural rubber with synthetic rubber is possible only to the extent of 50%. It should be the aim of the Board to achieve the target of 100,000 tonnes by 1970-71". He said

that the estimate of demand of rubber in the country by the end of 1975-76 would be 300,000 tonnes and by the end of 1980-81 it would be 425,000 tonnes. The productit was only by such a course higher productreduced. He exhorted the Board to take a perspective view of the future situation. There was bound to be very much more demand for natural rubber. The Government would be prepared to consult the natural rubber industry if further licensing of synthetic rubber was contemplated. For the production of synthetic rubber, raw materials should be available in plenty and cost of production should be reasonable. Referring to the production of Messrs. Synthetics & Chemicals Ltd., Dr. Seetharamiah said that the cost of production was admittedly high, but the Government could not keep back same type of synthetic rubber only because the country was very short of foreign ex-

Continuing Dr. Seetharamiah said that the decision to license a synthetic rubber factory was taken with two views viz. to lessen expenditure on foreign exchange and to help the sugar-cane industry in U. P. Now oil refineries have been started by the Government. The waste products from these refineries could be used for the production of oil-resistant types of synthetic rubber. He assured that although the cost of synthetic rubber could be appreciably brought down, it would not be able to compete with the prices of natural rubber.

The Chairman said that natural rubber

was not facing any difficulty in its marketing at the present time and that the question might be taken up when a situation arose. He added that the production of natural rubber at present was only round about 46,000 tonnes.

Shri K. C. Sankaranarayanan said that the state Governments of Kerala, Madras and Mysore had taken an active interest in the promotion of rubber cultivation and it would be possible to produce a quantity almost equal to the demand in future years, that is, to reach the target of 100,000 tonnes by the end of the Fourth Plan period in 1970-71. He also emphasised that the Government should allow the industry to import more planting materials from Malaya. The Board was doing everything possible in the way of expanding its research activities, supply of planting materials and advisory service, Hence there would seem to be no need for Government licensing any more synthetic plant in the country. He also wanted that the Central Government should not give any undue preference to the synthetic rubber industry already existing in the country.

After the general discussions, the meeting concerned itself with the agenda before it. The important decisions taken at the meeting are detailed below.

# Election of Vice-Chairman

Shri George John was unanimously elected Vice-Chairman of the Board for a period till 6-7-1965 in accordance with rule 8 (2) of the Rubber Rules, 1955.

# Election to Various Committees

(1) Executive Committee. In addition to the Chairman and two other official members as laid down by Rule 15 (1) of the

Rubber Rules, 1955, namely, the Chairman, the Vice-Chairman and the Rubber Production Commissioner, the following members were elected to the Executive Committee.

- Dr. V. R. Narayanan Nair, and Shri Michael A. Kallivayalil
- (2) Planting Committee. The following members, in addition to the Chairman, were elected to constitute the Planting Committee for a period of two years.

Shri Joseph Mangara,

- ., J. C. Chaly,
- " P. K. Ali,
- " Michael A. Kallivayalil,
- .. B. K. Nair,
- " K. Karunakaran and the Rubber Production Commissioner

It was decided that Shri C. H. S. London shall also be a member of the Committee.

(3) Smallholdings Development Committee. The following members, in addition to the Chairman, were elected to constitute the Smallholdings Development Committee for a period of two years.

Shri Joseph Mangara

Dr. V. R. Narayanan Nair,

Shri Mathew Abraham,

- " K. C. Sankaranarayanan, and the Rubber Production Commissioner.
- (4) Import-Export Committee. The following members, in addition to the Chairman, were elected to constitute the Import-Export Committee for a period of two years.

Shri George John.

- " K. M. Philip,
- ,, A. T. Mathyoo,
- " Michael A. Kallivayalil, and
- Dr. Seetharamiah.

(5) Labour Welfare Committee. The following members, in addition to the Chairman, were elected to constitute the Labour Welfare Committee for a period of two years.

Shri K. Karunakaran,

- " B. K. Nair,
- " P. K. Ali.

., Mathew Abraham, and the

Rubber Production Commissioner.

Replanting Subsidy Scheme Rules,

The Board approved the Replanting Subsidy Scheme Rules, 1966, drafted in final form and the Chairman was authorised to take immediate steps to get the Rules approved by Government as early as possible in order to implement them from the commencement of 1966.

The Board also expressed the wish that the Replanting Subsidy Scheme should be continued during the Fourth Plan period also.

Sub-Office at Kanjirapally

The Board resolved that a Sub-office be opened at Kanjirapally from the commencement of the year 1965-66.

Distribution of Planting Materials

It was decided by the Board that the scheme of purchase and distribution of planting materials should be continued in 1965 at the following rates.

- (!) Tjir I seeds be purchased @ Rs. 35.00 per 1000 and issued to small growers at the subsidised rate of Rs. 30.00 per 1000, maximum supply being limited to 2000 seeds to any one applicant.
- (2) Germinated seeds be supplied at an extra cost of Rs. 5.00 per 1000 or fractions thereof.

- (3) The cost of indigenous varieties of planting materials supplied to replanting small growers (whose total area does not exceed 15.00 acres) be reimbursed to them in accordance with the Replanting Subsidy Rules, 1965.
- (4) PBIG, GG1 and GG2 seedlings be distributed at a concessional rate of Re.0.84 per seedling to all small growers.

# Supply of Copper Sulphate

The Board unanimously resolved to adopt the scheme of subsidising the cost of copper sulphate to the extent of 50% and that the same rate of subsidy calculated at the price of copper sulphate be allowed in respect of any other copper fungicide and diluent spray oil such as copper oxychloride used for spraying, employing low volume air blast sprayers and that the scheme shall be in operation for one year. The subsidy shall be limited to a maximum of Rs. 24.00 per acre for mature areas and Rs. 18.00 per acre for immature areas. The procedure for payment of subsidy shall be the same as that followed in 1964.

## Supply of Rollers

The Board decided that only Double rollers need be purchased and supplied to small growers on hire purchase basis and that supplies shall be made only through co-operative societies. The scheme shall be in operation for one year. But if any particular small holder wanted a roller direct from the Board, it may be supplied subject to special sanction of the Chairman.

## Supply of Manure

The Board approved the scheme for supply of manure to growers at subsidised rates to be in force for one year. The price of manure shall be fixed and communicated by the Board to the co-operative societies. This will be applicable only to those areas where proper cover crop has been established and without inter-cropping and interplanting.

## Regional Demonstration Plots

The Board unanimously approved the scheme of starting demonstration plots, one in the jurisdiction of each Rubber Instructor, and that the area of such plots need not necessarily be five acres but can even be lower, i.e. three acres

## Subsidy for Smoke-houses

The Scheme of granting subsidy to cooperative societies for construction of smoke houses was approved by the Board and it was decided that the scheme shall be in operation for one year.

# Loan for Rubber Marketing Societies

It was decided that the loan amount be enhanced to Rs. 50,000 per society, subject to a pro rata increase in its share capital and that the loan would bear the original rate of 5% interest.

# Share Capital Participation in

The Board decided to approve the scheme of share capital participation in smoke house and marketing co-operatives doing rubber marketing and that the scheme shall be in operation for one year.

## Managerial Subsidy Scheme to Societies

The Board resolved that subsidy for managerial assistance for three years to smoke house and marketing societies doing rubber

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marketing be given and that the scheme be in operation for one year.

# Supply of Sprayers

The Board approved the scheme for supply of sprayers to growers through co-operative societies and decided that it shall be in operation for one year-in the first instance. It was also decided that sprayers and dusters shall be released to the societies on their executing necessary agreement in favour of the Board for their safe custedy and return in good condition when demanded.

# Tappers' Training School

The Board approved the scheme for establishing a Rubber Tappers' Training School. As per the scheme, it is contemplated to have three training courses in a year, of eight weeks duration each. It is proposed to admit eight candidates for each of the courses, the selections to be restricted to the sons and dependants of small holders who want to take up tapping as a profession. A stipend of Rs. 12.00 per week per trainee will be given. The scheme will be in operation for one year.

#### Award to the Best Planter

The Board decided that two annual prizes shall be instituted to be given to small holders only and that a First Prize of Rs. 100 and a Second Prize of Rs. 50 (both in eash) be awarded to the best planters in the jurisdiction of each sub-office of the Board. A certificate will also be presented.

## Educational Stipend Scheme

The Board resolved that the Educational Stipend Scheme for children of workers and staff of registered rubber estates be continued in 1965-66 also.

# Import of Rubber during 1965-66

The Board resolved to recommend to the Government that the estimated overall deficit of natural and synthetic rubber during 1965-66 be of the order of 45,000 tonnes without taking into consideration the domestic production of synthetic rubber. It also resolved to recommend to the Government that the policy of import of rubber against d. r. c. of exported goods be continued in 1965-66 also. The question of import of reclaimed rubber was decided to be left to the Government to decide as the Board did not have any figures relating to production or consumption of this variety in India.

# Post-Graduate Course in Plantation Crops

The Board approved in principle a scheme for the introduction of a post-graduate course in plantation crops with specialisation in rubber. The course is to be opened at the Agricultural College and Research Institute, Vellayani, Trivandrum. The scheme is to work for a period of six years in the first instance.

# Smallholders' Advisory Service.

The Board unanimously approved a scheme for starting a Smallholders' Advisory Service on the same pattern as that prevailing in Malaya, with necessary staff and mobile equipments.

## Committee for Research and Extension Work

The Board resolved to constitute a Research and Extension Service Committee with the following members.

(continued on page 81)

# Shade as a Culture for the Control of Leaf-Spot Disease occurring in Heaved Seedling Nurseries

K. C. ANANTH<sup>1</sup> and K. N. G. MENON<sup>2</sup>

## Introduction

The occurrence of 'Birds eye spot' disease in nurseries and young plants caused by Helminthosporium heaveae is reported to be on the decrease in this country of late; however, another leaf-spot disease caused by Corynespora cassiicola appears to have assumed importance recently. This fungus is known to do much more damage to the nursery plants than Helminthosporium, by causing repeated defoliation.

Direct control measures employed by spraying copper formulations with and without zinc did not give any consistent response and so defective nutrition was attributed as a probable cause to this disease. One of the authors (KCA), with some experience in Coffee, in which crop a leaf-spot disease, is checked by shading, wanted to approach the problem on a similar cultural technique by providing light overhead shade, as practised in coffee nurseries. Accordingly, a feeler trial was laid out at the Board's nursery at Karikattoor to study certain aspects of nutrition under shaded and open conditions on the incidence of leaf-spot

disease on rubber seedlings. The treatments employed, the materials used in this simple trial along with the observations recorded and the indications thereon are presented in the following pages.

## Treatments

The treatments employed in this trial were as follows:—

- 1. Control
- 2. Shaded
- 3. Manured, and
- 4. Manured + shaded.

The planting material used was Tjr I seedlings, transplanted during the last week of August 1963, with a spacing of  $12^{\circ} \times 12^{\circ}$ . Under each treatment, there were 15 beds, individual beds measuring approximately 35' in length and 5' in width. Control beds did not receive either the basal dressing of rock-phosphate or the NPK 8: 12: 10 fertiliser mixture. On the other hand, manured beds were given in conformity with the Board's nursery practice, the basal dressing of 100 kg. rock-phosphate and 1000 kg. NPK 8: 12: 10

<sup>1.</sup> Deputy Director (Agronomy), RRII, Kottayam 9

<sup>2.</sup> Field Officer, Development Department, Rubber Board-

fertiliser mixture per acre in two split applications. The overhead shade (pandal) work was completed during the first week of October 1963. The height of the pandal was, on an average, 6' from ground level and constructed with necessary top supports to spread the (unwoven) green coconut leaves to give partial shade. The intensity of shade progressively decreased with drying of coconut leaves, which gave a lattice type of shade almost upto the end of February 1964. Due to the drying and complete disintegration of the coconut leaves by the end of March 1964 the shading was very sparse. Actually the pandal was removed during mid May 1964, when rainy and cloudy conditions were experienced.

## Spray Treatment

Though originally not contemplated, a spray treatment was superimposed on randomly selected 5 beds, under each treatment on 18th December 1963. The seedlings in the selected beds were sprayed with 5 per cent neutral Bordeaux mixture, employing a low volume mist blower type of knapsac sprayer on the afternoon of 18, 12, 1963 and then on at monthly intervals up to march 1964. The beds with spray treatments received in all 4 rounds of Bordeaux mixture application. With the superimposition of spray treatments for certain beds chosen at random, the ultimate treatment-combinat\_ ions, available for observation, were as

- Control E. Manured + sprayed Manured F. Manured + shaded
- Sprayed G. Sprayed + shaded, and
- Shaded H. Manured + sprayed +

## Observations

Assessments of disease incidence, seedling height and girth, casualties, rejects and the number of transplantable seedlings were carried out.

(a) Disease Incidence: To assess the leaf-spot disease position, 50 seedlings were selected at random and from each seedling, 2 leaves were collected with the help of unskilled mazdoor, from individual treatments at monthly intervals. Tender leaves were not collected and thus 100 fully developed leaves under each treatment were subjected to disease spot count to assess the degree of disease incidence. For purposes of assessment, leaves containing 5 spots and above were considered as diseased. Further classifications were made to determine the intensity and severity of the disease. Accordingly, the leaves containing 5 to 10 spots were put under very mild, 10 to 20 spots as mild, 20 to 50 spots as severe and over 50 spots, including scorched leaves, as very severe categories. The percentage and intensity of disease incidence in the samples assessed along with the general visual observations recorded are presented in Table I.

From the table it can be seen that under overhead shade either alone or in combination with other treatments, seedlings registered only mild spotting, whereas the disease continued to be virulent under open conditions irrespective of manurial or spray treatments. The above revealed the importance of shade in reducing the disease intensity. During March and April 1964, due to considerable flush formation the disease incidence was comparatively milder throughout the experimental area. The visual observations made at the close of the experiment re-

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# Table I Statement showing the percentage and intensity of leaf-spot

TOTAL VISUAL ODSELVATIONS.	Remarks, by visual observations as on 25-6-1964	Stunted-very severe defoliation, Casual-	Uneven growth—very severe defoliation	Casualnes very high. Stunted—severe defoliation. Rejects very	Stunted—Healthy and uniform seedlings.	Uneven growth—severe defoliation.	Healthy and uniform. Best of the lot with dark press. Lower	Healthy and uniform, but possibly sup-	Appeared the second best, with healthy leaves.
	April & May	N. F.	N. F.	N. F.	N. F.	Z. F.	N. F.	N. F.	z.
	February 29-2-64	**06	**96	1001	**98	**08	**06	100**	92**
-	February 7-2-64	100 ‡	92 <del>†</del>	1001	**98	1001	72**	72**	**08
-	October Nevember December February February April 25-10-63 23-11-63 29-12-63 7-2-64 29-2-64 & May	81**	1001	***9	73**	92**	46*	72*	40**
-	November 23-11-63	83**	83†	1	51**		**02		:
	October 25-10-63	**19	**05		35**	1	**69	:	:
-	Treatments	A. Control	B. Manured	C. Sprayed	D. Shaded	E. Manured + sprayed	Manured + shaded	Sprayed + shaded	Manured + shaded + sprayed
1	Trea	A.	B.	C	D.	E.	H.	G.	H

<sup>\*</sup> Intensity of spotting 5-10 spots-very mild.

\*\* Intensity of spotting 10-20 spots-mild.

-very mild.

† Intensity of spotting 20–50 spots—servire.

† Intensity of spotting over 50–very severe. (including scorched leaves).

N. F. = New flush with very little or no spotting.

vealed the manured + shaded and manured + shaded + sprayed beds as outstanding.

(b) Assessment of Height: Height recording of seedlings, chosen at random, from the different treatments, was undertaken on 18-12-1963. The relevant data are given in Table II.

TABLE II
Height of seedlings chosen at random as influenced by different treatments.

Treatments		Average height of seedling in inches as on 18-12-196.		
1.	Control	22.90		
2.	Shaded	22.16		
3.	Manured	29.00		
4.	Manured +			
	shaded	26.70		

From this data, it is clear that manuring at the recommended dose helps to achieve maximum height, both under open and shaded conditions. No manuring, both under open and shaded conditions, recorded low growth rate in terms of plant height-Summing up, it may be said that the pattern of shade used in this experiment did not alter appreciably the height of the seedlings.

(c) Assessment of transplantable seedlings: From the experimental area, the entire seedlings were pulled out on 25, 6, 1964. The transplantable seedlings, with standard stem girth at ground level being 2.0° and above, were separately counted. The data collected along with the calculated proportion of transplantable plants in relation to the original number of plant points are presented in Table III (a)

TABLE III (a)

Proportion of transplantable plants to original number of plant points at the end
of June, standard girth at ground level being 2.0" and above.

	Treatments	No. of original plant points	No. of transp- lantable seedlings	Proportion of transpl- antable plants to total	Standard
	1	2 .	3	4	5
A.	Control	1164	241	0.207	0.0119
В.	Manured	3219	752	0.234	0.0075
C.	Sprayed	872	226	0 259	0.0148
D.	Shaded	2429	845	0,348	0.0096
E.	Manured+sprayed	797	229	0.287	0.0160
F.	Manured + shaded	1333	511	0.383	0.0133
G.	Sprayed+shaded	905	309	0.341	0.0157
H.	Manured+shaded+ Sprayed	744	272	0.366	0.0177
Tre	atments	F H	D G	E C	<u>B</u>

The treatment, F (manured + shaded) gave 38.3 per cent transplantable seedlings, immediately followed by the treatment H<sub>1</sub>, (manured + shaded + sprayed) with 36.6 per cent. The treatment F, with a percentage of 38.3 transplantable seedlings was significantly superior to D (shaded-34.8%), G (sprayed+shaded-34.1%), E (manured+sprayed-28.7%), C (sprayed-25.9%), B (manured-23.4%) and A (control-20.7%). However, there was no significant difference

between treatments F and H and among H, D and G. It is interesting to note that treatments with shade combinations (F, H, D and G) were significantly superior to the treatments with no shade (E, C, B and A).

In a similar manner, the proportion of transplantable plants in relation to the final stand as on June 25, 1964, with standard girth at ground level being 2.0" and above, was also calculated and is presented in Table III (b).

TABLE III (b)

Proportion of transplantable plants in the final stand as on June 1964, standard girth at ground level being 2" and above.

Treatments		No. o seedlin stand the end June 19	gs at of	No. trans antal seedli	pl- ole	propor of tra antab June s	nspl- le to	Standard error		
	1	2			3	4			5	
A.	Control	806		241		0.299		0.0	0161	
В.	B. Manured			752		0.366		0.0106		
C.	C. Sprayed 70		700		226		0.323		0.0177	
D.	D. Shaded		2113		845		7	0.0	107	
E.	Manured and sp	prayed 545	yed 545		229		9	0.0	211	
F.	Manured and sh	naded 1065		5	11	0 48	5	0.	152	
G.	Sprayed and sh	naded 793	ed 793		309		0	0,0	0172	
H. Manured, shaded		ed								
	and sprayed	630		2	72	0.43	2	0.0	197	
Treat	ments	F	H	E	G	D	В	C	A	
Percenta	ge	48.5	43.2	41.9	40.0	39.7	36.6	32.3	29.9	

From the table it may be seen that transplantable proportion expressed in terms of percentage in relation to the June 1964 stand was uniformly on the high side due to the occurrence of vacancies. However, the treatments F (manured + shaded) and H

(manured+shaded + sprayed) maintained the same order of superiority. The treatment E (manured+sprayed) occupied third position with 41.9 per cent of transplantable seedlings when proportions were expressed on final stand, as against 5th position (with 28.7%) in relation to the original plant Further the percentage of transplantable points. These variations are indicative of seedlings under different treatments, with the large number of rejects and casualties girth at ground level being 2.0" and above

as standard, are presented in table IV.

TABLE IV Percentage of transplantable seedlings under different treatments, standard girth at ground level being 2.0° and above in relation to the original plant points.

(a) Shade Vs no shade:

Treatment	Shade	No shade
Not manured and not sprayed	34.8	20.7
Manured and sprayed Manured only	36.6	28.7
Sprayed only	38.3	23.4
Sprayed only	34.1	. 25.9
Weighted mean .	35.8**	23.9

(b) Manure Vs no manure:

Treatment	Manured	Not manured
Not shaded and not sprayed	23.4	20.7
Shaded and sprayed	36.6	34.1
Shaded only	38.3	34.8
Sprayed only	28.7	25.9
Weighted mean	29.0	30.2

(c) Spray Vs no spray:

Treatment	Sprayed	Not sprayed
Not manured and not shaded	25.9	20.7
Manured and shaded	36.6	38.3
Manured only	28.7	23.4
Shaded only	34.1	34-8
Weighted mean	31.2*	28.8

<sup>\*\*</sup> Significant at 1 per cent level. \* Significant at 5 per cent level.

From these individual tables, it is evident reduce the number of transplantable seedthat shading was significantly superior to lings and the reduction was not statistically open conditions. Manuring was found to significant. The spray treatment has significant. ficantly increased the percentage of trans- from the above, an assessment of casualties plantable seedlings.

as influenced by different treatments was undertaken and the relevant data are given in

(d) Assessment of casualties: Apart Table V.

TABLE V

Percentage of casualties of seedlings under different treatments, at the close of the experiment (June 1964).

# (a) Shade vs no shade

Treatment	Shade	No shade
Not manured and not sprayed	13.0	30.8
Manured and sprayed	15.3	31.7
Manured only	20.1	35.9
Sprayed only	12.4	19.7
Weighted mean	15.0	32.0**

## (b) Manure vs no manure

Treatment	Manured	Not manured
Not shaded and not sprayed	35.9	30.8
Shaded and sprayed	15.3	12.4
Shaded only	20.1	13.0
Sprayed only	31.7	19.7
Weighted mean	29.4**	17.8

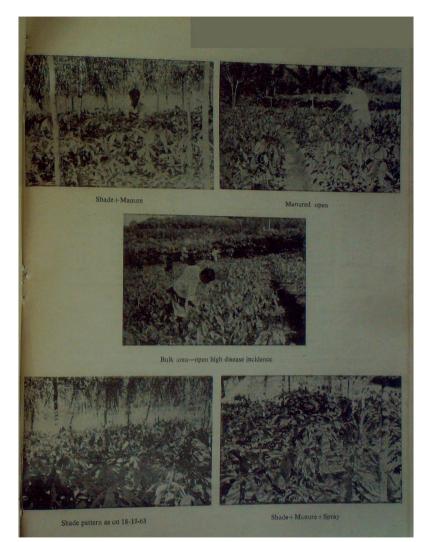
## (c) Spray vs no spray

Treatment	Sprayed	Not sprayed
Not manured and not shaded	19 7	30.8
Manured and shaded	15.3	20.1
Manured only	31.7	35.9
Shaded only	12.4	13.0
Weighted mean	19.6	25.8**

Significant at 1 per cent level

Here again, it may be noted that the shading and spraying, under independent assessment, have significantly reduced the seed-

ling casualties. On the other hand, manuring has incereased the percentage of casualties significantly.



(c) Assessment of girth: The data recorded by actual girth measurement of individual seedlings, from one bed chosen at random, are grouped in convenient intervals

and the percentage distribution of seedlings from different treatment combinations are presented in Table VI.

TABLE VI

Percentage distribution of plants according to their girth under different treatments as on 25-6-1964.

Group size in inches	Control	Manured	Sprayed	Shaded	Manu- red + Sprayed	Manured + Shaded	Sprayed + Shaded	Manured + Sprayed + Shaded
	A	В	C	D	E	F	G	Н
0·00-1·00 1·00-1·50 1·50-2·00 2·00-2·50 2·50-3·00 3·00-3·50 3·50-4.00	14.9 50·3 14·9 5·7 9·2 4·3 0·7	2·9 37·3 15·7 14·7 13·7 10·8 4·9	10·1 38·7 25·6 10·1 10·1 5·4 0·0	6·4 36·9 24·2 16·6 15·3 0·6 0·0	6·6 38·2 21·9 12·4 12·4 4·8 3·8	4·3 31·9 12·1 11·2 15·5 17·2 7.8	9·5 32·3 19·0 22·1 15·8 1·3 0·0	6·5 25·9 18·7 20·9 19·4 5·7 2·9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Treatme	nt: F	Н	В	Ē	D	c	G	A
Mean gi		1.998	1.998	1 829	1.747	1.688	1.592	1.548
S. D.	1.907	0.748	0.807	0.755	0.604	0.664	0.545	0.673

Perusal of the data, clearly indicated that highest average girth (2.172 inches) was obtained under treatment F (manured+shaded) along with 63.8 per cent of seedlings above 1.50 inches girth. Though treatment H and B recorded the same average girth(1.998")the percentage of seedlings obtained above 1.50 inches girth, was 67.6 and 59.8 respectively. On the whole, higher percentage of seedlings in the category of the above 1.50 inches girth, was obtained mostly from shaded treatment-combinations, while lowest average girth (1.548 inches) and low percentage (34.8) of transplantable seedlings were recorded from control beds. Concluding, it

may be pointed out that the treatment F (manured+shaded) was significantly superior to the treatments E (manured+sprayed), D (shaded), for the growth attribute expressed as average stem girth at ground level. However, there was no significant difference among the treatments F, H and B.

(f) Comparative Assessment: As a comparative assessment the percentage of transplantable seedlings, rejects and casualties under different treatment—combinations was calculated as on June 1964, in relation to the original plant points, and are given in table VII.

TABLE VII

Percentage of transplantable seedlings, rejects and casualties under different treatments as on June 1964, in relation to the original plant points.

100	us.				
Treatment		Transplantable seedlings above 2.0" above 1.50"	Rejects 2.0" & below 1.50" & below	Casualties	Total
Α.	Control	20·7 24·2	48·5 45·0	30.8	100
В.	Manured	23·4 38·1	40·7 26·0	35.9	100
C.	Sprayed	25·9 41·3	54·4 39·0	19:7	100
D.	Shaded	34·8 49·0	5·22 38·0	13.0	100
E.	Manured + sprayed	28·7 38·4	39·7 30·0	31.6	100
7.	Manured + shaded	38·3 50·0	41·6 29·0	20.1	100
3.	Sprayed + shaded	34·1 50·6	53·5 37·0	12.4	100
H.	Manured + spray- ed + shaded	36·6 57·7	48·1 27·0	15.3	100

From the available figures it is worth noting that treatments with shade combinations have contributed to the large percentage of transplantable seedlings (34.1 to 38.3%) with low percentage of casualties (12.4 to 20.1%). It is essential to point out that (seedlings below 2.0° girth) percentage of rejects was highest (54.4%) in sprayed plots and 40.7 per cent in manured beds. However, the manured beds lost this advantage by recording the highest percentage (35.9%) of seedling mortality, resulting in the ultimate decrease of transplantable seedlings (23.4%).

If the comparative assessment is made by projecting the data, keeping 1.50 inches and above as standard girth the transplantable seedlings obtained were 49.0 to 57.7 per centure under treatments with shade combination. Following this standard, pecentage of rejects recorded (seedlings below 1.50 inches girth) was highest (45.0 per cent) in control plots and lower stores and control plots and lower stores are seen as a control plot and lower stores.

Entire seedlings were pulled out during the last week of June 1964 itself for recording facilities, with no provision for successive selections as is practised in commercial nurseries. Therefore, it would appear that seedlings with girth below 2.0" but above 1.50" recorded during June could be easily grouped under transplantable, categories for exploitation upto July as is done in commercial nurseries.

#### Conclusions

- 1. The disease incidence and intensity continued to be high under open conditions irrespective of manurial or spray treatments; whereas under overhead shade either alone or in combination with other manurial or spray treatments the disease incidence and the intensity were only mild.
- 2. Manuring at the recommended dose helped to achieve maximum seedling height irrespective of shaded or open conditions.
- 3. The beds which were manured and shaded gave more number of transplantable seedlings compared with the treatments under open conditions, including control.
- 4. The percentage of seedling mortality was highest under open conditions in general and more so with manuring. The occurrence of rejects also followed more or less the same pattern. It was observed that the sprayed treatments with and without shade registered the large number of rejects when the stem girth standard was 2.0" and above, for transplantable seedlings.
- 5. From the available data it is possible to conclude that in seedling progeny 25 to 30 per cent of seedlings may go as rejects even under good husbandry. This finding corroborates the general views of nursery men.

- 6. On considerations of leaf-spot disease control, attaining of the desirable girth of seedlings, thereby increasing the number of transplantable seedlings, shading is advantageous. If only small areas are involved, provision of overhead pandal in the nursery would be practicable. However, on extensive commercial nurseries, for economic reasons, planting suitable shade hedges or trees in north south direction, with timely lopping programme in order to get adequate shade during October to February period, may be helfpful to check the ravages of this disease.
- 7. In general, the seedlings under the pattern of shade provided in this experimentation appeared healthy and the water requirements were comparatively less throughout the hot weather period. Eleven rounds of Bordeaux mixture spray given to the non-experimental bulk seedlings did not give reasonable control of leaf-spot disease; whereas adequate seasonal control appeared possible under shade with four rounds of Bordeaux mixture.
- 8. As a word of caution, it may be mentioned that heavy shade alone or shade coupled with irrigation during January/ March period may provide conditions for *Oidium* infection. To avoid such occurrences of *Oidium*, it is advisable to thin out shade wherever necessary.

## Acknowledgments

The writers wish to place on record their indebtedness to Dr. Rama Varma, the then Chairman, Rubber Board, for giving necessary permission to conduct this trial and for

the keen interest evinced by him throughout the period of study. Thanks are due to Dr. K. T Jacob, Director, Rubber Research Institute of India, for help in the preparation of this manuscript and Shri K.V. George Dy. Director (Pathology) for the suggestions given by him, during write-up, on the disease angle of the problem. The assistance rendered by Shri R. G. Unni, Statistical Rub er Board 1961 to 1964.

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It was also decided to co-opt, the follow-

Dr. S. L. Kapur, National Chemical Laboratory, Poona.

Shri Venkitakrishnan, General Manager Madras Government Plantations' Nagercoil.

The meeting concluded at 1.20 PM with a vote of thanks to the Chair.

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# Rubber in Malaya

K. C. Sankaranarayanan Managing Director, Plantation Corporation of Kerala Ltd., Kottayam

This is the relevant portion extracted from an exhaustive report, on Rubber Plantation Industry in Malaya, made by Shri K. C. Sankaranarayanan, IAS, Managing Director, Plantation Corporation of Kerala Ltd., after his recent study tour of Malaya. Shri Sankaranarayanan has devoted a major part of his report to elucidate the processing techniques of natural rubber adopted in Malaya, as he feels that in technical know how of scientific rubber Planting we in India are in no way inferior and that we have to bestow more attention now to good processing techniques.

The views expressed in this article are exclusively the personal views of the author.

## Malaya

'Malaya' is the Peninsula, Penang and Islands while includes Sarawak and Sabah (British North Borneo). Rubber cultivation is only on a modest scale in Sarawak and Sabah, while it is the most important crop in the Peninsula. The area of the Malayan Peninsula will be roughly the area of our Kerala State plus Madras State put together (51,000 sq. miles). 70% is still largely equatorial rain forest. which is impenetrable. Of the remaining, 30%, roughly half the area is cultivated with rubber, while the rest of the area is devoted to other crops, fruit gardens, towns, villages, public places etc. The total acreage planted with rubber is approximately 4 million acres while the total production in 1963 was roughly 7 lakhs tons. This may be compared with India's 3.5 lakhs acres and 40,000 tons. Roughly half the area under rubber is held by the estates while the other half is covered by small holdings. More than 2/3 of the acreage in the estates are under high yielding

clones. About half the area of the small holdings are under high yielding clones. "Estates" are defined as holdings above 100 acres. Our definition in India fixes the limit at 50 acres. During my visits, I saw a few giant estates. I had occasion to see a few small holders' plots also planted under the Federal Land Development Authority's Scheme. This is a programme very much on the lines of our scheme for grant of land to landless poor persons and educated unemployed for planting with rubber. Malaya the FLDA plots have a minimum size of 10 acres, while in our scheme the minimum size is 3½ acres. The FLDA hopes to bring I million acres of forest lands under various crops like Rubber, Oil Palm,

## Rubber in Malaya

Rubber is the main agricultural preoccupation and the chief item of export. It contributes substantially to the national income and the taxation revenues of the state. It is the means of support for a fifth

of the total population of 1 crore of people. Thus the fortunes of Malaya are bound up with the fortunes of the natural rubber industry. That explains the enormous sums of money spent by the Malayan Government in research, improvements in cultivation and processing and in export promotion, sales and servicing of natural rubber. They are keenly aware of the competition from synthetic rubber and their strategy is to improve the efficiency of plantations and to produce exacting requirements of the rubber goods producer. Their aim is to produce more per acre and also more per worker. They aim at producing all kinds of rubbers, which, while remaining natural, will also be able to give complete satisfaction to the manufacturer, in

#### India

In India, we are primarily producing, for an assured domestic market and our internal price per lb. is more than the world export price ruling at Singapore. But this should not lead us to a false sense of satisfaction that all is well with us. We have a growing synthetic rubber industry, which is already trying to harm the natural rubber industry by using even unfair means. The rubber goods producers are bound to switch over to domestic synthetic rubber, if we do not take steps to improve the quality of our natural rubber and also produce more of it to serve their expanding needs. Therefore it will pay us to take a lesson from the developments in Malaya, even though our circumstances are not exactly identical.

#### Planting

Rubber plantation in Malaya is now in its intensive phase of development. There is

very little new planting except in the case of the FLDA programme. Both the estates and the small holdings are doing extensive replanting. The subsidy for replanting is available even if rubber is replaced by some other crop. This is being availed of by the rubber plantations in the plains near the sea shore, to replant with oil palm extensively. However this does not mean that the acreage under rubber is being reduced. The area lost to oil palm in the plains is being replaced by area newly planted in the hills under the FLDA and the companies. Under the Government's new policy, European or Chinese owned estates are not heing given leases of forest lands any longer for expanding their holdings. So expansion in that sector is confined to planting up

## Planting Materials

The bulk of the replanted areas have been planted with the new clones developed by the RRIM, Prang Besar and Chemara Research Stations. TJIR-1 is used exclusively for mother stock only. PB 86 is not a satisfactory clone in Malaya, though its performance in India is good. In Malaya FB 86 grows differently in different places and the yields are moderate. The Prang Besar estate has developed several other clones and these are now popular. Among the RRIM clones the 600 series is more under distribution though complete large scale trials are not yet over. In several estates 7.0 series will come under yielding by next year. In general, the RRIM and the planters follow a courageous policy with regard to selection of planting materials. They do not wait for complete proof of any particular material. The experimental stations and the estates work closely. Poly clonal seedlings like GG1 and GG2 are the only seedlings which are very popular and are interspersed in use. The suppliers invariably guarantee the germination and their after sales enquiry and service is very prompt. On the day I visited Prang Besar Estate, the research officer had gone to investigate a complaint of low germination

## Breeding and Selection

The selection of new clones is mainly based upon their yield value. But considerations like a good wind resistant crown, resistance to root diseases and oidium, resistance to brown bast while tapping, etc. also weigh in the selection. Crown budding to ensure a good wind resistance is also fairly common. Green budding in the polythene bags in the nursery is very popular, as it is found to be more successful and as it reduces the period of waiting for the yield. In several estates I saw trees which have come into bearing after 51 years, thanks to the nursery methods adopted. There is no regular planting season as there is no definite drought period. I saw new planting going on in Prang Besar Estate

#### Soils

The soils in Malaya are generally poor, with very little nutrient status once the forest humus is lost. Near the sea-shore, the soil is often peaty and liable to subside. In Bukit rotan, Klang and other places, I saw several trees sinking into the ground, with the trunks leaning at various angles. In many cases,

it is impossible to tap these trees properly. They are lall being replanted with oil palm. But the brackish water in the sub soil and the acidity are definite indicators that even oil palm may not succeed very well. Water supply in such areas is a problem and in many estates, drinking water is gathered from the rain caught in white washed roofs.

#### Diseases

There is practically no *Phytopthora* in Malaya and so they save the large sums which we spend on spraying. As against this they have increased incidence of root and leaf diseases. They have practically no trouble from wild animals in new plantations, while we face trouble from elephants, hogs, porcupines etc. Field rats are a problem in Malaya also and the RRIM advocates the use of a kind of bait, with sodium arsenate or other poisons inside a ball of tapioca starch.

## Cover Crops

The main cover crop is *Pueraria*. But they also have *Centrosema*, *Crotalaria*, *Mykania* and other species. In Prang Besar estate as well as in the RRI of experimental station at Sungei Buloh, I saw several kinds of cover crops under trial. The *Pueraria* does not flower in Malaya as it does in India, perhaps due to the lack of a definite dry season. They are importing *Pueraria* seeds from India and other places for stocking. The cover crop grows easily except in areas infested with lalang grass.

## Weeds

The lalang continues to be the main weed in Malaya. They have Eupatorium, brought from Siam. But Eupatorium in Malaya does not grow to the giant size or extent to

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which it does in India, due to reasons of climate and the amount of direct strong sunlight. Thailand is almost on the same latitudes as Kerala and that is perhaps the reason for its luxuriant growth here. They follow a ruthless policy of clearing of weeds and sowing the cover crop along with the planting of rubber and spend large sums of money on weedigides.

## Tapping and Latex Collection

Most of the estates in Malaya cover large areas and in such cases, assisted collection is the rule. The tappers do not have to come to the factory every time their pails are full. They carry their usual buckets. But near every task area there are big churns they pour their latex into When these churns are full, the lids are closed and they are left in the path. A lorry or a tractor of some other vehicle with the tank attachment takes these churns to the factory. The tappers are thus enabled to tap more trees with less effort. The latex reaches the factory quicker thus effectively tackled. For preventing carry it in small bottles. Their buckets, the latex cups, the churns and the tanker wagons, all use liquid ammonia. This is more convenient and does not harm the processed under the Riventex system the use of ammonia is the rule in Malaya. The the cups used for collection have to be larger than ordinary. They do not use coconut shells, but only glass cups and ceramic coated earthenware cups. These are

big enough to collect the latex which keeps on dripping for a considerable time. The collection of cup lumps has become very important because of this prolonged dripping. Even after daily collection is over, there is considerable bleeding and this forms the cup lumps. These are good rubber and so the estates spend a considerable sum of money in collecting and processing this cup lump. Tree laces are treated separately and made into a brown crepe. In India when our high yielding varieties begin to yield, we have to think on the lines of Malaya about the utilisation of cup lump and tree lace.

## Time of Tapping

Some time ago early morning tapping used to be considered very important and in some estates the tapping used to begin at 4.30 a. m. after mustering. But nowadays in most estates the tapping starts at 6 a. m. only, though in a few estates they continue to tap at early morning hours. They do it with the help of carbide lamps and battery head lamps. These lamps are not supplied by the managements. They are owned by the workers themselves. Under Indian conditions, it does not appear necessary to start on early morning tapping. The tapping tasks are completed by about noon and the factories also close for the day about 2 p. m. except in cases where they are run on

## Transport of Latex

Factories manufacturing concentrated latex are normally run continuously, with three shifts of workers. The latex for such factories come from anywhere between 20 to 40 thousand acres. Where the estate in

which the factory is situated, does not produce the required quantity of latex, they get their requirements from nearby estates either owned by themselves or by others. They have worked out arrangements under which some estates do not process their rubber at all, but sell their latex to some factory. In such cases, the agreements provide for certain conditions of upkeep and tapping by the cultivating estates. Subject to these conditions, the buying factories make their own arrangements to collect the latex from the central point of the cultivating estates and transport to the factory site. In many cases the distances involved in transporting are considerable. For example, the Harrison & Crosfield latex factory at Petaling get their supply every day from Prang Besar (15 miles away), Sepang (3) miles away) and some other estates even further off. The Malayan American latex factory at Bedong and the Dunlop latex factory at Regent also get their latex from as far away as a hundred miles. The transport cost per gallon of latex works out cheaply. Generally all estates are provided with a number of vehicles for transport of latex, both within the estate and outside.

## Processing

The bulk of the rubber in Malaya is made into ribbed smoked sheet as in India. There are 5 grades of RSS. They also make pale crepe and sole crepe, though the production of the latter is not much. They also make estate brown crepe and blanket crepe. The scrap rubber and tree laces are cleaned and made into a kind of blanket sheet. The cup lumps are processed in various ways depending upon the degree of their purity. The greatest possible care is

taken to see that none of the lyield is wasted or left unrecovered. There is considerable rubber theft going on. But estates are vigilant and keep it within manageable limits The incentive wages system encourages the tapper to bring all the latex he can get to the factory. There have been several improvements to the designs of smoke houses. The RRIM have perfected a new design for smoke houses, which enable maximum utilisation of the heat and smoke, without damaging the colour of the sheet. The GEC Woods tunnel type drier is now becoming popular and all the leading estates are installing this. This is an oil fired drying shed, in which diesel oil is burnt to provide the heat. It has adjustments for partial use of wood fuel also to provide smoke, if necessary. It could perhaps be adjusted for using fuel oil also. In Malaya, there is some scarcity for cheap wood fuel and the prices are high. Diesel oil is very cheap. The Woods tunnel dries the rubber sheets quickly and more efficiently. The sheets retain a good colour. The Woods tunnel can be used for drying crepe and other products also. In some estates, where they have boilers for making steam and electricity, they couple the hot air exhausts to the drying tunnels and make use of the hot air for drying. The Woods tunnel drying helps to produce RSS grades 1 to 3. It is possible to get these tunnels erected in India, through GEC India Ltd. The contract for supply includes the contract for erection also. They construct the drying sheds as well as the trolly lines and provide the trolleys.

The factory lay out in the rubber estates is very much similar to those in India. The factory is normally located in an incline to

take advantage of the gravity flow. The latex is brought to the top by lorries and wagons and then bulked in big tanks. After the bulking, the latex flows either into the centrifuging section or the sheet section. In the sheet section, the latex flow; into the aluminium coagulating tanks. These tanks are some times so grooved as to make one continuous sheet, instead of several sheets of definite length. Continuous sheeting has its own advantages. After coagulation the sheets are cut into size and the moisture is pressed out. Then the sheets are sent to the drying shed. The RRIM has encouraged the manufacture of a specially processed rubber, which can be called half before coagulation at a certain temperature and allowed to stand for 24 hours. This alters its chemical properties and renders it more adaptable to further processing in the cessed rubber is sold to the producers at a slightly higher price. After the addition of just like ordinary RSS and crepe. In appearordinary grades. The market for SP rubber is steadily increasing. The sheeting battery in a factory can be adopted for making SP tanks for latex, where the vulcanising agents

## Centrifuging Process

The latex concentrate is obtained under three different processes. The most universal is the centrifuging process. The next

method is creaming process. The third and rather rare method is the Rivertex process which is patented. In most factories in Malaya, the centrifuging battery is arranged side by side with the sheeting battery. But there are also specialised centrifuging plants, where enormous quantities of latex are processed all the 24 hours. This is economically advantageous as there is maximum utilisation of the machinery and large quantities can be tackled. The latex are gathered from serveral areas, far and near and brought by lorry in bulked condition to the centrifuging plants. Rows of centrifuges of different capacities are arranged on either side of the bulk reception tanks. The centrifuges are worked in such a manner, that while some of them are at work, the others are under cleaning or repair. The centrifuged latex is collected separately and stored in tanks awaiting either ship nent or drumming. Wnere port facilities are available shipping by bulk in special compartments in the holds is preferable to drumming. The latex is centrifuged sometimes again and again to improve the percentage of recovery. The watery run off is collected in special tanks and by means of sieving and heating some more dry rubber is recovered. This is made into a kind of inferior blanket crepe The purely water contents alone are lost

## Creaming Process

In the creaming process, the latex is mixed with certain creaming agents like Algina and soap etc. This sets up chemical reactions and a process very similar to the formation of curds in milk occurs. The different stages of this change occur at different levels in different settling tanks. In the

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which the factory is situated, does not produce the required quantity of latex, they get their requirements from nearby estates either owned by themselves or by others. They have worked out arrangements under which some estates do not process their rubber at all, but sell their latex to some factory. In such cases, the agreements provide for certain conditions of upkeep and tapping by the cultivating estates. Subject to these conditions, the buying factories make their own arrangements to collect the latex from e central point of the cultivating estates and transport to the factory site. In many cases the distances involved in transporting are considerable. For example, the Harrison & Crosfield latex factory at Petaling get their supply every day from Prang Besar (15 miles away), Sepang (3) miles away) and some other estates even further off. The Malayan American latex factory at Bedong and the Dunlop latex factory at Regent also get their latex from as far away as a hundred miles. The transport cost per gallon of latex works out cheaply. Generally all estates are provided with a number of vehicles for transport of latex, both within the estate and outside.

## Processing

The bulk of the rubber in Malaya is made into ribbed smoked sheet as in India. There are 5 grades of RSS. They also make pale crepe and sole crepe, though the production of the latter is not much. They also make estate brown crepe and blanket crepe. The scrap rubber and tree laces are cleaned and made into a kind of blanket sheet. The cup lumps are processed in various ways depending upon the degree of their purity. The greatest possible care is

taken to see that none of the lyield is wasted or left unrecovered. There is considerable rubber theft going on. But estates are vigilant and keep it within manageable limits The incentive wages system encourages the tapper to bring all the latex he can get to the factory. There have been several improvements to the designs of smoke houses. The RRIM have perfected a new design for smoke houses, which enable maximum u(ilisation of the heat and smoke, without damaging the colour of the sheet. The GEC Woods tunnel type drier is now becoming popular and all the leading estates are installing this. This is an oil fired drying shed, in which diesel oil is burnt to provide the heat. It has adjustments for partial use of wood fuel also to provide smoke, if necessary. It could perhaps be adjusted for using fuel oil also. In Malaya, there is some scarcity for cheap wood fuel and the prices are high. Diesel oil is very cheap. The Woods tunnel dries the rubber sheets quickly and more efficiently. The sheets retain a good colour. The Woods tunnel can be used for drying crepe and other products also. In some estates, where they have boilers for making steam and electricity, they couple the hot air exhausts to the drying tunnels and make use of the hot air for drying. The Woods tunnel drying helps to produce RSS grades 1 to 3. It is possible to get these tunnels erected in India, through GEC India Ltd. The contract for supply includes the contract for erection also. They construct the drying sheds as well as the trolly lines and provide the trolleys.

The factory lay out in the rubber estates is very much similar to those in India. The factory is normally located in an incline to

take advantage of the gravity flow. The latex is brought to the top by lorries and wagons and then bulked in big tanks. After the bulking, the latex flows either into the centrifuging section or the sheet section. In the sheet section, the latex flows into the aluminium coagulating tanks. These tanks are some times so grooved as to make one continuous sheet, instead of several sheets of definite length. Continuous sheeting has its own advantages. After coagulation the sheets are cut into size and the moisture is pressed out. Then the sheets are sent to the drying shed. The RRIM has encouraged the manufacture of a specially processed rubber, which can be called half is mixed with certain vulcanising agents and allowed to stand for 24 hours. This rubber goods factory. The specially projust like ordinary RSS and crepe. In appearance the SP rubber is no different from the is steadily increasing. The sheeting battery in a factory can be adopted for making SP tanks for latex, where the vulcanising agents

## Centrifuging Process

The latex concentrate is obtained under three different processes. The most universal is the centrifuging process. The next

method is creaming process. The third and rather rare method is the Rivertex process which is patented. In most factories in Malaya, the centrifuging battery is arranged side by side with the sheeting battery. But there are also specialised centrifuging plants, where enormous quantities of latex are processed all the 24 hours. This is economically advantageous as there is maximum utilisation of the machinery and large quantities can be tackled. The latex are gathered from serveral areas, far and near and brought by lorry in bulked condition to the centrifuging plants. Rows of centrifuges of different capacities are arranged on eitherside of the bulk reception tanks. The centrifuges are worked in such a manner, that while some of them are at work, the others are under cleaning or repair. The centrifuged latex is collected separately and stored in tanks awaiting either shipment or drumming. Where port facilities are available shipping by bulk in special compartments in the holds is preferable to drumming. The latex is centrifuged sometimes again and again to improve the percentage of recovery. The watery run off is collected in special tanks and by means of sieving and heating some more dry rubberis recovered. This is made into a kind of inferior blanket crepe

## Creaming Process

In the creaming process, the latex is mixed with certain creaming agents like Algina and soap etc. This sets up chemical reactions and a process very similar to the formation of curds in milk occurs. The different stages of this change occur at different levels in different settling tanks. In the

final tanks we get a higher concentrated latex than by the centrifuging process The watery portion is put through seives and heated to recover the remaining dry rubber content and the rubber so recovered is made into a blanket crepe. The creaming process gives a richer concentrate and it is preferred for certain types of uses. Only the Malayan American plantations, a subsidiary of U. S. Rubber Co. of America, is concentrating latex by this process. In this the entire processing is done untouched by hand and so the final product is very clean. But there is always a great risk of bacterial contamination and therefore a high standard of cleanliness in the factory and surroundings is called for.

## Rivertex Process

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Except for the process of making SP rubbers, the other methods of making RSS centrifuged latex and creamed latex etc. are all well known and have been in use for some time. The Rivertex process of concentration is a novel one, though not new. This process is a patented one and only the Rivertex factory at Kluang is making rubber according to that method in the whole world. Here the field latex is treated not with ammonia as usual, but with caustic potash. This dissolves in the latex and prevents coagulation prematurely. This is then prepared for the Rivertex process by a method of concentration, where the important principle is heating and evaporation under near vacuum conditions. The process is very much similar to the production of milkpowder from milk. The boiling of the latex evaporates most of the water. The latex is then sprayed under near vacuum conditions inside a tube and this results in the formation of a luffy substance. The substance is sufficiently sticky, but it is not viscous nor is it a liquid. This is packed in drums and sent in that condition to kluang, where further secret processing is done. The Rivertex factory is interested in making rubber which will go well with roadbuilding materials like asphalt, bitumen etc. Rubberised roads will create a demand for rubber to be processed under the Rivertex patent At present the demand is very limited and specialised.

## Standardisation

The main interest in Malaya is now concentrated on one problem i.e., how to produce a rubber that will meet the challenge of synthetic rubber and be uniform in chemical This is tried to be met in two different ways. Firstly, the idea is to sell natural rubber processed by present day methods under technical classification and secondly, the idea is to produce a natural rubber that cannot be any longer classified as per present day standards. Under the first scheme, a number of important rubber plantations have joined a testing programme conducted by the RRIM, Chemical Division. They send samples of their daily production of sheets, to the RRIM. Parts of these samples are vulcanised at the RRIM laboratories and examined for their elasticity, plasticity and ability to vulcanise easily. On an average of the result of these daily tests, symbols of red, yellow or blue circles are awarded every month to the participating firms. Red circle is slow vulcanising, yellow is medium vulcanising while blue is fast vulcanising. The firms market their sheets showing those symbols as marks of quality. There is no extra premium for any one of

qualities in the market. At present 30 firms are participating in this voluntary programme. With some modifications, it is felt that this programme can be extended to cover dirt content, measure of oxidisability. mineral contents etc. There is also a move to get international standards for rubber fixed with reference to the chemical and physical composition of rubber rather than on visual grading as at present. Malayans believe that this will enable the natural rubber producer to get even with the synthetic producer in the long run. Already the American Society for Testing of Materials, has accepted a formula for rubber. In the International Standards Organisation Conference held in New Delhi recently, this was generally accepted. It is expected to be formally adopted the world over by 1965. Then every country will have to follow the new standards.

The second line now being tried in Malaya is the production of a chemically pure rubber. This is now under advanced stages of experimentation and by 1965, we are expecting the final results to be announced. This is the production of what is called crumb rubber or comminuted rubber or granular rubber and so on. One company, Messrs, Guthrie, have already started producing small quantities with the trade name Dynat. The processing of this rubber can be simply stated as follows. The wet coagulum is cut up by sharp knives into very tiny particles and these particles are cooked in heat. The moisture content is thus evaporated and a mass of tiny bits of dry rubber are left. This processing takes anything between six hours to a day. After enough moisture

has evaporated, the comminuted rubber is pressed into pellets and these pellets are pressed into bales of convenient size and shipped. The most economic and efficient method of doing this is now under examination and the RRIM will be announcing the results. The new crumb rubber will be dirt free, chemically pure and can be shipped easily. This can be easily classified under the new international standards proposed. Malayan companies are awaiting the final annou reements before switching over to this new method in a big way. Existing creping machines can be easily adopted to the production of crumb rubber.

## Marketing

So much for the cultivation and processing sides. Marketing of rubber in Malaya is quite different from what it is in India. The fundamental difference is the fact that they produce for a world market. Therefore almost the entire production of Malaya has to find its way to a port. The usual channels are Singapore, Penang, Port Swettenham and Port Bicksar. Liquid latex is exported without coming into the rubber market, producers and consumers. But dry rubber is invariably bought and sold through the rubber market. The main rubber market is at Singapore, though there is another new market at Kuala Lumpur. The market is composed mainly of foreign buyers' agents. estate selling agents, brokers, dealers and packers. The brokers mainly perform the function of introduction and of standing at Singapore and Kuala Lumpur are quite The dealers in the country side are like our

dealers in India and perform the service of it in bulk to the market. The big dealers buy from them as well as the packers. The packers are mainly remillers who buy Indonasian, Thai and Borneo low grade rubber and make remilled rubber with it. The rubber market in Malaya deals not merely in local rubber, but also in rubber brought from the neighbouring countries. The confrontation has reduced the volume of this trading But even today they do business in about 7 lakhs tons a year. The Rubber Association of Singapore is the leading rubber exchange. The daily rubber prices are fixed alternatively by the Singapore and Kuala Lumpur exchanges. The market deals in spot as well as forward trading. The settlement of contracts is made once a month under the rules formed for the purpose by the Singapore Chamber of Commerce. exchange also conducts a weekly auction of rubber on the floor. The forward contract business is quite flourishing and governs the processing activities of the individual estate factories rather closely. The ruling price in the Singapore Market nowadays is round 70 to 75 M. cents a lb. The price level is very sensitive to political changes and to the entry or exit of the communist block of countries in the market. The diurnal variation is roughly 1/8th of a cent or so. The profit margins in the operations are therefore small and big money is made by the size of the

#### Labour

The bulk of the estate labour in Malaya is Indian. This is only to be expected as most of them are descendants of the original labour recruited from India under the Indent used labour system. The total number of Indians in Malaya will be roughly 10 lakhs. Roughly 80% of this will be the number of Indians in the estates, the bulk of whom are simple labourers. The immigration of labourers to Malaya has been stopped since 1949. The Tamils form the overwhelming majority of the Indians. Malayalees come a close record with the Sikhs and other northern Indians following. Tamil has been recognised as a local language and road signs are in Tamil also. Estate managers and supervisory staff have to learn Tamil. Most of the estates maintain Tamil schools.

## Trade Unions

There is no Plantation Labour Act or Minimum Wages Act in Malaya. The estate labour conditions and the wages are fixed by mutual agreements between the owners and the labour. There is no law to provide for compulsory arbitration in Malaya. The Government limits its role to conciliation and appointment of arbitrators in cases of voluntary arbitration. This has resulted in the growth of a strong trade union movement and a strong employees' organisation. Neither side can hope to influence the Government to back it up in case of a dispute. By a peculiar stroke of luck the trade union movement in the plantations has been on the right lines. There is no influence from the political side and therefore the union is able to take sound decisions and follow a correct policy of workers' welfare. The National Union of Plantation Workers is the biggest trade union in the whole country and its membership is almost 100% in coverage. The employers on the contrary

are divided on a racial basis. The European Estate Employers Federation is the biggest unit. The Chinese and Malaya owned estates are having their own organisations. The Indians owning estates are too few to have a body. The agreements between the Nurwand the European managements generally govern the relations in the industry.

## WELFARE

The estate labour housing standards differ from estate to estate, depending upon the financial position and the views of the company concerned. Generally they are comfortable and convenient. Water supply depends on the availability of good portable water in the locality. The companies spend a lotof money in treating the water. In the seashore areas the water supply is an acute problem. Electricity is extended to all the labour lines and it is not considered a luxury. Most of the labourers can afford to have radios and other electrical appliances. The hours of electric supply are restricted. Company medical attention standards differ from estate to estate. The Indian situation in this regard appears to be better. Estates maintain fairly good schools at their own cost. Classes are taught in Tamil, Malay, Chinese and English. Estates permit outsiders under licence to operate shops within the estate and in some cases maintain company shops also. There is no subsidised grain supply. Almost all food articles are labourers work in family units, the men doing the tapping and heavy work, the women doing the lighter jobs and the children doing the odd jobs. Therefore they have substantial per family income per

month. Savings are invested mainly in jewellery and electrical and other gadgets. The Nupw collects its dues regularly and havo organisers in every unit. The full time trade union workers get leave of absence from the estates. They get attractive salaries from the union. There is no politician or outsider as an office-bearer or member of the union anywhere. The distinction between trade union activity and political activity is always maintained.

The major part of the plantation industy is under European control, mainly through share-holding and agency house control. The agency house is some what like a managing agency firm of India. But there are cases where the finances are provided by others, secretarial jobs are done by others and so on. But generally the operations and supervision are done by the agency house for a definite fee or a percentage. There is no flight of foreign capital from the industry though there are occasional cases. In such cases the estate tend to get broken up and sold as small holders lots. The Indian Estate Workers and Finance Co-operative Society, formed under the auspices of the Malayan Indian Congress, has bought a few of these estates. The workers in those estates are the owners also. But the management of these estates continues with the European agency house of Syme Darky & Co. This society and the Nwpu have built up substantial funds and are investing them in Malayan industries and properties. This is a move to be welcomed as this indicates the full partnership of the Indian along with the Malay and the Chinese, in building up a modern multiracial Malaysia.

### Construction and Working of a Pilot Smoke House for Small Estates

P. P. CHERIAN,
Assistant Development Officer, Rubber Board.

#### Introduction

Complete drying within 3 to 4 days with fuel economy and production of top grade sheets are possible on small estates with simple permanent smoke houses, a type of which has now stood the test for over a decade near Kothamangalam. The model built on the basis of plan given by the Board incorporating most of the improved features of large modern smoke houses is the first of its kind in India. A symposium in regard to its initial working published in 1954 elicited large number of enquiries<sup>1</sup> culminating in the construction of some 50 similar ones varying in minor details but following the general pattern. This development in south Indian estates is quoted by the Rubber Research Institute of Ceylon in its Journal<sup>2</sup>.

During 1953/60, parties seeking advice for the erection of smoke houses were taken at the Board's expense to the pilot smoke house for demonstration and for spot discussions of such alteration as deemed necessary to suit individual requirement. Sometimes masons also accompanied them. No plan as in the first case was furnished; demonstration proved more practical and effective than mere advice and supply of blue print of model not previously made or seen or tested.

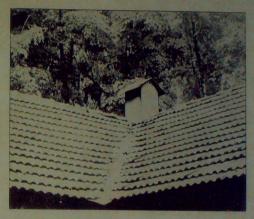
The second model completed in 1953 near Nedumkunnam on the pattern of the

pilot type relates to modification of an old double-storey smoke house and fitting the improved furnance which reduced the smoking period from 7 to 4 days, apart from other advantages. The third was made in 1954 at Vazhoor, the fourth in Ernad taluk, Kozhikode, the fifth and sixth in Ernakulam district, the seventh in Thodupuzha taluk, the eighth near Trivandrum and the next three in Changanacherry taluk followed by others. The size of the smallest one is only 160 cubic feet.

In all the small smoke houses built by the co-operative societies under the Rubber Board's subsidy scheme from 1963, identical furnace as used in the pilot smoke house is invariably incorporated. The representatives of the Cheruvally Rubber Karshaka Co-operative Society who initiated the first smoke house under the subsidy scheme had also been taken to the pilot smoke house to get them acquainted with the construction of the improved furnace and other features. This paper is intended to describe the evolution of the pilot smoke house and experience gained in the working of similar ones made since 1952

#### History

· In the construction of smoke house, the main advances made during the last 25 years other than oil fired drying are:



The roofing of the smoke house with the Chimney. (The smoke house is built in the corner of two wings constituting store, coagulating and machining shed and office).



Front view of the furnace with the door closed.



Same as in picture on left, but door opened showing smoldering logs.



ior of the smoke house showing rack arrangement.



The outer top casing without cracking even after use for over 12 years.



Interior showing the distribution of smoke and hot air through perforated kerosene tin inverted over the mouth of the flue.

- (a) Reduction of handling of sheets to the minimum by improved layout of the factory and providing mechanical aids
- (b) Use of cheaper building materials and
- (c) Dispensing with the entire ground floor solely constructed for stoking and consequent saving in the cost of building double storeys.
- (d) Improved outside furnace which preheats the air entering into the smoke house and improved ventilators enabling smoking to be completed within 31

Massive structures once considered essential to eliminate fire risk are unnecessary as they need high temperature to heat up especially during monsoon. Further, fire of inflammable gas coupled with careless firing and not necessarily due to cheaper

One of the permanent and large models recommended in Malaya is the Tunnel Smoke House developed by the Rubber Research Institute.8 Smoking in the smallest one designed to deal with about 1000 lb. dry rubber daily (about 4000 lb. when full) is completed within 31 to 41

Neither of the two RRIM type large smoke houses built in India during the pre-war period from blueprints obtained from features including the modified furnace possibly due to oversight or mistake. Details of cost and working of a standard RRIM A model, true to type -- the only one known to exist-constructed in 1955 in accordance with the assistance rendered by the Board will be furnished in a separate

#### Standard models for small estates

Model smoke houses suggested for holdings and small estates in Malaya and Ceylon in pre-war period comprise two categories:

- (a) Temporary ones of bamboo and sacking treated with starch etc., or the so called " wattle and daub" types :
- (b) Double storey permanent smoke house2

Further development of small smoke house or pattern is not recorded after the

Temporary smoke houses are not viewed with favour in India and so far known none has been erected. Permanent ones can be either single or double storeyed with inside or external furnace and not in conformity with any standard pattern which hardly

#### Improved models for small estates

Mechanical aids which form one of the improved features of approved large smoke smoke house but the other features could profitably be utilised. But though the RRIM type smoke house was designed some 26 years ago, the preheating device connected with the improved furnace and other beneficial features are not recorded to have been adopted in the construction of small smoke houses in Malaya nor in

Wall

Roof

Fuel

In 1952 Shri K. Thomas, Manager of Mangalam Estate sought advice for the construction of a small smoke house suitable for some 100 acres. A plan incorporating all the practical features mentioned was furnished to him with due warning on the risk involved in the construction of untested model. The details of the Pilot Smoke House thus originated are summarised here-

About 700 to 800 sheets when 3 to 4 days even without drip-

ping and 4 to 5 days during monsoon. Inside temperature ranges from 120 to 140°F. The Board's Thermostat which records automatic weekly temperature ranges in chart was supplied for verification

Concrete, sloping from the centre towards the sides so that serum dripped from the sheet can drain off easily

Laterite in lime mortar

Tiles over wooden conical ceiling. Window A window provided to facili-

> tate the inspection of sheet. A small cheap but efficient chimney made on wooden frame with asbestos is provid-

ed through the ceiling. consideration as firewood becoming scarce and costly. When the smoke house loaded fully, the quantity of firewood

required works out to slightly

less than a pound for curing one pound of dry rubber. The furance used is a second hand 44 gallon drum enlosed

by a cavity comprising-(a) Two side walls made of bricks

- (b) Reinforced concrete top comprising of two removable slabs provided with rings for lifting and inspection when necessary. The inner adjoining sides of the slabs are grooved to fit to each other without setting.
- (c) The face plate of 4" bolted on to the walls and to which the the outer structure but clear of the walls and top by 4"

The air space between the drum and the outer case is ventilated by two air inlets one at each side of the door. During smoking, the air between the drum and outer structure becomes heated and passes into the drum of the back of the drum. The hot air mixing with the smoke in the drum enters the flue and finally into the smoke house. Vertical foot from the rear serve as fire stops to prevent fire-wood from being pushed into the flue and choking it.

Air inlet into the furnace is provided through horizontal cutting made on the

Distribution of smoke,

Over the mouth of the flue through which smoke and warm air enter into the smoke

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house, a kerosene tin with perforated holes is inverted so as to prevent the sparks, if any, entering in and for spreading the smoke throughout the smoke house.

#### Advantages

External furnace when provided is generally built at a side adjoining the wall of the smoke house. The furnace is mostly of brick or concrete or of metal plate with brick or concrete lining surrounding it on the mistaken notion for minimising the loss of heat radiated to the outside air. But such furnace takes a long time and high temperature to heat up during which the smoke produced may be burnt out in which case rubber sheets tend to become pale apart from the consumption of large quantity of firewood.

In furnace built of drum or of thin metal plate surrounded by an outer case, the heat radiated goes to warm up the air around the drum within the outer case and a continuous current of hot air is drawn into it through air inlets and then to the smoke house after mixing with the smoke in the drum. As cool air enters between the drum and the outer structure through ventilator holes to replace the heated air entering into the drum, the temperature is not unduly raised nor is smoke produced burnt out but goes to give the characteristic medium brown colour. The current of hot air drawn also accelerates the drying.

It was thought that the original drum should have to be discarded after one or two years. In practice, however, it could continuously be used for eight years before replacement. The pilot smoke house built 12 years ago still remains outstanding in respect of the quality of sheet obtained and efficiency of its working and can be confidently recommended for small estates with a daily production ranging from 50 to 200 normal sheets. However, defects observed in those made in imitation to it but without incorporating and understanding all its features are accounted for to prevent avoidable failures.

(a) Large increase in the size of smoke house but without corresponding enlargement of the furnace may not be advisable unless fully tested. The size of furnace need not necessarily bear a fixed proportion to that of the smoke house owing to variable other factors. For the size of the smoke house built, 44 gallon drum is entirely adequate and even appears to be on the higher side, but larger types may need bigger furnaces and vice versa. In a smaller model furnace made out of second hand paint drum is successfully used.

A furnace of exactly the same type and measurements is embodied in the smoke house made in 1963 by the Cheruvally Rubber Karshaka Co-operative Society, the dimensions of which however, being  $18\times12\times12$  ft. against  $10\times10\times10$  ft. in the pilot smoke house. In another co-operative smoke house of the same size, larger furnace is provided. When they are worked fully loaded, valuable information will be available as to the maximum capacity to which the size can profitably be extended without impairing the efficiency and economy in fuel consumption when the standard 44 gallon drum along with preheating device is utilised as furnace.

- (b) Construction of similar models but alias J. H. Pidford, Chemical Engineer, without suitable chimney has not been en-
- (c) Negligence of providing sufficient air inlets on the door of the furnace at the correct height has been another cause for unsatisfactory working in some cases. The correct height is influenced by the actual size of the smoke house, furnace, chimney etc., and can be easily adjusted after some
- (d) The top outer casing enclosing the furnace when made with a single block of reinforced concrete tends to crack even after a year. In the pilot model, two removable slabs in reinforced concrete are inlaid side by side over the vertical brick walls. after 12 years without using expensive fire
- (e) Smoke house can only cure sheets. If sheets are carelessly and unsatisfactorily processed and machined, efficient smoking cannot result in the production of top grade

#### Acknowledgment

The original tunnel smoke house for large estates was developed by Mr. J. H. Piddlesden

formerly of the Rubber Research Institute of Malaya under whom I had the privilege to work in his experiments. I acknowledge my indebtedness to him.

I am also obliged to Dr. K. T. Jacob, Director of Rubber Research Institute of India and Shri T. Nambi Nair, Development Officer, Rubber Board for suggestions in the preparation of this paper.

#### References

- (1) Cherian P. P. Smoking within 3/4 days, Indian Rubber Grower, Vol. III. No. 2, 1954.
- (2) Risdon E. J. The Drying and Smoking of Natural Rubber, Combined Quarterly Circulars of the Rubber Research Institute of Ceylon, Vol. 33,
- (3) Piddlesden J. H. Journal of the Rubber Research Institute of Malaya Vol. 8, 1938.
- (4) Planting Manual No. 7. Rubber Growing-Principles and Practice, Rubber Research Institute of Malaya, 1938.

### NEWS AND NOTES

#### Exhibitions

#### 1. Tripunithura.

The Rubber Board participated in the "Tripunithura Utsavam Industrial and Agricultural Exhibition" organised by the Tripunithura Unit of the Bharat Sevak Samaj at the Palace Girls' High School, Tripunithura, Ernakulam district, from the 2nd December 1964 to the 9th December 1964. The exhibits included panels, charts, posters and models. It is estimated that about 25,000 people visited the stall put up by the Board at the Exhibition.

#### 2. Kuravilangad.

The Board also participated in the "District Level Science Fair and Exhibition" held at Kuravilangad from the 2nd December 1964 to the 6th December 1964. The Exhibition was organised by the District Educational Officer, Palai, at the St. Mary's High School for Boys, Kuravilangad. The Exhibition was seen by a large number of people. Two Merit Awards were awarded to the Board for its stall at the Exhibition.

#### 3. Changanacherry.

The Kerala Khadi and Village Industries Board had organised an exhibition at Changanacherry from the 27th December 1964 to the 10th January 1965 to synchronise with the Golden Jubilee Celebrations of the Nair Service Society. The Rubber Board participated in the exhibition and put up a stall. Instructive and attractive exhibits were displayed at the stall.

#### 4. Durgapur,

The Board participated in the All India Exhibition held at Durgapur from the 31st December 1964 to the 20th January 1965, in connection with the 69th Annual Session of the Indian National Congress. The exhibits consisted mostly of coloured photographs depicting the various aspects of cultivation of rubber, the various uses of rubber in everyday life and charts showing the financial and other aid schemes of the Board and rubber statistics. It is estimated that over nine lakhs of people witnessed the exhibition.

#### 5. Trivandrum.

The Corporation of Trivandrum had, as usual, organised an All India Industrial, Agricultural and Arts Exhibition at Trivandrum this year also. The Board had put up an attractive stall at the exhibition which opened on the 25th January, 1965 and lasted till the 22nd March 1965. The exhibition was a great success and had attracted a very large number of visitors.

#### 6. Kottayam

The Eighth National Agricultural and Industrial Exhibition organised by the Municipal Council, Kottayam, was opened at Kottayam on the 17th March 1965 and lasted till the 19th April 1965. The Board put up a very attractive pavilion at the Exhibition. The exhibits included coloured photographs, models and charts. The Board's pavilion was awarded the second prize and a gold medal certificate.

#### Seminars

#### 1. Vadasserikara.

A rubber growers' seminar was organised at Vadasserikara in Quilon district on the 21st December 1964 under the joint auspices of the Rubber Board, the Rubber Plantation Department, the local unit of the Bharat Sevak Samajand the Vadasserikara Panchayat. Vadasserikara is a locality where there are large number of small holders of rubber who have been allotted Government lands for rubber cultivation.

The seminar was well attended. Study classes on various aspects of rubber cultivation were held from 9 A. M. to 1 P. M. by the technical officers of the Rubber Board. In the afternoon there were group discussions in which rubber growers took part enthusiastically. Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, inaugurated the public meeting held at the conclusion of the seminar.

In his inaugural speech, the Chairman exhorted rubber growers to produce more rubber in the country by adopting modern scientific methods of cultivation so that the present state in which the country had to depend on synthetic rubber to fill the gap between production and consumption, could be changed. He said that the Board would render all necessary help to the rubber growers to achieve the objective.

Shri M. M. Haneef welcomed the gathering. The Board had arranged a small-scale exhibition in connection with the seminar.

#### 2. Palai

The Meenachil Taluk Rubber Planters' Co-operative Society had organised a semi-

nar on replanting at the St. Thomas' Higher Secondary School, Palai, on the 24th January 1965. Dr. K. T. Jacob, Director of Research and Rubber Production Commissioner, Rubber Board, presided. Dr. Jacob, in his presidential address, explained the urgent necessity of replanting old rubber estates and the help and assistance offered by the Board to rubber planters for undertaking replanting.

Shri P. P. Cherian, Assistant Development Officer, Rubber Board, Shri K. P. Phalgunan, Deputy Registrar of Co-operative Societies, Rubber Board and Shri P. S. Kuriakose, Field Officer, Rubber Board, led the discussions. About 300 rubber growers attended the seminar. Shri P. J. Thomas, Secretary of the Society, welcomed the guests and delegates and Shri K. V. Joseph proposed a vote of thanks.

#### Film Show

The Rubber Board, with the kind co-operation of the British Information Services, Madras, arranged the screening of the documentary film "Sarawak prospers with rubber" at the A. V. George Hall, Y. M. C. A., Kottayam on the 27th January 1965. The film featured the different aspects of rubber cultivation from planting to processing as practised in Sarawak. A number of planters and officers and members of the staff of the Board witnessed the film show.

#### Rubber Marketing Society

Shri A. M. Thomas, Union Minister for Defence Production, formally inaugurated the Arakkunnam Co-operative Rubber Marketing Society on the 2nd February 1935. This Society has received financial assistance from the Rubber Board to the tune of Rs. 30,000 as loan towards its working capital.

Shri Thomas, in his speech, said that as were middlemen engaged in the marketing of rubber also and if the producer was to get a fair price for his product these middlemen should disappear and co-operative marketing societies should take their place. Reviewing the progress of the rubber plantation industry in India in the past decade, Shri Thomas complimented the Rubber Board for its good record of work in the service of rubber growers in the country. Though there was no immediate threat to natural rubber from synthetic rubber, it was necessary that natural rubber producers should be alert and ready to meet any evening rubber growers to organise themselves into efficient co-operative societies and to cooperate with the Rubber Board in successfully implementing its various development

Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, who presided at the meeting, dwelt at length on the various schemes chalked out by the Board for the benefit of rubber planters.

Shri M. J. Mathew welcomed the gathering and Shri V. J. Kurian presented a report on the activities of the Society. Sarvashrl M. K. Menon and Paul P. Mani also spoke on the occasion. Shri Varughese Paramban proposed a vote of thanks. A distinguished gathering consisting of officials and non-officials attended the function.

#### Fertilizer Expert Committee.

The Fertilizer Expert Committee, appointed by the Government of India, Ministry of Food and Agriculture, under the Chairman-

ship of Shri B. Sivaraman, I. C. S., Chief Secretary to the Government of Orissa, visited the Rubber Board and the Rubber Research Institute of India on the 21st February 1965. The committee held discussions with the officers of the Board on the fertilizer requirements of the rubber plantation industry and other connected topics. The members of the committee later visited a rubber plantation at Mundakayam.

The committee also participated in the Fertilizer Festival at Anchal, Quilon. The Board had put up a small stall at the exhibition organised in connection with the Fertilizer Festival.

#### Meeting of the Board

The forty-ninth meeting of the Rubber Board was held at the Board's Office on the 20th March 1965. Shri P. S. Habeeb Mohamed, Cheirman, presided This was the first meeting of the re-constituted Board. Most of the newly nominated members were present at the meeting. Shri K. Narayanan, Registrar of Co-operative Societies, Kerala, Shri V. C. Nanavathy of Messrs. Synthetics & Chemicals Ltd., and Shri K. Sreenivasan of Messrs, A. V. Thomas & Co., Ltd., attended the meeting by special invitation. The speech delivered by the Chairman and the important decisions taken by the Board at the meeting are published elsewhere in this issue.

A special meeting of the Board (Fiftieth Meeting) was held at the Board's office on the 23rd April 1965 to consider proposals for the expanded activities of the Rubber Research Institute of India and Extension Wing till the end of the Fourth Five Year Plan.

## The Effect of Water, Salt-Water and Sea-Water (Synthetic) on Smoked Rubber Sheets

P. J. JACOB N. H. SIVARAMAKRISHNAN

#### Introduction

It has been observed that if smoked rubber sheets come in contact with sea-water they lose their colour and are consequently downgraded, even after surface drying. This may happen particularly during transhipment or while loading or unloading the sheets. Consequently, the quality of the sheets become poor, resulting in a considerable financial loss.

The present study, therefore, was undertaken with a view to finding out a suitable post treatment of smoked rubber sheets, which are downgraded due to contact with salt-water or sea-water. Synthetic sea-water ' was used in the following experiments, due to practical difficulties in getting fresh supplies of sea-water, whenever needed.

Experiments on the following were conducted viz.

- (a) effect of water,
- (b) effect of salt-water (Nacl) under different concentrations (5, 10, 15 and 20%) and
- (c) effect of sea-water (synthetic mixture).

The smoked rubber sheets were dipped separately in pure water, salt-water at different concentrations and sea-water for 48 hours. The pH of the solution and the bleaching action on the sheets were observed.

The recorded observations are given in the following table:

Tre	catment	Dipping time	pH of solution after 48 hours	Bleaching action
1.	Pure water Salt-water at a con-	48 hrs.	6.3	Maximum
	centration of			
	5%	*,	6.3	
	10%	"	6.2	
	15%		6.1	
	20%	,,	6.2	Minimum
3.	Sea-water			The state of the s
	(synthetic mixture)	,,		Minimum

The sheets were then washed with water thoroughly, dripped and re-smoked in the smoke house for four days.

The weights were recorded each day and it was observed that the sheets attained constant weight and normal colour at the end of the third day.

Two sheets, which were dipped in sea water were air dried after washing and dripping. On observation it was found that after four days' drying, constant weights were recorded and there was no visual change in colour.

To study the time lag between immersion and washing, sixteen sheets were dipped in the sea-water mixture for forty eight hours and aur-dried. Each day two sheets were washed, dripped and smoked. The experiment was continued for eight days. On an examination of these sixteen sheets, it was observed that the original colour and texture were regained after four days' smoking.

#### Observations and Conclusions

It was found that the bleaching action was maximum in ordinary water and decreased with increase in salt concentration of the solution. This may, probably, be due to the salt effect.

In all the sheets which were washed completely, dripped and smoked, the colour was regained after three days smoking. This indicates that such a treatment will be advantageous to obtain the normal grade sheets.

It was observed that the sheets which were air dried, though indicated no visual faults, still some amount of tackiness was produced. This effect may probably be due to the removal of the phenolic bodies which

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act as antioxidants and while air drying, degradation might have taken place due to oxidation.

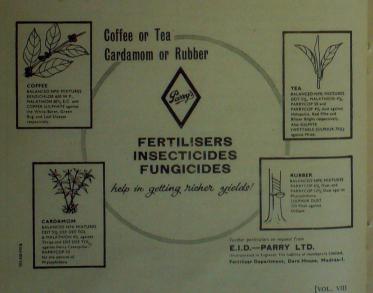
Thus it can be concluded that ribbed smoked sheets, when it is subjected to accidental soaking in water, with or without certain salt ingredients can be effectively washed, dripped and resmoked to avoid degradation of sheets, even if there is a time lag between immersion and smoking.

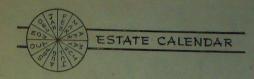
#### Acknowledgement

The authors are grateful to Dr. K. T. Jacob, Director of research R. R. I. I, Kottayam for suggesting the problem and continued interest.

#### Reference

<sup>1</sup> UVAROV E. B. AND CHAPMAN, D.R. Dictionary of Science pp 19 3(1956) Published by Penguin Books Ltd., England.





July

New flushes in nursery and young plants are sprayed. Planting is continued. If trees are tapped during this month panel protection should be given. Seed collection is done if available.

August

October

November

December

New flushes in nursery and young plants, in regions where shoot rot is prevalent, are sprayed. Treatment against pink disease is done. Seed collection is continued. Panel protection is given in areas where tapping is done. Rubber seeds are sown.

September This is the time for weeding and manuring. Sowing of seeds can be continued. Repeated inspection and treatment of pink disease should be done. Young rubber buddings planted out during June-July should be given shade. Yield stimulants may be applied on trees 20 or more years old.

Weeding and manuring may be continued. Dead woods should be removed. Tapping panel should be given protective treatments.

Mulching should be done in nurseries and round young plants. Young plants should be guarded against sun-scorch. Stems of young plants, 2—7 years old and of older plants should be lime-washed if exposed to sun.

Lime-washing and mulching is continued if found necessary. Calopogonium seeds are collected during this month.



Dr. K. T. Jacob, Rubber Production Commissioner planting the first rubber seedling in the Demonstration plot at Thodupuzha.

#### Demonstration Plots

To demonstrate to rubber growers the scientific techniques involved in raising a good rubber plantation, the Rubber Board has launched a programme to establish 21 demonstration plots distributed all over the rubber growing tracts, with one plot each in the jurisdiction of each Rubber Instructor.

The plots for this are selected from the holdings of small rubber growers. The operations to be demonstrated include all stages from clearing of land, lining, pitting, planting, and maintenance to tapping, processing and marketing of rubber.

The period of the demonstration is 10 years from the date of planting. Planting operations in the first plot in the series, at Kumaramangalam near Thodupuzha was performed by Dr. K. T. Jacob, Rubber Production Commissioner, on t6th June 1965.

It is estimated that this new project would cost about Rs. 2 lakhs for the Board.

## NEWS IN PICTURES



Board's Stall at the Exhibition at Changanacherry



Commodore Kapoor at the Board's Stall at Kottayam Exhibition



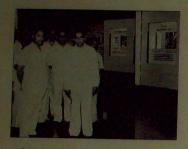
Board's Stall at Durgapur Exhibition



A View of the Board's Pavilion at the Kottavam Exhibition



Durgepur Exhibition.—Another View of the Board's Stall



Sri R. Prasad, Adviser to the Govt, of Kerala visits the Board's Stall at the Trivandrum Exhibition



Chairman Welcoming Hon. Minister Sri A. M. Thomas at the time of the opening of the Arakkunnam Rubber Marketing Society. Dr. K. T. Jacob, Rubber Production Commissioner is seated to the left of the Chairman



Replanting Seminar



Sri A. K. Rajapadmanabhan opening a Sales Depot of the Branch of the Meenachil Taluk Rubber Planters' Society at Thidanad



Sri K. P. Phalgunan opening a Branch of the Sales Depot of the Meenachil Taluk Rubber Planters' Society at Ramapuram



Sri Habeeb Mohammed, fraugurating the new office of the Meenschil Taluk Rubber Planters' Co-operative Society at Palai

Sri Habeeb Mohammed, opened the new smoke house at Kallanode on 28-4-1965 constructed by the Rubber Industrial Co-operative Society, Kallanode





Chairman speaking at a public function arranged along with the opening of the Kallanode smoke house



Clearing of land for planting rubber

## Rubber Cultivation in Andamans



Rubber Nursery at Andamans



TABLE I
Area Under Rubber as at the End of Each Year

Year	Area in acres
.1950-51	 170,506
1951–52	 171,191
1952-53	 172,786
1953-54	 173,643
1954-55	 176,647
1955-56	 207,239
1956-57	 234,351
1957-58	 261,998
1958-59	 286,567
1959-60	 305,452
1960-61	 321,002
1961-62	 348,121
1962-63	 361,142
1963-64	 377,938
1964-65	 383,813

TABLE II

Planted Acreage Under Different Planting Materials as at the End of 1964-1965
(Area in acres)

Planting materials		Newplanted area	Replanted area	Total area
Ordinary		206,014	4,360	210,374
Budded		42,534	20,302	62,836
Clonal		92,065	18,538	110,603
	Total	340,613	43,200	383,813

TABLE III

Classification of Holdings and Estates According to Size as at the End of 1964-1965
(Area in acres)

		Groups			No. of units	Area
A.	Small Holdings	(50 acres & be	low)			
	5 Acres and be				61,967	121,650
		and up to and	including 10	acres	5,722	42,505
	Above 10 acres	3			3,537	73,300
			Total		71,226	237,455
<b>B.</b>	Estates (above	50 acres)				
	Above 50 and	up to & inc	luding 100 a	icres	325	23,372
	" 500	,,	500	,,	239	49,286
	,, 100		1000	,,	30	21,699
	,, 1000	"	1500	,,	19	23,405
	,, 1500	,,	2000	,,	4	6,602
	,, 2000				9	21,994
		Total			626	146,358
		GRAND TOTAL			71,852	383,813

TABLE IV Statewise Distribution of Area at the End of 1964–1965 (Area in acres)

	STATES		HOLDINGS icres & below)	(.	ESTATES Above 50 acres)	1	TOTAL
		No. of units	Area	No. of units	Area	No. of units	Area
i.	Kerala	70,345	231,062	572	130,085	70,917	361,147
2.	Madras	854	5,942	42	11,906	896	17,848
3.	Mysore	25	392	11	3,945	36	4,33
4.	Andamans			1	422	1	422
5.	Tripura	1	20			1	20
6.	Maharashtra	1	39			1	39
	Total	71,226	237,455	626	146,358	71,852	383,813

TABLE V
Statewise Production of Natural Rubber (In Metric Toppes)

			vaturai Kubb	er (III ivieti	ic Tonnes)	
States	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Kerala	21,890	23,175	24,954	29,057	33,792	41,391
Madras	1,814	2,040	2,060	2,695	3,176	3,724
Mysore	437	452	402	447	468	481
Andamans	32	30	30	40	51	20
Total	24,173	25,697	27,446	32,239	37,487	45,616

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber

(In Metric Tonnes)

	Production		Import		Con	sumption	
Year	Natural Rubber	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total
1958-59	24,169	12,538	4,229	16,767	35,767	3,477	39,244
1959-60	24,173	15.287	5,718	21,005	40,491	4,964	45,455
1960-61	25.697	23,125	8.097	31,222	48,148	7,397	55,545
1961-62	27,446	22,528	10,121	32,649	48,410	10,186	58,596
1962-63		23,360	10,297	33,657	53,553	10,723	64,276
1963-64		26,275	8,812	35,087	61,155	11,959	73,114
1964-65		15,003	3,315	18,318	61,057	15,285	76,342

TABLE VII

Reclaimed Rubber Acquired and Consumed by Manufacturers
(In Metric Tonnes)

Year	Acquired	Consumed
1958–59	3,973	4,102
1959-60	5,177	4,969
1960-61	5,183	5,453
1961-62	6,422	6,046
1962-63	6,839	6,850
1963-64	8,251	7,982
1964-65	9,349	9,369

TABLE VIII Stock of Natural Rubber at the End of Each Month (In Metric Tonnes)

Month	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
April	8,723	10,035	8,571	9,696	11,003	12,818	16,129
May	9,106	9,067	8,186	9,716	10,937	12,894	16,129
June	8,756	8,138	8,128	8,462	12,193	14,003	16,798
July	8,710	8,545	8,067	8,256	12,475	14,824	16,609
August	8,619	8,968	8,489	9,235	12,218	14,239	15,913
September	8,322	8,995	9,157	9,744	12,723	14,302	16,069
October	9,523	9,810	10,265	11,291	13,917	15,605	16,312
November	11,007	10,467	10,742	12.120	15,059	17,142	17,756
December	11,587	10,793	12,993	13,359	16,334	18,314	19,110
January	11,715	10,496	13,036	12,990	15,940	18,381	17,950
February	10,438	9,533	11,185	11,511	13,879	16,437	15,772
March	10,233	9,201	9,875	11,439	13,485	16,092	14,094

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Group 2	R. M. A. 2 R. M. A. 3 Cuttings No. 1	159.85 158·20 149.93	
Group 3	R. M. A. 4 R. M. A. 5 Cuttings No. 2	154.34 149.93 143.32	
Group 4	Precoagulated Crepe Pale Latex Crepe IX Pale Latex Crepe I Pale Latex Crepe 2 Pale Latex Crepe 3 FAQ	167.57 165.36 163.16 162.06 160.96	
Group 5	E. B. C. Super IX Estate Brown Crepe IX Estate Brown Crepe 2X Smoked Blanket Remilled Crepe 2	156.54 152.13 148.83 152.13 143.87	
Group 6	Estate Brown Crepe 3X Remilled Crepe 3 Remilled Crepe 4	140.01 137.81 131.74	
Group 7	Flat Bark	122.37	
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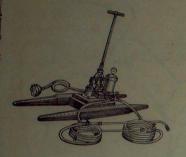
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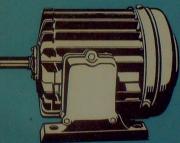
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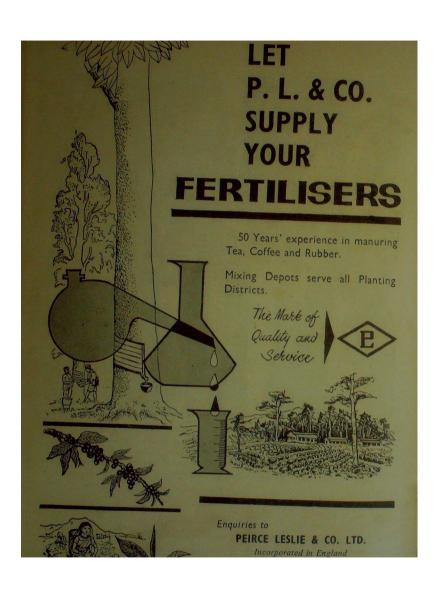
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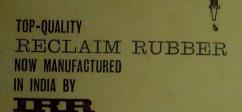
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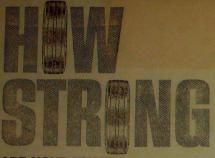
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### Role of Co-operatives

The small holder has come to occupy a very important position in the rubber plantation industry in India. As per latest statistics available, out of a total of 71,852 units under rubber, 71,226 are small holdings of 50 acres and below. They cover 62 percent of the total acreage. Any scheme for the progress and development of the industry has necessarily to take into account this situation if it is to achieve the desired result

Over and above the problems facing the rubber plantation industry as a whole, the small holding sector has its own special problems, which if not analysed and solutions found for in time, may hold back the progress on sound lines of the industry itself.

Though small holdings occupy 62 percent of the total acreage under rubber, they contribute only 38 percent of the total production of natural rubber in the country. While the average yield per acre for the industry as a whole was 375 lb, during 1964-65, it was 582 lb for estates and only 236 lb for small holdings.

The future of the natural rubber industry depends on its ability to produce rubber at such a cost and to process and market it in such forms as would enable it to compete successfully with synthetic rubber.

If the cost of production is to be kept at a low level, the yield per acre has to be raised considerably. Scientific research has made it possible to obtain very high yields by using modern varieties of planting materials and by adopting improved cultural practices. So also, for improving the quality of the product, correct scientific methods of processing have to be followed.

The small holder may not have the economic means or the technical know how to adopt modern scientific methods of cultivation, manuring, plant protection and processing aimed at efficient production. It is in this context that co-operative effort assumes importance. The role that co-operative societies could play in the modernisation and improvement of the small holding sector of the rubber plantation industry has been discussed and analysed by the various bodies that enquired into the problems of the industry in the past. For improving the condition of the small holders of rubber, the Plantation Enquiry Commission (1956) recommended that primary co-operative societies of a multipurpose character were in the first place essential. The Tariff Commission and the Estimates Committee of Parliament has also recommended that a planned programme of development of co-operative societies for small holders should be implemented and that, that was the only way in which they could be effectively helped.

The purpose of a multipurpose or service co-operative society serving the needs of small growers should not be confined to providing cheap credit facilities for production and supplying the various other requirements of the growers for increased production but it should also extend its scope of service by disseminating information on the improved methods of production and by taking up processing activities. Marketing societies should be able to give the most favourable price to the rubber produced by the grower members and there by save them from the clutches of private dealers. The co-operative organisations should help to carry out the target of production according to the plans of the Rubber Board.

The Rubber Board had conducted certain investigations during the fifties on the question of developing co-operative societies of small rubber growers, but the results were found to be not very encouraging. It was reported that the efforts of the Board in inducing the small holders to form co-operative societies did not meet with success owing to lack of enthusiasm on the part of small holders themselves to the proposal. But the Board was of the view that the scheme should be kept in view for implementation if and when the small holder took interest in it.

And in due course the small holder did take interest in the scheme for development of co-operatives. It is gratifying to note that the small rubber grower has come to appreciate, in recent times, the inevitability of mutual co-operation to protect his interests and that the co-operative movement has begun to make some impact on his condition.

In order to improve the condition of the small growers through co-operative societies, the Board sought the services of an officer of the rank of a Deputy Registrar of the Co-operative Department of the Kerala Government and the first officer joined duty in the Board in 1960. From then onwards the Board adopted a policy of actively encouraging co-operative organisations. In course of time various schemes have been drawn up and implemented by the Board with this end in view.

Currently the following schemes are being operated through cooperative societies for the benefit of small rubber growers (1) Distribution of formic acid. (2) Distribution of sprayers. (3) Subsidy for
construction of smoke houses. (4) Subsidy for purchase of copper
sulphate. (5) Subsidy for purchase of fertilizers (6) Supply of rubber
rollers on hire purchase basis. (7) Working capital loan to societies
engaged in the marketing of rubber. In addition, schemes have also
been drawn up for share capital contribution of Rs. 25,000 by the
Board to societies doing marketing of rubber and of Rs. 10,000 to
societies having smoke houses for processing operations and for giving
managerial subsidy to rubber processing and marketing societies.
Necessary approval of the Central Government has now been obtained

for the former schemes. It is the policy of the Board to implement all the development schemes for the improvement of small rubber holdings through co-operative societies only so as to bring them into the co-operative fold and make the societies function effectively for the benefit of the growers.

At present, 103 co-operative societies of different types are implementing one or the other scheme of the Board. They are either organisations of rubber growers only or are organisations in which the interests of rubber growers are well represented. 12 of these societies have taken up marketing of rubber and 11 societies have constructed 12 smoke houses under the Board's subsidy scheme. There are five societies which are now at the organisational stage.

Still it is to be emphasised that a considerable section of small rubber growers remain outside the fold of co-operative societies and, therefore, there should be no slackening of efforts to bring the entire small holder community into the co-operative movement.

In this age of increasing competition from and technological progress of the synthetic rubber industry, the individual small grower with one or two acres of rubber will not be able to safeguard his position by himself. He will only be a drag on the progress of the natural rubber industry. If his voice is to be heard and if his interests are to be protected he should be prepared to subdue his individuality to some extent, and come into some organisation or other which is capable of giving him protection. And the co-operative movement offers the small rubber grower the best opportunity for progress and development.

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Shri P. S. Habeab Mohamed, Chairman, Rubber Board, addressing the 51st meeting of the Rubber Board

#### Rubber Plantation Industry - A Review\*

P. S. HABEEB MOHAMED\*

It is with great pleasure that I welcome you to the 51st meeting of the Board. Since we met in April, 1965, there have been important developments in the country and the crisis which we have passed through and is still continuing has strengthened our will to face any situation as one nation and gear up the production programmes to the rubber is a strategic material in war and peace and this opportunity should be used to increase our production of rubbers of all kinds. The crisis has taught us to rely on our own resources primarily and this is the time to build our resources to the maximum. This is the time to maximise the production of natural rubber and synthetic rubber and not engage in controversies about synthetic rubber production and things of that kind, and at the same time think of modernisation of the natural rubber plantation industry to meet any foreseen or unforeseen developments in the

#### Collection of Excise Duty

The collection of excise duty continues to be satisfactory. The figures will show how much our collections have improved since 1956-257

	Rs	P
1956/57	24,03,954	77
1957/58	20,56,329	29
1958/59	20,35,054	94
1959/60	20,99,095	28
1960/61	21,37,300	15
1961/62	33,66,241	65
1962/63	75,33,784	75
1963/64	51.53,750	08
1964/65	1,13,55,803	02
Total	3,81,41,313	93

During 1964-'65 we collected excise duty to the extent of Rs. 1,13,55,803.02. The collection from 1-4-1965 to 15-9-1965 is Rs. (0,10,303.91 and we hope to collect a little more than what we did during the last year.

Speech delivered at the 51st Meeting of the Rubber Board held on the 16th October, 1965, at Kortayam.

<sup>\*</sup> Chairman, Rubber Board, Kottayam, Kerala State.

#### Fluctuations in Price

One of the important developments which have taken place in the natural rubber market in this country is the recent fluctua-tions in the price of natural rubber. It is understood that the ruling price of rubber is Rs. 180 per 50 kg today. The price has been fluctuating on account of various factors, the most important of which is the curtailment in the imports, due to difficulties of foreign exchange and other reasons.

Though in the short run the price increase is advantageous to the producer, it may have wide and far-flung repercussions for the future. The fluctuating price of natural rubber coupled with the poor yield per acre may constitute a threat to the permanent interests of the natural rubber producers. Our yield per acre continues to be poor and the following statistics will show how the yield compares with the yield in other natural rubber producing countries.

		(including immature area)	duction in 1964 (ton
1.	Malaysia	46,48,000	8,86,000
2.	Indonesia	44,69,000	6,47,000
3.	Thailand	8,40,000	2,18,000
4.	Ceylon	6,76,000	1,09,800
5.	Nigeria	2,88,000	72,000
6.	Liberia	2,45,000	42 000

#### Average yield

The average yield per acre in Malaysia, excluding Sabah and Sarawak, in 1963; was 640 lb including both estates and small holdings. It is estimated that from the small holdings in Malaysia the average yield per acre is 540 lb. In Ceylon the average yield per acre in 1964 was 450 lb. Our average yield is only 375 lb per acre, though the average yield from the large holdings is 582 lb. However, there has been an increase in the average yield per acre in this country which will be seen from the statistics.

1961—'62	329 11
1962—'63	3 12 lb
1963—'64	351 lb
1964-'65	375 lb

A recent study conducted by the Board shows that out of the total production of 45,600 tonnes, large holdings which account for 40% of the tappable area have contributed 28,400 tonnes (62% of the total production) while the small holdings with 60% of the tappable area contributed only 17,200 tonnes (38% of the production). The small holders' yield per acre is estimated at only 236 lb per acre. It is to be noted, however, that in a large number of small holdings in Kerala the area under rubber is heavily interplanted with other crops and to this extent the effective area under rubber is much less than the registered area. While the conditions are favourable, all action must be taken by us to increase the yield per acre in both large estates and small holdings and thereby bring down the cost of production.

#### Targets Achieved

In fact it should be possible for us to increase our production substantially. The fact that against the Third Plan target of 45,000 tonnes, we could produce 45,600 tonnes and that we could exceed the prescribed target of 3.6 lakhs acres by the end of the plan period and show a registered area of 3.84 lakhs by the end of 1964—'65 which has subsequently increased to 3.93 lakhs acres by the end of September, 1965, indicates that with concerted efforts much more can be done.

#### Consumption of Synthetic Rubber

Another important development which has been noticed is the progressive increase in the percentage of synthetic rubber use in this country. The statistics show that the consumption of synthetic rubber has been steadily increasing.

Year	Consumption (tonnes)	
1952—'53	19	
1958—'59	3,477	
1963—'64	11,959	
1954—'65	15,285	

It is also noticed that against the consumption of 4,478 tonnes of synthetic rubber for the period from April to July 1964, the quantity of synthetic rubber consumed from April to July, 1965, is 6,600 tonnes. This tendency of increasing synthetic rubber use will continue in future. We have collected some statistics from industrially developed or developing countries which show the percentage share of synthetic rubber in the total consumption of natural and synthetic

	1954	1959	1964
U. S. A.	52	66	75
U.K.	4	30	47
France	10	33	53
F. R. Germany	12	34	53
Italy	16	38	54
Australia	1	33	48
Canada	42	56	70
Japan	2	17	44
Brazil	- 1	17	56
India	0	10	19
World	29	43	54

It is also well known that Brazil is the only country except India, which produces both synthetic rubber and natural rubber and consumes its entire production of natural rubber and synthetic rubber, and even in Brazil, the percentage of synthetic rubber use has increased from 1% in 1954 to 56% in 1964 while in our country it has increased from 10% in 1959 to 19% in 1964.

#### Reduce Cost of Production

One fact which emerges very clearly from the present position of the low yield per acre in this country, the price fluctuations and the progressive increase in

the offtake of synthetic rubber is that the future of the natural rubber industry lies in reducing the cost of production and holding the price level even. It will be a mistake to suppose that an increase in the cost of production can be offset invariably by an increase in the price of natural rubber, as has been the case so long. Since the Government fixed the price of rubber on the basis of the Tariff Board's report in 1951 and the Tariff Commission's report in 1960, there are at least two factors which make it difficult for an increase in the cost of production to be offset by an increase in the price of natural rubber. One is, as already mentioned, the emergence of a strong synthetic rubber industry. The present policy of the Government is well known which is to allot specified quantities of synthetic rubber to the manufacturers particularly the tyre manufacturing sector and link the offtake of synthetic rubber by these units with the issue of import licences to them for raw materials and spare parts. Current year's allotment of synthetic rubber to these units is to the extent of about 20,000 tonnes. There are proposals before the Government for the setting up of more synthetic rubber factories, one for the production of Cis Poly butadiene with an annual capacity of 25,000 tonnes and another unit for the manufacture of Butyl rubber with an annual capacity of 15,000 tonnes. The estimated requirements of all rubbers by the end of the Fourth Plan is 2.24 lakhs tonnes of which natural rubber production is estimated at about 72,000 tonnes, the balance being met by production of synthetic rubber and reclaimed rubber in this country and import of natural and synthetic rubbers. The Government have, however, assured the Board that in granting licences for the setting up of synthetic rubber plants they will keep in view the long-term interests of the natural rubber

#### Price of Synthetic Rubber

The price of synthetic rubber is Rs. 3.85 / kg for the top grade but with the increased production of the SBR plant at Bareilly the cost will come down. The analysis of the balance sheet of the company (Synthetics and Chemicals, Ltd.) for the year ending 19/4 shows that out of the production costs, interest and depreciation items alone account for 37%, materials, labour charges and other expenses accounting for the remaining 63%. It is undoubted that with increased production, the elements of depreciation and interest charges will be spread over more evenly and the company may find it possible, if not today, in the near future, to reduce its cost of production and its selling prices. The marketing wing of synthetic rubber manufacturers is very active and it has been tackling the problem in a systematic way on the following fronts:—

- (1) Introducing the product in industries where similar synthetic rubbers have not been used in the past.
- (2) Meeting the requirements of such types of rubber from established users, and increasing the percentage of synthetic rubber in their consumption of all types of rubbers.
  - (3) Providing service facilities.
- (4) Ensuring supplies to the users at specified periods and also providing facilities for supply at short notice.

#### **Determining Factors**

It is to be noticed that while the price of natural rubber has been fixed by statute, there is no such statutory fixation of price in the case of synthetic rubber. It is undoubted that at least in the tyre manufacturing sector, synthetic rubber may be able to capture a substantial portion of the market and at this stage the price and presentation of natural rubber will be important determining factors in the choice

of rubbers by the manufacturing sector. While the marketing wing of synthetic rubber producers has been in regular touch with the manufacturers there is at present no concerted effort by the natural rubber producing interests to provide the type and quality of natural rubber required by the manfacturers. If unsystematic ways of presentation are persisted in, the advantage will be in favour of synthetic rubber which may also become cheaper.

The second fact which we have to take notice of and which in fact necessitates the price line of raw materials and particularly natural rubber being kept steady, is the present policy of the Government which is increasingly export-oriented. Though there are export promotion councils and export promotion assistance schemes of the Government, one of the biggest factors in export promotion will be the availability of raw materials at a more or less steady price, particularly in the case of natural rubber, the price of which is higher than the international market price, which has been showing a declining trend. If a stage comes, and that stage came in the recent months, when synthetic rubber produced in this country is cheaper ultimately to the manufacturer, the tendency will be to go in for synthetic rubber for uses where it can be easily substituted. Though there is an expanding market for rubber goods in the country the manufacturing interests will also have to explore possibilities of export and will have to keep their prices competitive in the international market. It is undoubted that in this context to a large extent the interests of natural rubber producers will manufacturers. It is necessary that close relationship is established between the manufacturing interests and the natural rubber producers, though at present the contacts are few and far between. It is only recently that a beginning has been

made by providing some financial assistance for the research activities of the Rubber Manufacturers' Associations in the budget of the Rubber Board.

These factors make it inevitable that if in the previous contexts the cost of production was the relevant factor in the fixation of the price of natural rubber, the most relevant factor in future in the determination of the price will be cost of efficient production. In fact the Board's activities today can be summarised broadly under two headings: (1) more production of rubber to meet our increase in demand and (2) ensure efficient production in the large holdings and the small holdings.

#### New Planting Schemes

The tempo of new planting in the public sector and in the private sector has been fairly good. Available information shows that about 13,000 acres have been planted by the Plantation Corporation of Kerala. A pilot project of the Rubber Board has been started in the Andamans and planting has been completed in 100 acres. The Governments of Mysore and Madras have been taking keen interest in the plantation of rubber as part of minor forest produce in the Five Year Plan. The Agricultural Refinance Corporation has started a scheme for giving loans through the scheduled banks for new planting and allied activities and a loan of Rs. 4.46 lakhs has been More cases of sanctioned in one case loans through the scheduled banks are likely to be sanctioned by the Corporation in the near future. A new scheme for sanction of loans for new planting and maintenance of rubber for small holders which would be implemented through the Land Mortgage Banks will be introduced as soon as approval of the Government of India is

#### Progress of Replanting

The programme of replanting is being pursued with vigour. Against the applica-tions received for 13,081 acres, in 1965, permits have already been issued for more than 6,000 acres. All the permits are expected to be issued by the end of October and we expect that the minimum area which will be replanted in 1965 will be 9,000 acres. The recent fluctuations in the price of natural rubber have made quite a number of small holders withdraw their replanting applications and this has affected our replanting programme to some extent Some other schemes like the establishment of smoke houses for producing quality sheets by smallholders have also suffered as dealers were willing to purchase any kind of natural rubber without proper smoking or grading. To this extent it is true to say that the effective implementation of the Board's

#### Research Programmes

On the Research and Extension side the progress has been fairly satisfactory.

#### Agronomy

Existing permanent manurial experiments indicated the utility of nitrogen and phosphate applications for young rubber to reduce the immature period. Potash applications beyond 40 lb per acre appeared to suppress the stem girth.

Series of nursery experiments undertaken during 1964/65 season have shown that well manured old nursery sites may respond only to nitrogen application as the levels of phosphate and potash are invariably high in such locations. There was no significant difference in plant growth obtained from plots at Karikattoor, supplied with 250 kg to 1450 kg of NPK 8:12:10 mixture per acre.

Studies conducted to assess the compatibility of ammophos with Bordeaux mixture indicated that in addition to nitrogen loss, the soluble phosphate was converted into insoluble form. In certain other cases, solubilised copper was also released which can be a hazard to crop plants when applied. Hence ammophos cannot be mixed with Bordeaux mixture in any foliar spray schedule.

Sulphuric acid treatment of seeds for 15-70 minutes appeared to give better germination percentage especially in the case of Calopog mium. Acid treated Calopogonium seeds could store well for 55 days without any deterioration in percentage of germination.

Results from different weedicide trials indicated that some practical advantages may accrue in employing premergent weedicides, especially for a better establishment of cover crops.

Botanu

A clone from an estate mother tree selection of the R. R. I. I. has recorded an yield of 5.31 kg of dry rubber per tree per year (approximately 740 kg per acre annually) and another yielded 4.12 kg per tree per year (approximately 575 kg per acre annually) compared to control Tjir I which showed an yield of only 2.67 kg per tree per year (approximately 370 kg per acre annually).

Two more selections from estate mother trees have been added to the Rubber Research Institute of India Experiment Station. These, in addition to their high yield, showed considerable field tolerance to abnormal leaf fall disease.

Twenty two primary clones developed from the 1954 series of hand pollinations, recorded better performance than the control Tjir 1. Their yield varied from 2.71 kg per tree per year (approximately 375 kg per acre

per year) to 4.39 kg per tree per year (approximately 600 kg per acre per year). Tjir 1, the control, yielded 2.67 kg per tree per year (approximately 370 kg per acre per year).

The second polyclonal garden with RRIM 501, PR 107, and Tjir 1 is being established at Manalodi Division of the Madras Government Rubber Plantations. The planting has been completed during August 1965.

Studies on the floral biology and fruit set in five clones of *Hevea* have revealed that these clones which have been used as parents in breeding work, differ in their sex ratios and in the extent of fruit set.

Green budded plants raised in polythene bags showed a mean height of 7.17 ft compared to 3.66 ft recorded by conventionally budded plants in July 1965. Both were planted to field during 1964.

The first batch of 7 trainees from the Tappers Training School completed their training in the first week of August and second batch of 8 persons has commenced their training in the third week of August. The training for the second batch is in progress.

Pathology

Six different isolates of *Phytophthora* palmiv ra have been established from different areas for comparative studies.

Preliminary studies connected with the epideamology of abnormal leaf fall disease have been started through use of a Hirst Spore trap.

Attempts on developing a simple laboratory screening technique for assessing tolerance of different planting materials to Phytophthora palmivora, employing assessment of growth rate of the pathogen in petiole extracts of the plant materials have not yielded conclusive results so far. Preliminary assessment of field performance of six different planting materials showed that, three of them were promising with over 95% leaf retention without spraying.

After extensive field trials, the use of-Mini Micron 77 stretcher model was found to be effective and economical for spraying rubber up to 55 ft.

Results of tests with a water emulsifiable oil based copper oxychloride formulation in place of oil dispersed oil-based copper oxychloride, have been encouraging.

Testing of the efficacy of a tin based fungicide (Brestan) did not give conclusive results as the incidence of the disease in the trial plots was very low this season.

Results of tests comparing Micron spraying with aerial spraying showed, that invariably, the former gave better disease control than the latter. Further, uniform pattern of good leaf retention was characteristic of the former, while with aerial spraying, missed patches with poor retention were common, Cost of Micron spraying is very much cheaper than aerial operations (Rs. 40/to 45/- against Rs. 75/- to 80/- per aere).

Four different hosts showing *Oidium* incidence have been collected and it would appear that in the case of two, the pathogen may be the same as that affecting rubber.

Incidence of nursery leaf spot disease during 1964/65 nursery period was comparatively low and delayed and hence did not appreciably affect growth and vigour of seedlings. Provision of overhead shade reduced disease incidence.

Studies on pests of cover crops have been initiated. Leaf feeding caterpillars (Pagrissignata) and a stem boring cerambycid beetle were found to be the most serious. Life history studies upto larval stage have been completed.

A group of latex drinking slugs were collected from Taliparambi area and attempts at controlling them using baits, contact poisons and fumigants are under way. Certain maggots and bacteria suspected to be parasitic on the slugs have been obtained and studies have been initiated to assess their potential as biological control agents.

Life history studies on the newly recorded insects, viz., mulch feeding caterpillar and gallery making caterpillar have been started.

A species of Melidogyne (Nematode) affecting the roots of the cover crop *Pueraria* javanica and causing root knot was recorded.

#### Technology

Test reports from four industrial concerns on acctic acid coagulated sheets, indicated that these are in no way inferior to formic acid coagulated sheets; however, since the acetic acid used was chemically pure, further trials using commercial grade acetic acid are programmed.

Use of carboxy methyl cellulose as a creaming agent was found to be effective with a recovery of 51% of the rubber in skim latex. Studies to fix up the optimum concentration of tamarind seed gum for maximum rubber recovery and use of Lactol H. V. as creaming agent have been recently started.

Studies on oil-extension of natural rubber showed that an emulsion prepared from 5-6% stearie acid and 1-1.25% ammonia on the total weight of oil used was efficient. Preparation of the emulsion using oleic acid in place of stearie acid had certain disadvantages. Test reports on the oil extended rubber produced at the latex stage, received from M/s. N. R. M. and I. C. I. laboratories indicate its slight superiority over oil-extended rubber produced in the dry rubber stage in tyre composition. However, the test reports received from M/s. Bata Shoe Co., indicate that such a type of oil-extended rubber is not suitable for soles and tiles industries.

#### Extension Activities

A design for a 30 kg smoke house has been prepared and this is in the process of testing for its performance. Twenty Demonstration Plots have been planted in small growers' fields to demonstrate to the growers the correct system of planting, aftercare, tapping, latex processing etc.

Trials laid out earlier on small growers' fields in 11 different centres demonstrating the benefits of manuring, use of plant protection measures (spraying and dusting) and application of yield stimulants have been continued.

Use of fertilisers in rubber has increased as a result of the Board's subsidy schemes and propaganda.

The increased facilities provided by the Board through supply of hand-operated and Micron sprayers and subsidised supply of copper fungicides, have enhanced the area sprayed by small holders. 538 hand-operated sprayers have -been made available to the small holders through 57 co-operative societies and the Board's sub offices and this is estimated to have been used for spraying in about 15,000 acres. An area of 1,012 acres has been sprayed using the 2 Micron sprayers available with the Extension Wing. Further, a substantial area is estimated to have been sprayed with the Micron sprayers available on hire from the Central Plant Protection Department's regional office at Ernakulum.

There are 21 Rubber Instructors, 10 Field Assistants and 6 Tapping Demonstrators posted to different rubber growing centres engaged in active extension work, in addition to the senior staff at the Head Office. Advisory service has been intensified and 2,750 visits to small holdings were made by the field staff.

A scheme for supply of Rubber Rollers on hire purchase terms is being implemented

and it is expected that about 50 rollers will be supplied during the current year.

Eleven smoke houses have been functioning under co-operative societies as per the Board's subsidy scheme operating with a view to improve the quality of rubber produced, particularly amongst the small holders.

#### Nurseries

Of the 4 Regional Nurseries proposed to be opened for meeting the increasing demand for improved planting material, two have been opened and started functioning (Alakode and Kadakamon) and the other two are proposed to be opened shortly. Material raised in the Central Nursery at Karikattoor and the 4 Regional Nurseries is expected to be sufficient to plant an area of about 6,000 acres annually.

High yielding seeds and other planting material, sufficient to plant an area of 15,000 acres were distributed during the year. The planting material distributed by approved private nurseries is expected to be sufficient for planting another 1,600 acres. Import licences to the c. i. f. value of Rs. 8 lakhs was obtained for importing PBIG seeds from Malaysia during 1965-66 period.

Import of formic acid and distribution to meet the requirements of the industry was arranged.

#### Research Station

The Government of Kerala have allotted 640 acres of land to us from Chethackal Reserve in Ranni forest division which will be developed as our main research station. We will be taking over 25 acres of land shortly and laying out various experiments.

The Director of Research will be visiting Malaya to study the impact of the standard Malaysian rubber on the market and to work out a suitable system of classification of natural rubber in this country.

#### New Sub Offices

On the administrative side, we have strengthened the Market Intelligence Section and regular inspections of the accounts of dealers are being carried out. The Cost Accountant of the Board has been inspecting the accounts of the manufacturers and has brought to light a lot of evasion of excise duty at some points. The work of the Extension Staff has been separated from the routine work of inspection for registration and enquiry into subsidy applications etc. The Rubber Instructors on the Extension side will from now onwards be regularly inspecting the small growers' areas and giving advice to the planters. We have reorganised the working of the sub offices. Five additional sub offices have been opened at Punalur, Kanjirapally, Palghat, Taliparamba and Ernakulam. The Ernakulam sub office will be mainly concerned with market intelligence analysis. The latest instructions issued to the Rubber Instructors are that each small estate will be visited and a programme of improvement drawn up for that estate on the basis of the inspection. The Board will not be content merely with giving technical advice to the small planters but all the schemes meant for the small planters will combine some sort of financial assistance and technical advice. The main intention is to develop the small holdings

#### Schemes for Small Growers

The following schemes are in operation from the Pool Fund for the benefit of the small growers:—

- Subsidy for soil conservation work for replanting small holders and new planting loanees.
- Newplanting loan scheme to help small growers to raise their existing holdings to a minimum of 5 acres and a maximum of 15 acres.

- Supply of high yielding planting materials free of cost to small growers who replant or newplant under the Board's aid schemes.
- Subsidised supply of high yielding planting materials to all small growers.
- 5. Subsidised supply of copper sulphate to all small growers.
- Subsidised distribution of fertilisers for replanting and newplanting to small growers.
- 7. Supply of sprayers and dusters through co-operative societies.
- 8. Tappers' Training School.
- 9. Supply of rollers on hire-purchase basis.
- Distribution of formic acid through co-operatives.
- 11. Subsidy for the construction of smoke houses by co-operatives.
- 12. Interest-free loan for co-operative rubber marketing societies.

It will be noticed that every stage of the planting operations, processing and marketing has been covered by one scheme or the other. The tempo of the activities of the small growers will also be seen from the expenditure we have incurred from the Poul Fund in the previous years:—

Year	Expenditure (Rs.   lakhs)
1958-59	0.13
1959-60	0.43
1960-61	0.33
1961-62	1.08
1962-63	1.47
1963-64	2.18
1964-65	f ananding at

We are confident of spending at least Rs. 15 lakhs during the current year on schemes for the small growers. Fortunately

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## Rubber Research — Progress and Prospects of Development

DR. K. T. JACOB\*



Dr. K. T. JACOB

#### Introduction

An assessment of the progress of research in rubber, in relation to the increased production, has necessarily to take into account the initiation and development of Rubber Plantation in India.

#### Historical Review

Planting of rubber on a commercial scale is said to have commenced in 1902. In the subsequent years, cultivation of rubber began to spread in different parts of South West Coast of Southern India and by 1910 the area under rubber had increased to 29,500 acres. With further plantings, the area under rubber by 1925 was estimated at 76,295 acres. In 1930 there was a slump in the prices of all agricultural commodities and in 1932 the price of rubber came down

to an unprecedented low level and during that and the subsequent years, the increase in the area under rubber was negligible. In 1934, however, the International Rubber Regulation Agreement came into operation, whereby production and newplanting of rubber were restricted and regulated. Again, the outbreak of World War II in 1939 changed entirely the pattern of the progress of the industry. As a result of Japanese occupation of most of the important rubber producing countries in South East Asia, India and Ceylon were the only sources of natural rubber for the then Allied Nations. The rubber growers in these countries were strenuously encouraged to produce the maximum rubber required for the prosecution of war. Restrictions on the production and planting of rubber were removed in 1942

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and there was, therefore, considerable activity in newplanting and some replanting which in 1943 covered about 14,599 acres. the largest increase in any one year since 1926. Again, during the fifties, the price mechanism coupled with the adequate protection to the industry by the Government by enacting Rubber Act (1947) and constituting the Indian Rubber Board, and later the Rubber Board, had a salutary effect on the growth and production of this vital industry. Today there is a total area of 3.83.813 acres under rubber in India. The region of cultivation is confined to States in the South zone of the country, namely Kerala, Madras and Mysore. Because of its favourable climatic and edaphic conditions, Kerala State alone accounts for 95% of the total area under rubber in India.

#### Increase in Demand

Research work carried out on plantation crops to evolve improved clones or strains is of prime importance in getting increased yields in newplanting or replanting. Also, such plantings can be laid out with modern requirements of disease control, more efficient use of labour and other machinery. But in all the plantation crops, there is a lurking fear of overproduction and consequent loss in returns, but as far as rubber is concerned, the position, at least for a considerable time, is the reverse as we cannot produce anywhere near our requirements.

#### (Continued from page 131)

we have got sufficient funds at the disposal of the Board and recently the rules have been amended by the Government to provide for a large number of new schemes sanctioned by the Board at its meeting in March, 1965.

#### Conclusion

To sum up, we should aim at more production and the most efficient methods of production. The presentation of rubber

At the end of the Fourth Five Year Plan. the requirement of rubber is estimated to be 2.24 lakh tonnes, while the production of natural rubber is expected to be about 72,000 tonnes. For 1965-66 the estimated requirements of rubber is put at 1,10,000 tonnes against a production target of about 50,000 tonnes. Even after utilising all the synthetic and reclaimed rubber, the manufacturing industry will still need additional quantity of rubber which is estimated at just over 67,000 tonnes at the end of the Fourth Plan period. Today not only in India, but throughout the rubber growing areas of the world, every kilogram of rubber produced finds a ready market. The output of rubber products in India has increased sharply, but domestic production of raw materials has not increased proportionately. On the contrary, the gap between raw rubber supply and demand continues to widen. To narrow the ever widening gap, immediate steps should be taken to bring more areas under rubber, along with phased replanting of old, moribund and uneconomic holdings, which have outlived their economic life span, with high yielding modern clones. As the area for the expansion of rubber cultivation is limited, due to the special agro-climatic requirements of the crop and also due to the competition between other forest products, the best method of bridging the gap appears to lie in intensive cultivation methods backed by sound scientific study of the crop. If the

and technical classification will be equally important. The fact that we have exceeded the Third Plan targets should not be a reason for complacency. The aim should be to reduce the cost of production by planting with high yielding materials and the latest methods of manuring, tapping and processing. If these things are pursued it should be possible for natural rubber to maintain itself in the market and ensure the supply of a product vital in war or in peace.

large majority of small growers have not replanted as much as they should have, the reason may be due to the fact that the flow of the technical knowledge and organisation of resources to help them have not been possibly adequate and streamlined.

#### Progress of Research:

#### Initial Studies

With the introduction of rubber into India at the beginning of this century, observations and experiments were conducted by the pioneer planters and such findings were generally exchanged and utilised for further plantings. Thus, certain amount of knowledge about rubber culture was built up on the experience gained by such studies elsewhere and in India, though not verified by scientific tools for general and local applicability.

The scientific study of rubber appears to have commenced along with large scale planting. The occurrence of leaf fall during the year 1909 should also be considered to have given the necessary impetus to a systematic study of the rubber diseases. From the reports it is evident that two experiment stations were working exclusively to tackle rubber problems, one at Mooply and the other at Tenmalai regions. Apart from these Government institutions, the organisation of the UPASI had one rubber mycologist in its scientific department to tackle the disease problem and to evolve suitable control measures. The investigation into the cause of the abnormal leaf fall disease was first undertaken in India by Mr. McRæ, who in 1916, announced that it was caused by the attack of a species of Phytophthora. In 1923, Ashplant, the Rubber Specialist attached to UPASI, who had been concentrating more on control measures, demonstrated that spraying the trees with Bordeaux mixture, just before the outbreak of the monsoon, could successfully check the ravages of this disease. The DSP sprayer

was recommended for this 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 South India would not have attained its present position.

#### The Lull

After this initial period of scientific investigations, there appeared to have been a lull and the year 1932 saw the closing down of the UPASI Rubber Experiment Station at Mundakayam for want of financial resources. Since then, very little scientifiic research on rubber has been undertaken in India. Another line of approach to the solution of the problem of Phytophthora leaf disease was to develop resistant varieties of rubber, Pioneer work in this regard was reported to have been undertaken by a planter at Mundakayam, using clone BD 10 for crown budding of high yielding clones susceptible to Phytophthora. The follow up and assessment of these initial attempts have not always been possible and the failure or success of such investigations could not be

#### Research Scheme

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 in different planting districts in South India. An examination of available yield records from the different planting districts, however, show that the performances of the proved clones and clonal seedling families introduced and established in India are more or less on similar lines to those in countries like Malaysia and Ceylon. From these and with the object of encouraging the use of high vielding rubber planting material, particularly

by small holders, the then Indian Rubber Board had been distributing selected clonal seeds among interested rubber growers since 1949. At this period, the Rubber Board had two technical officers namely the Rubber Production Commissioner and a Field Officer to attend to advisory work and distribution of selected high yielding planting materials. With limited staff and without laboratory facilities, the work done by these officers should be considered commendable. In the wake of these developments, there was a general awareness of the benefits of research and the Board accordingly submitted a scheme for the establishment of a Rubber Research Institute and Experiment Station in South India. Concurrently, schemes for rehabilitation of the Rubber Plantation Industry was also under consideration of the Government of India. Finally, realising the gravity of the problems specific to this country, the Government of India granted in 1954, administrative approval for the establishment of a Rubber Research Institute. The new Research Department was designed to form another important link in the chain of Research Institutes for

#### R. R. I. of India

As per the administrative approval of the Government of India, a beginning was made during 1955 by establishing a Research Institute at Kottayam with temporary laboratory accommodation. An area of 8? acres (33:18 Ha) was acquired by the Travancore-Cochin State Government on behalf of the Rubber Board and transferred to the Board for establishing a Rubber Research Institute and Experiment Station. The transfer of possession was effected on 5th October 1955. Dr. Rajendra Prasad, the first President of the Republic of India, laid the foundation stone of the new building of the Rubber Research Institute of India at a function held on 4th February 1956, at the site.

To initiate research, in addition to the Rubber Production Commissioner, a Pathologist and an Agronomist were appointed during 1955. The Pathology division functioned with continuity with a Pathologist from 1955 onwards. The other divisions like Agronomy and Botany had senior officers for short periods only and due to the paucity of laboratory facilities and supporting staff, the contemplated research schemes in its entirety, could not be implemented. With the aid of small temporary laboratories equipped with essential equipments, the work done by the Pathology division was significant. However the Agronomy and Botany divisions maintained the field experiments and collected useful data pertaining to the performance of various clones for manuring and locations respectively. Owing to lack of accommodation till the shifting of the laboratory to the new building, the botanical and chemical technology laboratories could not be set up. However, the new building constructed to house the different divisions was occupied at the end of 1962. Again, the senior officers were appointed to Agronomy and Chemistry-Rubber Technology divisions during June 1963. Further proposals were sent to the Government of India for the appointment of a Director of Research.

#### Agronomy

With this background, the work undertaken and the achievements of results are to be viewed. Agronomy division was responsible for increased fertiliser use in rubber plantations. In short, adoption of the research findings of specific fertiliser application to young rubber, both for newplanting and replanting, have shown that the immature period is reduced to economic advantage. Likewise, the importance of nursery manuring was also demonstrated by the division. Soil analyses were undertaken, especially from problem areas, for specific fertiliser recommendations. Apart from the field

manurial trials, the division devoted its time to study the manurial requirements of budwood nurseries and old rubber. Assessment of fertiliser requirements for the industry and allotment to the approved firms for ultimate distribution to rubber planters, also formed part of this division's work.

#### Botany

Botany division undertook breeding and selection work of rubber, in an attempt to improve the vigour, resistance to diseases and high yield. The programme of handpollination carried out during the years 1954-1959 in different private estates, has brought forward 61 new families consisting of 1331 legitimate seedlings and 1219 new clones. Small scale trials of these clones are in progress at the Experiment Station of the Research Institute. A polyclonal seed garden, in about 80 acres, in the Kanyakumari district, was also established by this division. Rubber planting at the Experiment Station commenced during 1956 and the available area was either replanted or newly planted and the entire planting was completed in a phased programme by 1961. The different come into bearing and yield records are being collected regularly from 1963 onwards. Apart from this, the division raised clonal seedlings for distribution to eligible small holders. But from 1962, the nurseries at the Experiment Station were mostly being converted into budwood multiplication nurseries, since the requirements of clonal seedlings were met from the Board's new nursery at Karikattoor.

#### Pathology

Investigations on the various diseases affecting rubber in southern India with regard to life history of the causative organisms and formulation of effective economic control measures, continued to be the main preoccupation of the Pathology division. Primary attention was given to

the study of leaf fall caused by *Phytophthora* palmivora and *Oidium hevea*. As a result of scientific investigations, the division has reported a few new diseases, hitherto unrecorded in Asia. The control measures for pink disease, panel disease. etc. have been perfected and advocated for extensive use. Testing of sprayers and dusters for comparative efficiency, also formed part of this division's work.

#### Extension Wing

The objective of the advisory service is to educate the growers in technical matters relating to rubber culture, dissemination of the results of research work and improved practices among growers, in order to raise rubber production at all levels. In addition, the problems faced by the rubber growers should be brought home for finding solutions. Thus this wing has to act as a two-way channel

With this objective, an Extension Service to cater to the needs of the planting community, as a separate wing of the Development Department was conceived in 1955. Consequently the required personnel were recruited, trained in rubber culture and posted to various growing districts. A great part of the time of the limited advisory personnel thus recruited, was spent in administrative and regulatory work together with duties in connection with issue of licences and permits, for replanting or new plantings. Thus, day-to-day duties had so fully occupied their attention, that little time could be devoted to developing a well thought out advisory programme on the state and district levels To increase the usefulness of this service, advisory work was separated from administrative work connected with replanting subsidy scheme and newplanting loan scheme since the reorganisation of the Development Department in May 1962. Accordingly this wing was concentrating on the collection and distribution of clonal seeds, clonal seedlings, budwood distribution and maintenance of Board's nurseries. Intensive cultivation centres for rubber, one in each Rubber Instructor's jurisdiction, were selected to carry out necessary protective measures against diseases. A new scheme of distributing spray machines through registered co-operative societies to rubber growers was launched and this scheme has given encouraging results so far.

#### Demonstration Trials

Result demonstration trials and intensive cultivation methods of mature rubber, are in progress at Kulasckharam, Punalur, Kottayam and Thodupuzha centres. The demonstrations are for operations like spraying, dusting, manuring and yield stimulant application singly or in combination, according to the regional requirements. The results obtained so far are encouraging.

To impart the correct technique on tapping methods, Tapping Demonstrators, numbering 6, were appointed. These Demonstrators were given intensive training on the correct techniques of tapping at the RRII before being posted to different zones. This service is being utilised by small growers in a large measure.

In addition to this, usual publicity techniques are being employed to disseminate the activities of the Rubber Board.

#### New set up and Prospects

Consequent on the appointment of the Director-cum-Rubber Production Commissioner, in May 1964, the Extension and Research wings were brought under the Research Department, for better co-ordination. The Director-cum-Rubber Production Commissioner is now in overall charge of the Research Department, including Library and Publicity sections. After a thorough study and appraisal, the Director-cum-Rubber Production Commissioner

brought out proposals for the reorganised set up of the Research Department. For stepping up the tempo of research work and for taking proposed new projects, certain essential staff augmentation were suggested. To take up the new projects of research, it is essential to procure specialised laboratory equipments indigenously and where necessary by import. For the proper conduct of many field experiments involving critical studies, establishment of a Central Farm, 500 acres in extent, is envisaged with adequate provision to plant at least 50 acres annually and other factory facilities. Further, to conduct macro and micro nutrient studies and disease inoculation experiments under controlled conditions, construction of a Glass-house is proposed. Turning to the chemistry & rubber technology problems, necessary provisions are made to construct a Workshop and Moulding room, apart from the steps already taken to import essential rubber testing equipments for this newly established division.

 To educate and train personnel sponsored by small growers in tapping methods, a Tappers Training School has been organised.
 The trained tappers will go back and employ scientific tapping techniques in small holdings, which is essential for consistent production and well-being of the rubber trees.

Further, a scheme to start a Small Holders Advisory Service is also suggested, which when implemented, may go a long way to assist the smallholders to understand the importance of various rubber production problems. It may also help to increase the overall production of rubber from small acreage brackets, which is at present said to be a drag on all India average.

#### Conclusion

Concluding, it may be stated that projecting the likely trend of the rubber industry into the future, there appears to be a

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# Preliminary Observations on Insect Pollinators of Hevea in India

K. JAYARATHNAM\*

Hevea brasiliensis is monoccious with diclinous flowers arranged in panieles. Various morphological characters of the flower of Hevea, such as its colour, fragrance, presence of nectar, sticky nature of the pollen and stigmatic surface etc. indicate insects as the most favourable pollinating agents. Dijkman (1951) states, "The plants are typically entomophilous cross pollinators."

Studies on pollination in Hevea may be said to have been initiated by Mass (1919). He states that members of Nitidulidae, Phloeridae, small Curculionidae, fly species and small bees have been seen on Hevea flowers in the Far East. Morris (1929) observed three or four types of bees in large numbers, small numbers of bugs, caterpillars, weevils, ladybirds and other beetles, flies and ants to visit flowers of Hevea in Malaya and he indicates that the more numerous and active bees may be responsible for pollination in Hevea. According to Seibert (1947) the common honey bees were noticed to requent the flowers of *Hevea* growing in the Plant Introduction Station of US Department of Agriculture at Florida. Mass (1919), Morris (1929) and Muzik (1948) found that inflorescences enclosed in insect proof bags did not set seeds. Further Muzik (1948) failed to collect pollen grains of Hevea in vaseline coated slides placed

near inflorescences. In Puerto Rico, Warmke (1951) collected large number of ing a sticky material on the tips of petals and by means of adhesive cards wrapped round the inflorescence in loose cylinders. Of the small flies, the majority were Ceratopogonid midges of the genera Dasyhelia, Atrichopogon and Forcipomyia. Continuing his observations at Brazil, Warmke (1952) ing male and female flowers, one to one and a half hours after sunrise and for the same period before sunset. Sripathy Rao (1961) made various valuable observations on the insect pollinators of Hevea in Malaya during the period 1953 to 1955. He failed to collect any pollen of Hevea on slides kept in a Hirst Volumetric spore trap that was run for three days within fifty feet of heavily flowering trees. And he detected none in the centrifuged leaf washings of upper surface of 100 leaves, taken at random from just below the inflorescences at four different localities. As regards the insect pollinators, he found thrips, midges of the family Ceratopoganidae, Chironomidae and Ceci-domyidae and Scatopsid flies to visit the flowers in large numbers. Among the midges, Ceratopogonids of the genera Forcipomyia and Dasyhelia were numerous. But in the year 1955, he noted the Ceratopogonids and the Scatopsids in almost equal

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numbers. Midges were observed to fly round the inflorescence for a while, then alight on an open flower and move all over the corolla tube and around the ovary or staminal column as the case may be. They were noted to spend three to five minutes within a flower and then emerge with pollen sticking on their body. Thrips were collected by him both in the morning and evening but the midges only in the evening. A small number of other flies belonging to the families Drosophilidae, Calliphoridae, Psychodidae, Sciaridae, Phoridae, Muscidae, Chloropidae, and some families of parasitic Hymenoptera were also collected. In 1955, he collected insect hairs, apparently the antennal and body hairs of midges and short

#### (Continued from page 137)

very great field for expansion, especially for the Natural Rubber Industry. It cannot be overlooked that the country needs a far bigger effort to meet the future demand for rubber. If it is estimated that 2,24 lakh tonnes of rubber will be required by 1971, the obvious answer is application of scientific knowledge, coupled with stable prices.

In general, the main technical problems confronting the Industry in its low yields are:—(1) Old plantations pl ntted with low yielding unselected materials, (2) Slow rate of replanting, (3) Very limited use of fertilisers, (4) Impovershment of soil due to crosion, (5) Incidence of diseases and pests, (6) Location of plantations in marginal or unsuitable localities, and (7) The shortage of authentic and scientific information, basic to rubber research, resulting in the very slow development of the Industry.

Interestore, it is needless to emphasise the importance of research in our efforts to attain self-sufficiency in rubber.

Scientific research and adoption of improved methods can alter the phase of the bristles resembling those on the wings of thrips, on the stigmas of some of the 150 female flowers that had opened the previous day.

In the light of these findings, insects are seen to play an important role in the pollimation of Hevea. A study on the insect pollimators will help greatly, in understanding the reason for the low percentage of fruit set normally noticed in Hevea and an effort could be made to increase the fruit set in seed gradens by artificially increasing the population of the right insect or insects. Further, this study can also be utilised to control the insect pollimators for deterring fruit set which in turn, might help in reducing incidence of abnormal leaf fall disease.

development. The development is envisaged not only on agricultural side, but also on the chemical and technological aspects. Certain processes employed at the factory are unnecessarily prolonged and some times can be considered wasteful. The question of fuel consumption, waste of energy and manual resources, are problems which have not been adequately investigated. In recent years, however, investigations conducted elsewhere have led to some marked technical progress, far more basic than the standardisation of quality or the economical preparation of crude rubber. These aspects of progress clearly indicate a possible change in the future outlook of certain aspects of rubber technology.

Future development of the Rubber Plantation Industry depends upon the research work undertaken in this country. It may be added that adequate but modest provisions are included for the expanded activities of the Research Institute during the Fourth Plan period, to face the problems expected in the production oriented development schemes, with self-sufficiency as the theme.

#### Materials and Methods

Observations on the insect pollinators of Herea in India were made in the months of February and March of 1965 at the Experiment Station attached to the RRII. Collection of insect pollinators with sticky insect traps such as vaseline coated cards and cylinders tied around inflorescences used in preliminary attempts, were later discarded, as the number of insects collected compared to the number noted in inflorescence was meagre. So, hand collection of pollinators, directly from the flowers was adopted.

supporting ladder of 16 ft height with a seat at the top was used and profusely flowering branches were brought near to the ladder from all directions with the help of ropes. Any insect that entered a flower, was watched for some time, then a broad test tube was inserted over the concerned inflorescence branch and the insect let into the tube by gently tapping the inflorescence branch. As most of the insects collected the closed end of the tube which was kept upwards towards light. Then the flower was taken out of the tube and the mouth of the observed in male and female flowers were dish with minimum disturbance to avoid falling off of any pollen grain present on the body of the insect. These insects were scope for the presence of pollen of Hevea and those which bore pollen grains of Hevea on their body were recorded. In the case of phorid flies, in addition to the above, they were washed with a small quantity of recti-fied spirit and the washing was examined for

Watch for insects visiting the flower was kept up on all hours of the day, from 6 a. m.

to 7 p. m. in periods of two to three hours on different days. The minimum and maximum number of insects that were noted in an inflorescence twig at each time of observation was roughly calculated and are detailed in Appendix I. This would provide only an approximate figure of the type and number of insects visiting the flowers during any particular period, as continuous watch from 6 a. m. to 7 p. m. was not kept up on the same day. However, this would provide information on the period of maximum activity of the insects and the type of insects predominantly present.

#### Field Observations

In the early morning hours from 6 a. m. to 7 p. m. one or two midges were noted, But, later by 8 a. m. one to six midges were seen either to fly around or move inside the flowers. In these hours, a large number of Indian honey bees (Apis indica) was noted to visit the trees, but they were mainly found to feed on the liquid exudation present at the broadened tip of the petiole where the leaflets are attached. Very rarely, they were noted to visit the flowers. Calliphorids (blue and green bottles) were also found in large numbers perching on the ventral side of leaves. Occasionally they were found to move on the inflorescence or drink the liquid exudation as the honey bees.

In the forenoon from 8 a. m. to 12 noon and in the afternoon from 12 noon to 3 p. m. five to twenty insects, mostly midgas and rarely insects belonging to the families Chloropidæ and Culicidæ, were found. Greater number of them was noted in inflorescences at the lower branches of trees in cool shady regions, compared to a lesser number in open exposed areas. During the period from 8 a. m. to 12 noon the midges were found well within the flowers and they were noted to be inactive to such an extent that they did not come out even if the flowers were disturbed slightly. An observation of

importance is that from 1 p, m, till about 3 p, m, a large number of Ceratopogonid midges were found in their characteristic gregarious habit of 'dancing' in the air in swarms around the inflorescences. Further in these hours some honey bees were found to move about among the leaves and some Calliphorids were found perching on the wentral side of the leaves.

The maximum number of insects was found to visit the flowers in the hours from 3 p. m. to 5 p. m. Ceratopogonid midges were found to fly in swarms among the inflorescences and also to visit the flowers in 5 to 20 numbers. They were seen to move from one tree to the adjacent tree in swarms. More of them were noted in the higher branches of the tree compared to the branches lower down. Cecidomyid midges were also observed visiting the flowers in 5 to 10 numbers. They occasionally flew from one inflorescence to another, but they invariably moved slowly. Unlike the Ceratopogonids, flight in swarms was absent in the Cecidomyid midges. Calliphorids were noted in large numbers and they were found to actively fly from the inflorescences of one tree to the inflorescences of another tree. They remained on an undisturbed inflorescence for a long time feeding from different flowers of the inflorescence by putting their mouth parts and frontal region of the head, in quick succession. They were noted to rest on the ventral side of the leaves, when not visiting the flowers. Mostly, inflorescences present at higher levels of the tree were visited. Other insects which actively visited the flowers in these hours were Dipterans belonging to the families Pipunculidæ, Drosophilidæ, Syrphidæ, Culicidæ, Anthomyidæ, Chloropidæ and Hymenopterans belonging to the families Bethylidæ and Apidæ.

From 5 to 6.45 p. m. as sunlight faded and darkness set in, the insect population was considerably reduced. But in these hours,

honey bees were noted in larger numbers than in the morning hours and due to their active flight, an intense hissing sound was heard. They were observed to mainly feed on the liquid exudation at the distal end of petioles. They also got reduced in population when the time neared 7 p. m. and darkness set in

During all the hours of the day, a small light brown beetle, belonging to the family Silphidae was found in 5 to 25 numbers per inflorescence twig. They were found to be incapable of flying from one inflorescence to another and were found mostly inside the flowers or among dried flowers. Often, a mass of pollen grain was noticed on their elytra. Thrips were occasionally noticed in some flowers.

The large number of insects visiting the flowers in the afternoon hours appears to be correlated with the opening of fresh flowers from 2.30 p. m. onwards and the spread of more fragrance from the flowers in these hours.

#### Laboratory Observations

In the case of Ceratopogonids, 11 to 23 pollen grains were found held in between the hairs present on their body and antennae. But in Cecidomyids, only 5 to 12 pollen grains were recovered. Only in very rare eases, the honey bees and Calliphorid flies were found to carry pollen on their body. But when the mouth part of Calliphorid flies were examined, the labellum contained numerous pollen grains (upto 52 nos), From the mouth parts of honey bees, no pollen could be recovered. Other Dipterans were found to carry 2 to 10 pollen grains on their body. But some rarely noted insects like Dammar bees, Syrphid flies and Anthomyid flies bore a mass of pollen on their bodies.

#### Discussion

As most of the clones of Hevea are self sterile to a great extent, only insects which

#### Materials and Methods

Observations on the insect pollinators of Hevea in India were made in the months of February and March of 1965 at the Experiment Station attached to the RRII. Collection of insect pollinators with sticky insect traps such as vaseline coated cards and cylinders tied around inflorescences used in preliminary attempts, were later discarded, as the number of insects collected compared to the number noted in inflorescence was meagre. So, hand collection of pollinators, directly from the flowers was adopted.

at the top was used and profusely flowering branches were brought near to the ladder from all directions with the help of ropes. Any insect that entered a flower, was watched for some time, then a broad test tube was inserted over the concerned inflorescence branch and the insect let into the tube by gently tapping the inflorescence branch. As most of the insects collected the closed end of the tube which was kept upwards towards light. Then the flower was observed in male and female flowers were chloroform and were transferred to a petridish with minimum disturbance to avoid falling off of any pollen grain present on the body of the insect. These insects were scope for the presence of pollen of Hevea and those which bore pollen grains of Hevea on their body were recorded. In the case of were washed with a small quantity of rectified spirit and the washing was examined for

Watch for insects visiting the flower was kept up on all hours of the day, from 6 a.m.

to 7 p. m. in periods of two to three hours on different days. The minimum and maximum number of insects that were noted in an inflorescence twig at each time of observation was roughly calculated and are detailed in Appendix I. This would provide only an approximate figure of the type and number of insects visiting the flowers during any particular period, as continuous watch from 6 a. m. to 7 p. m. was not kept up on the same day. However, this would provide information on the period of maximum activity of the insects and the type of insects predominantly present.

#### Field Observations

In the early morning hours from 6 a. m. to 7 p. m. one or two midges were noted. But, later by 8 a. m. one to six midges were seen either to fly around or move inside the flowers. In these hours, a large number of Indian honey bees (Apis indica) was noted to visit the trees, but they were mainly found to feed on the liquid exudation present at the broadened tip of the petiole where the leaflets are attached. Very rarely, they were noted to visit the flowers. Calliphorids (blue and green bottles) were also found in large numbers perching on the ventral side of leaves. Occasionally they were found to move on the inflorescence or drink the liquid exudation as the honey bees.

In the forenon from 8 a. m. to 12 noon and in the afternoon from 12 noon to 3 p. m five to twenty insects, mostly midges and rarely insects belonging to the families Chloropidæ and Culicidæ, were found. Greater number of them was noted in inflorescences at the lower branches of trees in cool shady regions, compared to a lesser number in open exposed areas. During the period from 8 a. m. to 12 noon the midges were found well within the flowers and they were noted to be inactive to such an extent that they did not come out even if the flowers were disturbed slightly. An observation of

Importance is that from 1 p, m. till about 3 p, m. a large number of Ceratopogonid midges were found in their characteristic gregarious habit of 'dancing' in the air in swarms around the inflorescences. Further in these hours some honey bees were found to move about among the leaves and some Calliphorids were found perching on the weaters leid of the leaves.

The maximum number of insects was found to visit the flowers in the hours from 3 p. m. to 5 p. m. Ceratopogonid midges were found to fly in swarms among the inflorescences and also to visit the flowers in 5 to 20 numbers. They were seen to move from one tree to the adjacent tree in swarms. More of them were noted in the higher branches of the tree compared to the branches lower down. Cecidomyid midges were also observed visiting the flowers in 5 to 10 numbers. They occasionally flew from one inflorescence to another, but they invariably moved slowly. Unlike the Ceratopogonids, flight in swarms was absent in the Cecidomyid midges. Calliphorids were noted in large numbers and they were found to actively fly from the inflorescences of one tree to the inflorescences of another tree. They remained on an undisturbed inflorescence for a long time feeding from different flowers of the inflorescence by putting their mouth parts and frontal region of the head, in quick succession. They were noted to rest on the ventral side of the leaves, when not visiting the flowers. Mostly, inflorescences present at higher levels of the tree were visited. Other insects which actively visited the flowers in these hours were Dipterans belonging to the families Pipunculidæ, Drosophilidæ, Syrphidæ, Culicidæ, Anthomyidæ, Chloropidæ and Hymenopterans belonging to the families Bethylidæ and Apidæ.

From 5 to 6.45 p. m. as sunlight faded and darkness set in, the insect population was considerably reduced. But in these hours,

honey bees were noted in larger numbers than in the morning hours and due to their active flight, an intense hissing sound was heard. They were observed to mainly feed on the liquid exudation at the distal end of petioles. They also got reduced in population when the time neared 7 p. m. and darkness set in.

During all the hours of the day, a small light brown beetle, belonging to the family Silphidae was found in 5 to 25 numbers per inflorescence twig. They were found to be incapable of flying from one inflorescence to another and were found mostly inside the flowers or among dried flowers. Often, a mass of pollen grain was noticed on their elytra. Thrips were occasionally noticed in some flowers.

The large number of insects visiting the flowers in the afternoon hours appears to be correlated with the opening of fresh flowers from 2.30 p.m. onwards and the spread of more fragrance from the flowers in these hours.

#### Laboratory Observations

In the case of Ceratopogonids, 11 to 23 pollen grains were found held in between the hairs present on their body and antennae. But in Cecidomyids, only 5 to 12 pollen grains were recovered. Only in very rare cases, the honey bees and Calliphorid flies were found to carry pollen on their body. But when the mouth part of Calliphorid flies were examined, the labellum contained numerous pollen grains (upto 52 nos), From the mouth parts of honey bees, no pollen could be recovered. Other Dipterans were found to carry 2 to 10 pollen grains on their body. But, some rarely noted insects like Dammar bees, Syrphid flies and Anthomyid flies bore a mass of pollen on

#### Discussion

As most of the clones of Hevea are self sterile to a great extent, only insects which

can carry pollen from flowers of one tree to the flowers of another, could be considered as effective pollinators. So, from these observations, considering the population of each type of insect observed to visit the flowers and their habits of movements, only the Ceratopogonid midges of the genera Dasyhelia and Forcipomyia and Calliphorids could be considered as effective pollinators. The present observation that the Ceratopogonid midges are likely to be major pollinating agents is in accordance with the findings of Warmke (1958) at Brazil. But his observation on the time of appearance of these insects in abundance is slightly different from that of the observations made here. In India, they were found in large numbers in the afternoon hours from 1 p. m. to 5 p. m. and they were noted to visit the flowers in larger numbers between 3 p. m. and 5 p. m.; whereas in Brazil, they were noted mostly for one to one and a half hours after sunrise and for the same period before sunset. In Malaya, the Ceratopogonid midges were not noted in such large numbers as noted in

No special mention has been made about the role of Calliphorid flies in the pollination by the earlier workers. In India, even though they were noted in large numbers, further studies are required to find whether the pollen grains are transferred from their mouth part to the stigmatic surface of flowers and thus act as effective pollinators.

Honey bees (Apis indica) were found to visit the trees in numerous numbers, particularly during the late evening hours. But they cannot be considered as effective pollinators as very rarely they were observed to visit the flowers and carry pollen. This finding differs from that of Morris (1928) who states that the more numerous and active bees may be responsible for pollination in Malaya. It may, however, be mentioned that in India a few Dammar bees were

found to actively visit male and female flowers.

#### Summaru

A short review of literature on the pollination of *Hevea* is given.

Materials and methods used in this study are described.

The various insects that visit the rubber trees in general and the flowers in particular in India, that were observed during the different hours of the day and their role in pollination are stated.

Ceratopogonid midges of the genera Dasyhelia and Forcipomyia appear to be effective pollinators of Hevea in India. They were seen to visit both male and female flowers and move from tree to tree in large numbers and were found to be good carriers of pollen. The Calliphorid flies were also found to have the above mentioned characteristics but their role as effective pollinators is to be further studied, since in this case, the pollen grains were observed to be kept within the mouth parts and not on their body. Insects belonging to some families of Diptera and Hymenoptera, Silphid beetles and some thrips were found to visit the flowers.

Even though the honey bees were found in large numbers, they were not found to assist in pollination to any great extent as they rarely visited the flowers.

Larger number of insects including the pollinators were seen to visit the flowers actively in the hours from 3 p. m. to 5 p. m.

#### Acknowledgements

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Appendix 1

List of insect visitors of the flower of Hevea at the RRII Experiment Station observed to assist in pollination.

Order and family	Genera	Nos, noted per inflorescence twig during 3 to 5 p. m	Nature of visit
Ord. Diptera			
Ceratopogonidae	Dasyhelea sp Forcipomyia sp	3 to 20	Visit male and female flowers
Cecidomyidae	Genus not determined	3 to 10	"
Calliphoridae	Calliphora sp Lucilia sp	Visit the flowers at random	,,
Pipunculidae	Pipunculus sp	2 to 5	Visit more male flowers than female flowers
Drosophylidae	Drosophyla sp	3 to 6	"
Syrphidae	Genus not		
	determined	1	,,
Culicidae	,,	1 to 5	Visit mostly male flowers
Anthomyidiae	"	2 to 6	,,
Chloropidae	"	1	,,
Ord. Hymenoptera			
Bethylidae	,,	2	
Apidae	Melipona sp	2	Visit male and female flowers
Ord. Coleoptera			
Silphydae	Genus not determined	5 to 25	,,
Ord. Thysanoptera Thripidae	,,	1 to 5	,,

#### References

DIJKMAN, M. J. (1951) Hevea—Thirty years of research in the Far East, Published by University of Miami Press, Coral Gables, Florida p. 178

MASS, J. G. J. A. (1919) De Bloembiologie van Hevea brasiliensis. Arch. Rubbercult. Vol. 3, p. 288, Meded. alg. Proefst. Avros. Rubb ser. No. 22.

- MORRIS, J. E. (1929) Field observations and experiments on the pollination of Hevea brasiliensis. J. Rubb. Res. Inst. Malaya Vol. 1, pp. 41-49.
- MUZIK, T. J. (1948) What is the pollinating agent for Hevea brasiliensis? Science Vol. 108, p. 540.
- SEIBERT, R. J. (1947) A study of *Hevea* (with its economic aspects) in the Republic of Peru. *Annals of the Missouri Bot. Garden* Vol. 34, pp. 261—352.
- SRIPATHI RAO, B. (1961) Pollination of Hevea in Malaya. J. Rubb. Res. Inst. Malaya Vol. 17, pp. 14—18.
- WARMKE, H. E. (1951) Studies on pollination of *Herea brasiliensis* in Puerto Rico. *Science* Vol. 113, p. 646.
- WARMKE, H. E. (1952) Studies on natural pollination of *Hevea brasiliensis* in Brazil. Science Vol. 116, p. 474.



### Studies on the Compatibility of Ammophos with Bordeaux mixture\*

P. K. ZACHARIAH1 and K. C. ANANTH2

#### Introduction

Foliar application of mineral nutrients has been gaining popularity in recent times. One of its great advantages is that the fertiliser applied does not get fixed up as is the case in soil incorporation. Thus it becomes a useful method, especially for applying soluble phosphatic fertilisers which get fixed up easily and become unavailable to plants when applied to soil. But foliar feeding is not adopted on a large scale due to high spraying cost and the unsuitability of most fertilisers for foliar application as the fertiliser should be water soluble and should not be phytotoxic. It is also believed that foliar feeding of nutrients using water as carrier sometimes helps to disseminate fungal spores. To counteract these, combined or "cock-tail" sprays are being attempted by mixing fertilisers, insecticides etc., along with basic fungicides. Bordeaux mixture is largely used in plantation crops and in this country many coffee planters spray Bordeaux mixture after incorporating fertilisers like urea, ammophos, muriate of potash etc. Though low volume spraying using oil based copper fungicides is becoming popular in rubber plantations, Bordeaux mixture is still being used for young rubber planted out in the

fields and nursery plants. Hence, a study on the compatibility of Bordeaux mixture spray seems to be worth while for evolving suitable foliar feeding schedule for rubber.

#### Experimental

A. Effect of different proportions of quick lime and copper sulphate on the resultant Bordeaux mixture

Reaction of the solution used in foliar feeding is an important factor as some of the nutrients are best absorbed by foliage at certain pH ranges. For example, a pH of 2 to 3 for the solution compared to a higher pH facilitates rapid uptake of phosphorus by leaves, (Teubner etal 1957). Since pH of the medium is an important factor in the efficient absorption of nutrients a study of the pH ranges of Bordeaux mixture when different proportions of copper sulphate and lime are mixed together becomes essential.

quick lime and water in the ratios of 4:1:40, 4:2:40, 4:3:40, 4:4:40, 4:4.5:40 and 4:5:40 were prepared by pouring equal quantities of diluted copper sulphate solution and diluted lime suspension into a third container. The settling rate, pH, and action

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on iron and acid-base indicators of the using glass electrode. Results are presented resultant mixture were recorded. Determinations of pH was done potentiometrically

TABLE I

Physico-chemical properties of Bordeaux mixtures with increasing levels of lime (50.0 percent CaO content)

Preparation number	Composition of Bordeaux mixture	by the	depth on mm.	of super	natant	the mi	ction of xture to:	-17
		intervals of:			Iron Phenolph-		pH	
		5 min	30 min	45 min	60 min	thalin		
1	4:1:40	Instan	aneous	settling		Stained	No colour change	5.5
2	4:2:40	5	14	18	24	nil	red	11.50
3	4:3:40	4	9	12	17	,,	,,	12.30
4	4:3.5:40	4	9	12	17	,,		12.40
5	4:4:40	4	9	13	17	**	",	12.45
6	4:4:5:40	4	10	13	18		,,	12.50
7	4:5:40	8	13	20	26	"	,,	12.50

As quoted by Frear (1948), early investigators recognised that a 'neutral Bordeaux' is a preparation in which the ratio of copper sulphate to calcium oxide was approximately 1:0·3. In the 4:2:40 preparation, using burnt lime with about 50·9 per cent CaO content, the copper sulphate to calcium oxide ratio is 1:0·25 and yet such a mixture showed a pH of 11·5. Hence a Bordeaux mixture containing copper sulphate and calcium oxide in the ratio of 1:0.3 must have a higher pH value than 11.5. It is logical to conclude that the so-called 'neutral Bordeaux' described in literature is not neutral with respect to pH and the term might have been used based on the action of Bordeaux on iron and acid-base indicators.

Here again, the values recorded, in Table I, show a steep rise in pH near the point of

neutrality, thereby proving the difficulty of preparing an exactly neutral Bordeaux mixture. Since the settling rates of the preparation numbers 3, 4 and 5 were lower than those of others, these mixtures may be taken as the best among the lot. They have a PH range of 12-3 to 12-5. Therefore the best preparations of Bordeaux mixture which do not contain free copper will be definitely on the alkaline side.

### B. Compatibility studies

Urea, ammophos and muriate of potash are the fertilisers commonly used in foliar feeding. As it is definitely known that potassic fertilisers are not adversely affected in alkaline medium and urea is only decomposed by hot alkalies, the investigations were confined to the study of the compatibility of ammophos with Bordeaux mixture.

Further, it was feared that nitrogen might be lost when ammophos is incorporated into the Bordeaux mixture due to the alkalinity of the latter and for the same reason phosphate may be rendered insoluble. Therefore in the present investigation, experiments were designed to study the loss of nitrogen occurring and the fate of phosphate when ammophos was added to Bordeaux mixture.

 Study on the loss of nitrogen occurring when ammophos is added to Bordeaux mixture.

Air freed from ammonia and carbon

dioxide by passing through sulphuric acid and aqueous potassium hydroxide was aspirated through 200 ml of Bordeaux mixtures, 4: 2: 40 and 4: 4: 40 containing 1 per cent of ammophos and through 4 per cent boric acid in succession. After 5 minutes of aspiration, ammonia absorbed in boric acid was estimated by titration against standard acid. The experiment was repeated for longer durations upto six hours. Results are presented in Table III.

Another experiment was also conducted to study the loss of nitrogen occurring when Bordeaux mixture was prepared and mixed

TABLE II

Loss of Nitrogen occurring when ammophos at 1 per cent level was added to
Bordeaux mixture. (Air aspirated through)

Intervals at which losses were measured	Percentage loss of nitrogen from 4:2:40 mixture	Percentage loss of nitrogen from 4:4:40 mixture
5 min	Negligible	2.62
10 min	1.75	5.90
20 min	3.06	12.26
30 min	4.07	20.74
1 hr	5.69	25.60
2 hr	14.35	55.26
4 hr	24.06	60.68
6 hr	32:40	66.50

with ammophos and kept as such for some time with occasional stirring. Two sets of Bordeaux mixture of compositions 4: 2: 40 and 4: 4: 40 containing I per cent ammophos were prepared. As soon as the mixtures were prepared 10 ml portions of aliquots were drawn out from each set and disposed into sulphurie acid to arrest further loss of

ammonia and its nitrogen contents were determined. This was repeated at different intervals upto six hours for the two sets of preparations. The two preparations were occasionally stirred and at each time before the aliquots were drawn out, the mixtures were stirred well. The results obtained are presented in Table III.

TABLE III

Loss of Nitrogen occurring when ammophos at 1 per cent level was added to
Bordeaux mixture (mixture kept with occasional stirring)

Intervals at which losses were measured	Percentage loss of nitrogen from 4:2:40 mixture	Percentage loss of nitrogen from 4:4:40 mixture
10 min	Negligible	3.50
30 min	1.75	5.25
1 hr	1.75	7 00
2 hr	3.50	12.25
4 hr	5.25	17.50
6 hr	7.00	24.50

The pH values of the Bordeaux mixture were measured using a pH meter. The preparations with and without ammophos values are given in Table IV.

TABLE IV
pH values of Bordeaux mixture as affected by the addition of ammophos

Mixture	pH of Bordeaux mixture	pH of Bordeaux mixture after addition of ammophos at 1% level
4:2:40	11.6	8.5
4:4:40	12.5	11.5

2. Fate of phosphate added as ammophos to Bordeaux mixture.

Bordeaux preparations 4: 2: 40 and 4: 4: 40 to contain ammophos at 1 per cent level were made following two methods, namely, diluted copper sulphate and ammophos solutions were mixed at first and at once added to the lime suspension and in the second method ammophos solution was added to Bordeaux mixture prepared in the usual manner.

At intervals of 5 minutes and 30 minutes the preparations were centrifuged. The filtrates obtained from 4: 2: 40 Bordeaux mixture presented a deep blue colour indicating the presence of cupri-ammine complex. The filtrate from 4; 4: 40 mixture was colourless showing the absence of copper complex.

Phosphate concentrations in the filtrates were determined colorimetrically using sulpho-molybdic acid and stannous chloride. In the cases where cupri-ammonium salts were present, the solutions were acidified and copper was eliminated as its sulphide prior to phosphate estimation.

Copper dissolved as cupri-ammine complex was determined iodimetrically. The results are given in Tables V and VI.

TABLE V

Percentage of phosphate immobilized on incorporating 1 per cent ammophos by different methods to Bordeaux mixture.

	Preparation .	Intervals at which measurements were made	Percentage of P left in dissolved stage	Percentage of P rendered insoluble
I.	Copper sulphate and ammophos			
	mixed and added to lime to get	5 min	0.12	99.88
	4:2:40 mixture containing 1 per cent ammophos	30 min	0.12	99.88
II.	Ammophos at 1 per cent	5 min	0.10	99.90
	level added to 4:2:40 mixture	30 min	0.10	99.90
Ш.	Copper sulphate and ammophos			
	mixed together and added to	5 min	0.06	99.94
	lime to get 4:4:40 mixture with 1 per cent of ammophos	30 min	0.06	99.94
IV.	Ammophos at 1% level added	5 min	0.04	99.96
	to 4:4:40 Bordeaux mixture	30 min	0.04	99.96

TABLE VI

Amount of Copper solubilized on addition of ammophos at 1 per cent level to

Bordeaux mixture.

Preparation	Intervals at which estimations were made	Concentration of solubilised copper in ppm
No. I	5 min	450
	30 min	408
No. II	5 min	408
	30 min	408

### Discussion

The data in Table III shows that even when Bordeaux mixture containing ammophos was kept in the vessel in which it was prepared and with occasional stirring significant amount of nitrogen was lost. The

loss was comparatively less in 4: 2: 40 mixture than in 4: 4: 40 mixture. By addition of ammophos, pH of the preparations was lowered (Table VI). This may reduce the loss of nitrogen to some extent. From 4: 2: 40 mixture, nitrogen loss of 1.75 per cent

in 30 minutes and 7·0 per cent in six hours, occurred; whereas from 4: 4: 40 mixture the corresponding figures were 5·25 per cent and 24·5 per cent. Further, a loss of 7·07 per cent of nitrogen from 4: 2: 40 mixture and 20·74 per cent from 4: 4: 40 mixture occurred in 30 minutes on agitation by bubbling air through the suspension. The loss of nitrogen occurring may be more when the mixture is sprayed, due to a high degree of exposure.

From Table V, it can be seen that phosphoric acid in ammophos is almost completely rendered insoluble, whatever be the manner in which addition of ammophos to Bordeaux mixture is made. In this context, it may be cited that Prebsting (1957) has indicated that inclusion of phosphate in a normal spray programme may not be warranted, since phosphate unlike urea, may react with other spray materials to give insoluble forms or release toxic compounds.

By the addition of ammophos to 4: 2: 40 mixture some amount of copper (408 ppm) was brought into solution as cupri-ammine complex. But no such solubilization occurred in 4: 4: 40 mixture. Whether this solubilised copper would cause plant injury or not depends on the rapidity with which the copper complex is decomposed soon after spraying. Cupri-ammine complex is readily decomposed, but, if by any circumstance its decomposition is retarded, it may cause injury to plants. This hypothesis is corroborated by certain observations made in coffee that use of ammophos with Bordeaux spray under cloudy and drizzling conditions was invariably found to end in leaf scorching and defoliation, whereas no phytotoxic symptoms were noticed under bright weather conditions, (Chokkanna, 1965). Hence, addition of ammophos to Bordeaux under certain conditions may prove to be hazardous phosphate into insoluble form and the loss of considerable amount of pitrogen.

### Summary

A study has been undertaken to find the compatibility of ammophos with Bordeaux mixture. It has been found that Bordeaux alkaline. While this is the case the feasibility of mixing ammophos with Bordeaux mixture was examined. Copper sulphate, lime and water in the ratios 4: 2: 40 and 4: 4: 40 were used in the studies for the preparation of Bordeaux mixture. It was found that signiof ammophos both to 4: 2: 40 and 4: 4: 40 mixtures. Almost complete conversion of phosphate into insoluble form was found on adding ammophos, irrespective of the manner in which it was added, either to 4: 2: 40 or 4: 4: 40 mixture. Addition of ammophos to 4: 2: 40 mixture was found to bring about solubilization of copper as cupri-ammine complex. This form of copper need not be phytotoxic as the complex is readily decomposed into insoluble form. If under any circumstance decomposition of the cupriammine complex is retarded it may prove to be hazardous to plants. Considering the loss of nitrogen and the conversion of phosphate into insoluble forms, the advantages of adding ammophos to Bordeaux mixture for supplying nitrogen and phosphorus to plants become nugatory. Hence it was concluded that ammophos is not compatible with Bordeaux mixture.

### Acknowledgement

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### References

- FREAR, D. E. H. (1948): Chemistry of Insecticides, fungicides and herbicides. 2nd Edn. Chap. XIII, pp 211—216.
- PROEBSTING, E. L. (1957): Calif. Agr. 11, P. 10. (Annual Rev. Plant Physiology, Vol. 10, pp 13—32, 1959)
- TEUBNER, F. G., et al (1957): Mich. State Univ. Agri. Expt. Sta. Quart. Bull., 39, 398—415., (Annual Rev. Plant Physiology, Vol. 10, pp 13—32, 1959.)
- CHOKKANNA, N. G. (1965): Official Communication, Central Coffee Res. Inst., Coffee Board, India.

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# Development of Plant Protection in the Rubber Plantation Industry of India\*

K. V. GEORGE I

Rubber is a unique agricultural produce. The uses of this product in one form or other in industry and in our day to day life, are numerous.

Planting of rubber in India on a commercial scale is said to have commenced in the year 1902, and today its cultivation extending to 3,83,813 acres, is confined mainly to the three southern States of Kerala, Madras and Mysore. The Rubber Plantation Industry of India, apart from saving a substantial portion of our much needed foreign exchange, is intimately connected with the economic well-being of many, particularly in the State of Kerala, where 95% of its cultivation is concentrated.

### Increase in Demand

While the output of manufactured rubber products has increased sharply in this country, domestic production of raw rubber has not increased proportionately; on the contrary, the gap between demand and supply continues to widen. The estimated requirements of rubber for 1965/66 is put at 1,10,000 tonnes against a production target of 50,000 tonnes of natural rubber. The annual requirement of rubber by the end of the Fourth Five Year Plan is estimated at 2:24 lakh tonnes, while the production of natural rubber is expected to be only about

72,000 tonnes. Even after utilising all the synthetic and reclaimed rubber, along with the natural rubber, the manufacturing industry will still need additional quantity of rubber which is estimated at just over 67,000 tonnes annually, at the end of the Fourth Plan period. The area for expansion of rubber cultivation being rather limited, adoption of intensive cultivation methods with a scientific approach, offers the greatest promise of bridging this gap. The role of plant protection in intensive cultivation of rubber to achieve increased production, is by no means small.

### Disease A Limiting Factor

Often, diseases act as factors limiting successful development and production of rubber. South America is a typical example. The low acreage of rubber in South America, the native habitat of Hevea, is in a large measure due to the ravages of the dreaded disease, viz. South American Leaf Blight. When the rubber tree was growing wild in the mixed tree stands of primeval jungle conditions in the forests of the Amazon Valley, its disease problems were not conspicuous. But, when it was brought under monocultural plantations in vast contiguous stretches, its disease problems became pronounced.

<sup>\*</sup> Paper presented at the UPASI scientific conference held at Coonoor on the 6th September 1965.

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In the Far Eastern countries where Hevea was planted extensively, the experience in different countries varied. Though the South American Leaf Blight has spared these countries so far, other diseases are prevalent. The climatic factors, particularly rainfall, and its distribution, appear to determine to a great extent the severity of the various diseases in the different Far Eastern rubber growing countries. In countries with moderate and well distributed rainfall, viz. Malaysia and Indonesia, the incidence of foliage diseases is mild, though, in some regions, root diseases are prevalent. In India, in regions of heavy and continuous rainfall conditions, incidence of Abnormal Leaf Fall, a foliage disease, is serious, whereas in comparatively drier areas, the disease is either absent or negligible.

The average yield of rubber per acre in India is low compared to those obtainable in Malaysia, Indonesia and Ceylon and this is partly attributable to the ravages of serious diseases incited by fungal agencies, in this country. When such diseases occur year after year, the trees become devitalised, shoots die off, production of latex goes down and the economic life span of the trees get shortened.

### The most Destructive Disease

The most destructive of the foliage discases of Hevea in India, is abnormal leaf fall caused by Phytophthora palmivora BUTL. The disease was first recorded in the year 1910, within a few years of the commencement of rubber cultivation in India. Today, the disease is observed in all the rubber growing tracts coming under a predominantly heavy South West Monsoon influence. It makes an annual recurring occurrence during the rainy periods of June/July/August and fades away by September. The economic loss caused by this disease is reflected in several ways. On young plants, retardation of growth in-

creases the immaturity period. On older plants, loss of leaf resulting in reduced food synthesis, causes crop losses ranging from 25 to 50%. Deterioration of the trees soon follow.

#### Investigations

The disease was first investigated in India by McRae from 1914 onwards. In the early years (1918-'20), it was believed that if the twigs showing signs of die back, which were suspected to harbour the fungus during the dry weather, were removed before the onset of the Monsoon rains and destroyed. the survival of the pathogen would be interrupted and the recurrence of the disease during the succeeding rainy season, prevented or minimised. In addition, it was recommended that all the fruits should be removed from the trees before the rain started, so that the multiplication of the inoculum during the beginning of the Monsoon could be reduced. However, these methods proved hazardous, uneconomical and ineffective and have been abandoned by the growers, long ago. Results of trials conducted at the Rubber Research Institute during the years 1957 to 1960, on the effect of mechanical removal of fruits and deblossoming through chemical sprays, in order to assess the efficacy of such methods in the control of the disease, have not been encouraging. The incidence of the disease in the plots where fruits were removed and where deblossoming had been carried out, was as high as the untreated control plots.

### Use of Fungicides

With the appointment of Ashplant as Rubber Mycologist attached to the UPASI, in the year 1922, experiments on the use of fungicides were commenced. He demonstrated that spraying the rubber trees with 0.75% Bordeaux mixture just before the onset of the Monsoon rains could keep the disease under control. The DSP sprayer was selected as the most suitable one. This method of protection was being gradually

adopted by the growers, when the slump in rubber occurred, further investigations were suspended and the method fell into disuse in many of the plantations. But for this valuable contribution, the rubber plantation industry of India may not have attained its present stature.

With the outbreak of the Second World War, conditions changed, there was great demand for rubber and prices went up. This gave a fillip to boost up production. With the creation of a Pathology division in the Rubber Board during 1955, work on comparative efficacy of different concentrations of Bordeaux mixture was started. Results showed that a 1% concentration was previously recommended. Results of comparative tests using various water miscible copper based and organic fungicides concontrol. Spraying Bordeaux mixture on the tall rubber trees using high volume sprayers is a hazardous and slow operation and necessitates large quantities of water, at a time when acute shortage of water is felt and as a result, many plantations did not take up to spraying. To overcome this difficulty, some progressive planters started using copper fungicidal dust formulations as early as 1950—51. Conflicting reports regarding the degree of disease control resulting from such dusting operations were prevalent. Based on the results of a trial conducted by the UPASI during 1953, it is reported that a satisfactory control of the disease could be achieved with a 6% dust trials conducted at RRII during 1956 and 1957 using different copper fungicidal dust formulations as well as an organic fungicidal, dust showed that disease control effected ing with 1% Bordeaux mixture, and

occasionally, as bad as the untreated control plots, in spite of 4 rounds of dusting carried out. Consequently, it was felt that dusting was not an efficient and dependable method of disease control, particularly under the prevailing heavy rainfall conditions.

### Low Volume Mist Spraying

The next step was to experiment with types of low volume mist blowers which could throw up the spray from the ground and thereby avoid the hazards of climbing the tree. As water-borne fungicides were unsuited for this type of mist spraying of tall trees, trials were started with oil based copper fungicides dispersed in diluent spray oils, in the year 1957. Preliminary trials conducted with an improvised mist blower gave encouraging results. Several grades of mineral oil and copper formulations were screened for avoiding phytotoxicity. After testing various types and makes of low volume air blast machinery, finally, the Micron 420 sprayer was selected as the most suitable one for spraying the tall rubber trees. In the first year of trials, defects were observed both in the machine and in the fungicide. In the succeeding year(1958) following improvements, results of trials were promising. Encouraged by the favourable results obtained in these early attempts, large scale field trials were laid out and conducted at the RRII and in private plantations during 1959, 1960 and 1961 seasons and the relative efficiency of disease control assessed. The results showed that oil based copper oxychloride discharged through the Micron 420 gave, in many instances, as good protection as with spraying of Bordeaux mixture, employing high volume sprayers. Among the concentrations tried, 4 lb of metallic copper per acre, gave as much disease control as the higher concentrations. Further, two rounds of spraying, one towards the end of April and the next towards the middle of May, resulted in greater protection than a single application.

The sprayer could, however, afford protection only to a height of 50 ft. With further improvements to the atomiser assembly, the later models were found capable of efficient spray coverage up to 65-70 ft. A great disadvantage with this machine is that it is very heavy and hence operating it in the difficult terrain encountered in rubber plantations, is rather difficult and calls for large number of mazdoors and provision of contour pathways between rows of trees. It has, however, the advantage of coverage water requirements and at the same time effective and economical. During the years 1962 to 1964, a number of demontations, to demonstrate the efficient economic use of the Micron spraying

During early 1964, a miniature model of the Micron 420, viz. Minimicron 77, was imported from UK and tested out in different planting districts. This unit was found to be efficient, light and could be carried by two people, could cover about 10 to 15 acres per day, and could give a spray coverage up to 55 ft height. This model is now being manufactured in India by a local firm in collaboration with the foreign manufacturers. Many improvements for increasing the efficiency, durability and easy transportability under field conditions, found necessary after field tests, have been incorporated.

### Aerial Spraying

The effective spraying period being limited to about 40 days, even the Micron sprayer with 10 to 15 acres coverage capacity per day, was found to be not ideally suited for the very large plantations. Since 1960, some areas have been aerially sprayed, as a result of a joint venture between certain enterprising planters, pesticide manufacturers, oil firms and aircraft companies. The demonstration trials conducted during 1960, the

development trials of 1961 and the commercial sprayings of 1962 to 1965, have opened possibilities for successful aerial spraying of large areas of rubber. The experience of the last few years' aerial spraying has given, on the whole, encouraging results, even though, disease control effected has not been as uniform as that of ground application. One may not be far wrong, in stating that about 75 to 80% of the sprayed area show satisfactory to good disease control, the rest 20 to 25%, representing missed patches and lanes, show only erratic disease control. The greatest advantage of aerial application is that, the operation being quick, large areas can be covered in a short period and hence is essentially suited to large plantations.

### Control Methods

Summing up the various methods of control of abnormal leaf fall disease through application of fungicides, it may be stated that high volume Bordeaux spraying is effective, but is essentially suited to small holdings only, since it is a slow process; spraying of oil based copper fungicides employing Micron sprayers is effective, economical and well suited to small and medium sized holdings; but, for spraying extensive contiguous stretches of rubber, aerial application appears to be most suited because of the quick coverage.

### Influence of Manuring

Field trials conducted during 1957 to 1959 to find out the influence of manuring on disease incidence, is reported to have shown that application of a complete NPK mixture combined with a copper fungicidal spray, gave better results compared to spraying alone or manuring alone.

### Disease Resistant Varieties

Coming to the aspect of developing disease resistant or tolerant varieties of rubber, field observations have shown that Gl 1, BD 10

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and AVROS 255 are rather tolerant to the disease, compared to the highly susceptible materials like PB 86, Thr I etc; however, their correct reactions under artificial infection conditions are not fully studied. It is often noticed that shy seeders, usually, show less disease incidence compared to prolifically seeding trees. There does not appear to be any genetic correlation between these two factors and it would appear that since the fruits are comparatively more susceptible than the leaves, a large number of fruits would provide ample disease inoculum for later development of the disease on the leaf.

In most of the plantations, indvidual trees are noticed to exhibit good leaf retention, though unprotected, standing out markedly amidst a population of trees, practically bereft of leaves. As these are suspected to show resistance, their multiplication and establishment at the Rubber Research Institute, to assess their correct reactions, are being carried out. A few foreign clones, reported to have shown resistance to the disease in other countries, have also been obtained and these also await screening tests.

### Powdery Mildew

Coming to the next important disease of rubber in India viz. Powdery Mildew, caused by Oidium heveae Stein., the first report of its occurrence in this country was only in the year 1936. Since then, it has been observed to build up and spread gradually and by 1956, its prevalence, practically, in all the rubber growing districts of South India, has been noticed. Successive waves of infection inducing defoliation and refoliation result in rapid depletion of stored reserves in the plant. Deterioration of the trees and fall in latex production, soon follow. Cloudy days, cool nights, dew or over-hanging mists and light drizzling rain during the refoliation period, all favour the disease incidence.

### Control Measures

Most of the clones and seedlings, now commercially exploited in this country, show susceptibility to the disease. Spraying or dusting of sulphur has been found to be effective, whereas, copper fungicides do not control the disease satisfactorily. Spraying of wettable sulphur is found to be more effective than dusting and could be adopted in nurseries and for young plants with advantage; however, this would be uneconomical for mature trees as repeated rounds to cover the newly forming flushes are required. For mature trees, it has been found that dusting of sulphur of 325 mesh fineness at the rate of 10 to 12 lb per acre and repeated 4 to 6 times at intervals of 7 to 12 days during the refoliating period gives satisfactory control of the disease. Trials with different combinations of sulphur and inert materials, showed that a mixture of sulphur and tale in the proportion of 70:30 also gave satisfactory disease control. After screening out a number of dusting appliances, it has been found that Mistral II AB power duster is best suited for dusting mature rubber trees.

### Other Diseases

Investigations on the other diseases affecting rubber in this country with reference to the life histories of the causative organisms, the factors favouring their incidence and intensity etc., with the main objective of formulating effective conomical disease control measures, are being carried out at the Rubber Research Institute. Some of the major developments resulting from these studies are treatment of Pink disease with Bordeaux paste mixed with raw linseed oil, treatment of Panel diseases, Patch canker, Dry rot and Brown root disease with organo-mercurial fungicides and water-proofing wound dressing compounds. The methods of treatment have also been

### Pests of Rubber

Insect pests of rubber, today, are not very serious in this country; however, to meet the possible future challenge of any of the present minor pests assuming a major role later on, a small entomology Unit has started functioning at the Rubber Research Institute. Studies have been initiated not only on the insect pests of rubber but also on the role of insects in the pollination of rubber, cover crop pests, including insects and nematodes, and on snails and slugs causing damage to rubber.

### The Challenge

The day may not be far of, when the

Natural Rubber Industry may have to face keen competition from the Synthetic Rubber Industry and the rubber grower may be called upon to reduce his cost of production so as to enable him to sell the produce at a price lower than that prevailing in India today. The only rational way to meet this possible challenge of competition with synthetic rubber in the future as well as to meet our country's increasing demands for the present day, will be by increasing unit area production. The role plant protection measures have to play in achieving this goal of increased production, by way of reducing crop losses due to pests and diseases, is substantial.

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### Role of Agricultural Refinance Corporation in Increasing Agricultural Production

T. S. K. CHARI\*

Perhaps in no other field of institutional since independence as in the credit provided by the Reserve Bank of India to co-operative apex institutions for agricultural purposes-From less than a crore of rupees in 1947-48, the Reserve Bank's credit limits to State co-operative banks for financing seasonal agricultural operations and marketing of crops provided at a concessional rate of 2 per cent below the Bank Rate (from 17th February 1965 the Bank Rate is 6 per cent) has grown to huge dimensions and reached the level of Rs. 164 crores in 1962-63. In addition, the Reserve Bank has given medium-term loans to these banks for agricultural purposes at a concessional rate of 14 per cent below the Bank Rate and the amount of such loans outstanding at the end of 1962—63 was Rs. 10.56 crores. The Reserve Bank has also given long-term loans to the State Governments for subscribing to the share capital of co-operative credit institutions, the total sum outstanding being It may be relevant to point out here that one of the objects of State contribution to the share capital of these institutions is to enable them to borrow more funds from the Reserve Bank itself.

### Long-term Credit Structure

As regards assistance to the long-term cooperative credit structure, the Reserve Bank has contributed to the debentures floated by the central land mortgage banks to the tune of Rs. 4.20 crores in the case of ordinary debentures and Rs. 3.42 crores in the case of rural debentures up to the end of 1962-63. In the sphere of long-term credit, however, the progress has not been significant The credit provided by them in the past has mainly been directed towards either repayment of old debts or to purchase new land, though in recent years there has been some switch over to financing productive purposes. However, such loans have not been aimed at anything like the development of a specified area or specified crop or the undertaking of specific projects for agricultural develop-ment which are included in the national plans. In the context of agricultural development long-term loans provided by land mortgage banks acquire special significance. It is necessary to ensure that loans provided by these banks are primarily routed for productive purposes. Moreover vast areas of cultivable waste lands in certain States can be brought under plantation crops like rubber, coconut, arecanut, pepper, cardamom etc., if suitable schemes are drawn up.

Secretary, Agricultural Refinance Corporation, Bombay.

### Agricultural Refinance Corporation

It is in these circumstances and also in view of the great urgency in securing higher levels of agricultural yield, which has shown no significant rise during the past, a new institution for providing refinance for agriby a special Act of Parliament on the first day of July 1963. The name Agricultural Refinance Corporation indicates that the Corporation would mainly be a refinancing agency, like the Reserve Bank of India in the being provided by the central land mortgage banks, State co-operative banks and scheduled banks who are shareholders in the Corporation. With the establishment of the Corporation it should be possible for the central land mortgage banks to play a more dynamic role than hitherto in promoting viable schemes of agricultural development in the country with a view to increasing agricultural production. Hitherto the central land mortgage banks were giving sporadic finance without any plan with the result that there was no correlation between credit given and actual increase in agricultural production. The establishment of the Agricultural Refinance Corporation should therefore herald a new era in which agriculture would be made a paying and profitable business rather than a way of life. It should help to create capital assets in the hands of the farmers and give them the capacity to produce more by better, improved and modern techniques. This will also enable them to take more loans for capital expenditure and repay them in instalments at the time when actual yield takes place. In this way, the short-term credit structure could be flanked by the Agricultural Refinance Corporation.

#### Technical Aspects

The scope of central land mortgage banks to play a positive and useful part in increas-

ing agricultural production is very great if only the land mortgage banks realise the In this connection it is pertinent to mention that at present the credit institutions do not ment schemes with their technical aspects. The technical staff is required not only for and individual technical plans for the farmers but also for the proper implementation of the schemes. The timely utilisation of the credit given should be verified so as according to the technical plans. This is of credit according to the plans alone will ensure increase in agricultural production. It was, therefore, appropriate that in the conference of the central land mortgage banks, held at Ahmedabad in December 1963, the Governor of the Reserve Bank suggested a change in the nomenclature of these banks to land development banks. It is right that this change should be taking place when Agricultural Refinance Corporation has commenced its work with the tions for promoting development of agriment banks will get themselves associated closely with technical departments with a in foreseeable future the land development banks will employ their own technical staff reclamation, mechanisation of agriculture etc., etc. and have their own divisions for these very important items of land development. It is only with this in view the Agricultural Refinance Corporation has stipufor the borrowers who avail of the loans from the primary land mortgage banks.

### Role of Scheduled Banks

Apart from the central land mortgage banks and State co-operative banks, schedumay also make a direct financial contribution to planned development in agriculture and they have also been included as shareholders and out of Rs. 5 crores subscribed Rs 57:40 lakhs have been contributed by the scheduled banks. The inclusion of scheduled banks should make it possible for them to take a positive interest in the schemes of progressive farming and agricultural development, especially in schemes relating to purchase of agricultural machinery, etc. for the use of progressive farmers with a view to making agriculture more paying and more profitable. Of late there is a ing up agricultural growth by even forming joint stock companies for running agricultural farms profitably and the Agricultural Refinance Corporation would be ready to schemes promoted by private limited companies, to the scheduled banks. Almost all plantation crops are foreign exchange earners and in most of the States land ceilings have not affected the plantation crops and hence individuals having a large holding could easily get adequate finance needed from the cashing the doctate manner necessary fresh plantations assisted by the various Statutory Boards who technically formulate the schemes and implement them. The individuals could also repay them after the gestation period involved in the plantation

### Scope of Development

The Agricultural Refinance Corporation Act very clearly lays down that the Corporation is to provide medium and longterm credits by way of refinance or otherwise for development of agriculture and other matters connected therewith or incidental

thereto. Even at the inaugural meeting of poration had mentioned that the scope of agriculture as outlined in the Act extends and animals. Such a wide connotation of the Corporation just to see that the Corporation helps almost all schemes of planned development which fall under the category of food and agriculture. The Corporation is not expected to take care of the ordinary and normal needs of farmers which are already met by the land mortgage banks but only to be an additional source of finance to central land mortage banks and State co-operative banks for special schemes of agricultural development which cannot, ordinarily, be met under the present pattern of arrangements. It is, therefore, very important that the central land mortgage banks should prepare special schemes covering compact areas for agricultural development which are intended to make agriculture paying and prosperous, and which cannot be financed by them in the normal course of their business.

Assistance from the Agricultural Refinance Corporation would be available for financing the following schemes:

- (a) Reclamation and preparation of land so that in particular, facilities for irrigation are fully utilised.
- (b) Development of crops such as arccanut, coconut, cashewnut, cardamom, coffee, tea, etc.
- (c) Development of special mechanised farming, use of electricity through tube-wells, pumpsets etc.
- (d) Development of animal husbandry, dairy farming, pisciculture, poultry farming, etc.

It is also to be remembered that the Corporation's resources are not to replace existing Governmental projects undertaken in the normal course of their activities. Agricul-tural Refinance Corporation is mainly a a refinancing institution at the top devoted primarily to stimulate and promote growth in agricultural production in private sector. This institution is in fact a reflection of the growing urge for rapid agricultural developagriculture and only with that end in view the Corporation arranges technical evaluation of the schemes by appointing on adhoc basis technical experts for the schemes formulated by the shareholders and approved by the State Governments. There is also benefit cost survey which is conducted by the specialised department of the Reserve Bank with a view to ascertain how far the benefits of such schemes actually go to the poorest of the farmers in the areas for which schemes have been formulated and whether ing the full benefits of these schemes.

#### Co-ordinated Implementation

It is expected that schemes should be drawn up initially by the institutions which take refinance from the Corporation after taking help of technical departments of the Even if at some future date the land mortschemes are in a position to employ technical staff of their own, Government will have to continue to shoulder major responsibility for the co-ordinated implementation of the development schemes by the agricultural communities concerned and for the provision of those aids and services and the basic set up of administration and organisation which are necessary if the cultivators should derive the full benefit of the projects. For all schemes formulated through co-operative sector, Government guarantee is very essential and this ensures the interest of the

State Governments concerned in achieving the actual increase in agricultural production. These schemes should be drawn up for compact areas so that they could be in-tensively supervised by the financing insti-tutions with technical aid. This is required not only for watching proper utilisation of finance, but also to ensure that development is undertaken according to a technical plan prepared for each cultivator which is necessary to secure maximum yield etc. In the case of land mortgage banks, the primary land mortgage banks would take finance from the central land mortgage banks and finance the individuals. The Agricultural Refinance Corporation would refinance central land mortage banks normally by subscription to debentures specially floated for the purpose. The State Governments are expected to take up at least 25% of the special development debentures floated for the purpose. So far the Agricultural Refinance Corporation has sanctioned schemes amounting to Rs. 24.07 crores as shown in Annexure I.

### Schemes Sanctioned

We have sanctioned Rs. 216.00 lakhs to the Andhra Co-operative Central Land Mortgage Bank in the case of Kaddam and K. C. Canal project schemes in 1963-64 and Rs.821.50 lakhs in 1964-65 for other five schemes. We have also sanctioned in 1964-65 Rs. 810.00 lakhs to Madras Cooperative Central Land Mortgage Bank and Rs. 98.28 lakhs to Bombay State Co-operative Land Mortgage Bank for land reclamation schemes. The land reclamation schemes are generally undertaken for levelling, bunding, provision of field channels, bunding, provision of field use of irrigation facilities available in the project areas. The cost of reclamation in the schemes sanctioned by us ranges from Rs. 210 per acre in the case of Ghod and Gangapur schemes in Maharashtra to Rs. 600 per acre in the case of ParambikulamAliyar Project scheme in Madras State The variance is mainly due to percentage of slope in lands to be levelled. The average size of holdings of the cultivators in the different areas where the land reclamation schemes have been approved by us ranges from 3 acres in the case of Zurreru and Thotavaripalem projects in Andhra Pradesh to 15 acres in Parambikulam-Aliyar Project scheme in Madras State.

The coconut plantation schemes sanctioned by us are located in Orissa and Andhra Pradesh and they involve a financial outlay of Rs. 28.80 lakhs and Rs. 5.19 lakhs respectively. The cost of cultivation of ecoconuts and catch crops for a period of 3 years is estimated at Rs. 750 per acre in the case of Visakhapatnam in Andhra Pradesh and Rs. 2,287 per acre in the case of Orissa. In the first three years of plantation, catch crops like bajra, cumbu horsegram or bananas and papayas will be grown to give income to the cultivators to support themselves as also to meet a part of the expenditure required to be incurred on plantation. The income from coconut plantation after 15 years of planting ranges from Rs. 900 in Orissa, to Rs. 1,294 per acre in Andhra Pradesh.

The horticulture scheme in Hoshangabad district of Madhya Pradesh is proposed for cultivation of citrus and other fruits in areas where the present cultivation of wheat and gram are not found to be so profitable. The cost of cultivation is estimated at Rs. 1,000/per acre for a period of 5 years and the return is expected at Rs. 12,000/per acre from the 10th year onwards. The amount sanctioned for this scheme by us is Rs. 9,00 lakhs. However, only the Andhra Pradesh Co-operative Central Land Mortgage Bank was able to draw Rs. 45 lakhs.

### A More Constructive Approach

In the case of scheduled banks, as earlier indicated, their constituents are usually

individuals, firms, companies, etc. and so banks in the matter of promoting any development scheme of agriculture. Since the facilities of refinance are now offered by the Corporation, it should be possible for the scheduled banks to evince a more constructive approach by helping the tion by financing viable schemes which could increase production. Plantation crops have a very good potential for financing by scheduled banks as generally lands under plantation are exempted from land ceilings. Further, plantation crops are very good foreign exchange earners and in certain States plantations have been exempted from land ceilings and therefore there are good number of individuals who require a very large initial capital outlay for developments. Further they involve considerable deferment even in regard to repayment of They have not so far been financed for development purposes by any scheduled bank and with the present refinance facilities offered by Agricultural Refinance Corporation the scheduled banks could play its part. It is also necessary that the State Governments should give unstinted co-operation to the scheduled banks by way of technical assistance for financing these available from the Corporation by issuing pamphlets in regional languages, so that the individuals may come forward with schemes for the purpose. The plantation crops for the development of which the scheduled banks can provide finance are tea, coffee, rubber, coconut, arecanut, pepper and cardamom. If scheduled banks could concentrate their efforts on a select number of farmers who have the requisite background and skill for absorbing new techniques and achieving higher targets of

production on the basis of their past performance, a certain degree of commercialisation with ability to plan production, with due regard to costs. Agricultural Refinance Corporation Act provides that for increasing its resources the Corporation may accept deposits of more than twelve months period.

#### Terms and Conditions

Refinance facilities will be available from the Corporation for both long-term and medium-term loans. Medium-term loans are for periods of more than three years and less than five years and long term loans are for more than five years but not exceeding normally 15 years and in exceptional cases 20 years. Further, on refinance facilities provided by the Corporation the rate of interest was originally fixed at 51%. Consequent on the increase in the Bank Rate from 5 to 6% the Corporation has decided that in the case of co-operative financing agencies the lending rate of the Corporation on the refinance facilities sanctioned by it after February 17, 1965, should be 6%. In the case of scheduled banks it was decided that the Corporation might charge such a rate of interest (subject to a minimum of 6%) as would restrict the margin to the financing bank to 21%. Taking into account the statutory obligation of the Corporation to pay a minimum guaranteed dividend at 44% to its shareholders and the present borrowing rate the Corporation has strived to keep its lending rate as low as possible in order to help the co-operatives in their endeayour to promote agricultural production. The interest is payable for every half year ending 31st December and 30th June.

The repayment of principal and payment of interest on the loans granted by the Corporation should be fully and unconditionally guaranteed by the State Govern-

ment. However, we have recently relaxed the condition regarding the Government guarantee in the case of plantation crops, provided that the financing bank has a good reputation and enjoys sound financial position and further the security offered is acceptable to the Agricultural Refinance Corporation. This financial assistance will be made available on the security of land, plant and machinery etc. mortgaged, hypothecated, pledged or otherwise secured to the scheduled banks and sub-mortgaged, sub-hypothecated, sub-pledged etc, by the latter to the Corporation.

### Implementation of Schemes

It is, therefore, up to the State Governments to prepare worthwhile schemes of agricultural development through their ties offered by the Corporation through the central land mortgage banks, State co-operative banks and scheduled banks. To do this expeditiously, we have suggested to the State Governments to earmark a senior officer in the State Secretariat whose duty will be to keep liaison with the Corporation and the land mortgage banks, State co-operative banks and scheduled banks on the one hand, and the technical departments through which schemes are to be drawn and executed, on the other. This is particularly necessary in the initial years to gain momentum in the preparation of worthwhile schemes of agricultural development. This is possible only if the State Governments examine and strengthen the economic and institutional environment in the specific areas selected for agricultural development with a view to ensuring that the finance provided in the areas actually results in increased agricultural production and helps in establishing a sound agricultural base.

Annexure 1
Particulars of schemes sanctioned by the Agricultural Refinance Corporation

State	Name of the scheme	Acreage	Total outlay	Agricultura Refinance Corporat- ion's contri- bution
1	2	3	4	5
Andhra Pradesh	Land reclamation under K. C. Canal     Land reclamation	50,000	165.00	148.50
	under Kaddam Project 3. Land reclamation under Nagarjuna-	25.000	75.00	67.50
	sagar  4. Land reclamation under Tungabhadra	2,90,000	830.80	747.72
	High Level Canal  5. Land reclamation under Zurreru	21,000	80.00	60.00
	Project  6. Land reclamation under Ramabhadruni-	1,500	4.50	3.37
	7. Land reclamation	537	1.61	1.21
	8. Land reclamation under Thotavaripalem Pumpi Scheme	er ing	2.84	2.13
	9. Coconut plantation scheme in Visakha-	2,694	9.43	7.07
laharashtra State	patnam  Land reclamation under Gangapur &	924	6.92	5.19
Tadras State	Ghod Project  Land reclamation under Parambikulam	52,000	109.20	98.28
rissa State	Aliyar Project Scheme for development of coconut	1,80,000	1,080.00	810.00
adhya Pradesh	plantation Scheme for development of Horticulture		32.00	28.80
		1,000	10.00	9.00
			2,407,30	1,988.77

## NEWS AND NOTES

### Nominations to the Board

In exercise of the powers conferred by clause (d) of sub-section (3) of section 4 of the Rubber Act, 1947 (24 of 1947), the Central Government has nominated Shri M. M. Muthiah, Managing Director, New Ambadi Estates (Private) Ltd., Nagercoil, Madras State and Shri Baldeve Singh, Industrial Liaison and Extension Officer. Council of Scientific and Industrial Research, New Delhi, as members of the Rubber Board for a period of three years with effect from the 3rd April, 1965, to represent interests other than manufacturers and labour.

The Central Government has also notified that Sarvashri Mathew Maniyangadan and K. K. Warrier, Members of Parliament, have been elected by the House of the People as members of the Rubber Board under clause (e) of sub-section (3) of section 4 of the Rubber Act, 1947, for a period of three years with effect from the 28th May, 1965, or for so long as they continue to be Members of the House of the People whichever is less.

### New Sub-Offices

The Rubber Board has opened five more new sub-offices at Thaliparmba in Cannanore district, Palghat in Palghat district, Punalur in Quilon district, Kanjirappally in Kottayam district and Ernakulam in Ernakulam district. The new sub-offices have begun to function as from the 1st August, 1965. Six sub-offices of the Board have already been functioning at Trivandrum, Pathanamthitta, Kottayam, Palai, Moovattupuzha and Calicut.

### Tappers Training School

The Rubber Board has opened a Rubber Tappers Training School to train tappers in scientific methods of tapping rubber trees. The course consists of intensive theoretical and practical training in tapping. It is hoped that this training scheme would go a long way in meeting the increasing demand from estates and holdings for well trained rubber tappers. The Training School is attached to the Rubber Research Institute of India.

The School was formally inaugurated by Dr. K. T. Jacob, Director, Rubber Research Institute of India, on the 14th June, 1965. The course will be of eight weeks duration and admission will be provided for eight condidates in any one batch. The selected trainees will be given a stipend of Rs. 12 per week and also free lodging facilities.

The seven trainees in the first batch who completed the training course were presented with certificates at a function held at the Rubber Research Institute of India on the 7th August, 1965. Shri George John, Vice-Chairman of the Board, presided and Dr. K. T. Jacob, Director, Rubber Research Institute and Shri A. K. Rajapadmanabhan, Deputy Rubber Production Commissioner, spoke on the occasion. Shri V. K. Bhaskaran Nair, Deputy Director (Botany), who is in charge of the Training School, welcomed

those present and Shri T. V. Joseph, Secretary, proposed a vote of thanks.

Eight trainees were selected for admission in the second batch and the course was begun on the 23rd August, 1965. Their training having been completed, certificates were presented to them by the Chairman, Rubber Board, at a function held on the 23rd October, 1965, at the Board's office.

Rubber Nursery at Kadackamon
Shri P. S. Habeeb Mohamed, Chairman.

Rubber Board, formally inaugurated on the 12th August, 1965, the 10 acre rubber nursery opened by the Board at Kadackamon in Pathanapuram taluk. This is the second nursery to be started by the Board this year. The Board has planned to open a total of four new rubber nurseries in different regions of the Kerala State in its effort to meet the large demand from rubber growers for high yielding planting materials. The first one has already been opened at Alakode in Cannanore district.





The Chairman, Rubber Board, inaugurating the Board's nursery at Kadackamon by planting a germinated seed (left). A view of the nursery (right).

The land for the nursery at Kadackamon was acquired from the Kerala Forest Department. An area of two acres has already been cleared and nursery beds prepared. The Chairman inaugurated the nursery by planting germinated seeds in the beds. Work of clearing, preparation of nursery beds and planting in the rest of the area is expected to be completed during the current planting season. It is proposed to distribute planting materials from the nursery

to rubber growers from the next planting season onwards.

### Demonstration Trials

"Model demonstration plots are being set up in different regions of the State with the intention of popularising modern scientific methods of rubber cultivation," observed Shri T. V. Joseph, Secretary, Rubber Board, at a public function held at Karikkattoor, near Erumeli, on the 9th August.

1965. The function was organised in connection with the formal ceremony of planting of seedlings in the demonstration plot set up by the Board at Karikkattor. He said that all the planting operations in the demonstration plots were being carried out under the supervision of the Board. "The rubber growers in this region could profit from these demonstration trials and they could adopt the improved scientific methods of cultivation that are being followed here," he continued. Shri Joseph exhorted the rubber growers to co-operate with the Rubber Board in modernising the rubber plantation industry in the country.



Shri T. V. Joseph, Secretary, Rubber Board, planting the first seedling at the demonstration plot at Karikkattoor.

The demonstration plot at Karikkattoor was the last one to be set up among the 20 plots which the Board had decided to start in private holdings in different regions.

Rev. Fr. George Vellekulam presided overthe function and Shri K. C. Eapen, owner of the land on which the demonstration trial was begin started, welcomed the gathering.

Shri A. K. Rajapadmanabhan, Deputy Commissioner and Shri P. K. Narayanan, Information Officer, also spoke on the occasion. Kumari Cicily proposed a vote of thanks.

### Office of the Development Officer

The Development Wing of the Rubber Board consisting of the Replanting, Registration and Excise Duty sections, has been shifted from the headquarters of the Board at Puthuppally to the "Ancheril Buildings," Kottayam, as from the 14th June, 1965. The Development Officer is in direct charge of the office. The Extension Wing of the Board under the Deputy Rubber Production Commissioner, which was functioning at Kottayam, has been shifted to the headquarters at the Rubber Research Institute of India buildings, Futhuppally, from the aforesaid date.

### Development Loans for Rubber Plantations

The Agricultural Refinance Corporation has accepted and begun to implement the scheme drawn up and submitted by the Rubber Board to give long term financial assistance for large scale development of rubber plantations. The Corporation has recently sanctioned a loan of Rs. 4:46 lakhs to a plantation under the scheme. This is the first loan of its kind to be given by the Corporation.

The loans are being channelised by the Corporation through scheduled banks operating in the country. They are available for new planting of rubber, replanting of old estates, maintenance of immature rubber areas, construction of quarters for labourers and staff on estates and installing of machinery and equipment necessary for

Loans given to rubber planters by the Corporation will be limited to Rs. 1600 per acre for individuals and Rs. 2100 per acre

for companies. Loan facilities will be available to planters who cultivate rubber in an area of 15 acres or above. (It may be recalled that the Rubber Board is already operating schemes for giving loans for newplanting of rubber and for maintenance of immature rubber areas to small holders owning less than 15 acres.)

Applications for loans totalling over Rs. 1,50,00,000 have been received by the Corporation. They include applications for newplanting in 4862 acres, replanting in 514 acres and maintenance of 2008 acres of immature rubber. As the Board is responsible for rendering technical assistance in the implementation of the loan scheme, it has set up a separate section in its office which is entrusted with the work of inspecting lands for which loans have been applied for and assessing their suitability for rubber cultivation.

### Supply of Manure at Subsidised

The Board has drawn up a scheme for supply of manure to rubber growers at subsidised rates through co-operative societies. The rate of subsidy will be 50 percent.

The subsidy will be granted only to small holders who own one to 15 acres of immature rubber and who have planted with high yielding planting materials. The holdings should have been registered with the Board to become eligible for the subsidy. There should be a minimum stand of 150 plants per acre and a maximum of 250. The subsidy will be granted only to immature areas from the first year to the seventh year of planting or till the area comes under tapping, whichever is earlier.

The subsidy will be limited to 50 percent of the cost of rubber mixture distributed by the co-operative societies to the small holders calculated at the rate fixed by the Board. The quantity of mixture to be

issued to each grower will be limited to the standard dozage prescribed by the Board for each year of planting. Cover crop should be established and no interplanting or intercropping will be allowed.

Applications, accompanied by proper survey plan (in duplicate) of the area for which subsidy is applied for, should be sent in the prescribed form to the Secretary, Rubber Board, Kottayam-9.

### Supply of Rollers on Hire-Purchase Basis

The Board has also a scheme for supply of rubber rollers on hire-purchase basis to small growers through co-operative societies.

According to this scheme, the Board will purchase and supply rollers to registered small growers owning 5 to 15 acres of rubber under tapping. It is proposed to supply double type rollers the cost of which is estimated at Rs. 1200. This will be exclusive of sales tax and transporting charges. The total number of rollers proposed to be supplied during 1965-66 is 50.

The roller will be issued to the grower on a hire-purchase basis. 25 percent of the cost of the roller will have to be remitted as earnest money to the Board along with the application for the roller. The grower will have to execute a mortgage bond with the Board before the roller is released to him. He should make his own arrangements for taking delivery of the machine from the Board's office.

The balance cost of the roller is to be remitted in three equal annual instalments. The first instalment should be remitted at the end of the first year and the second and third instalments at the end of the subsequent years. The loan will be interest free if payment is made without default. Interest at the rate of seven percent will be charged in the case of defaulters.

Rollers supplied as per the scheme would remain mortgaged to the Board and would be the Board's property until the full cost of the roller has been paid up. The roller should be kept in a safe place bolted on pedestals, properly oiled and maintained. Rollers supplied under the hire-purchase scheme should be used by the grower at least for a period of five years and they should be insured by the grower to cover the liability to the Board.

Applications from rubber growers for supply of rollers will be invited through press notifications. Applications should be submitted through co-operative societies to the Secretary, Rubber Board along with remittance of 25 percent of the cost of the

roller. But if any particular small holder wants a roller direct from the Board, it may be supplied subject to special sanction of the Chairman.

### 72nd UPASI Conference

The Seventysecond annual conference of the United Planters' Association of Southern India was held at Coonoor on the 6th, 7th and 8th September 1965,

At the UPASI Scientific conference held on the 6th September, 1965, Shri K. V. George, Deputy Director (Pathology), Rubber Research Institute of India, presented a paper on "the Development of Plant Protection in the Rubber Plantation Industry of India."



Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, addressing the 72nd UPASI Conference at Coonoor

Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, addressed the UPASI Conference on the 7th September 1965. He spoke at length on the problems facing the natural rubber industry in India and the

steps to be taken to ensure its future.

Dr. K. T. Jacob, Director, Rubber Research Institute of India and Shri George John, the then Vice-Chairman of the Rubber Board, also attended the conference.



Shri K. V. George, Deputy Director (Pathology), Rubber Research Institute of India, presenting a paper at the UPASI scientific conference.

The Board participated in the three day exhibition organised by the UPASI in connection with the conference.

Rubber Marketing Societies Representatives of co-operative in the Kerala and Madrae Series.

Representatives of co-operative societies in the Kerala and Madras States, which are



The Chairman, Rubber Board, presiding over the conference of representatives of co-operative rubber marketing societies. [VOL.VIII

engaged in the marketing of rubber, met at a conference at the office of the Rubber Board on the 25th September, 1965. Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, presided.

The conference reviewed the activities of the rubber marketing societies. Later a subcommittee was set up to consider the question of forming a federation of co-operative rubber marketing societies and other matters.

### "Rubber" Magazine

The Rubber Board has started the publication of a new monthly magazine in Malavalam entitled "Rubber" as from August 1965. The Magazine is intended mainly to cater to the needs of small rubber growers whose number now exceeds seventy thousand. Its aim is to educate the rubber grower in modern scientific methods of cultivation and to popularise the many development schemes operated by the Board. The subscription for the magazine is nominal being fixed at Rs. 1.50 per annum. The response of the rubber growers to this new venture has been most encouraging and the circulation of the magazine has shot up to over 10,000 from the initial 5,000, within the short period of four

### Vice-Chairman of the Board

Shri K. Karunakaran was unanimously elected as Vice-Chairman of the Rubber Board at its 51st meeting held at Kottayam on the 16th October, 1965.

Shri Karunakaran has been a member of the Board, representing labour, from 1950 onwards.

As a student Shri Karunakaran had been arrested for taking part in the struggle for independence. He was again imprisoned during the Quit India Movement in 1942. He was a member of the Legislative Assemblies of the former Cochin and Travancore-Cochin States.

Shri Karunakaran represented India at the International Labour Conference held at



Geneva in 1957. He was also a member of the Committee for Plantations of the International Labour Organisation. As a labour leader and trade union worker, he has earned a place for himself.

Shri Karunakaran has visited many foreign countries including Britain, France, Germany, Italy, Holland, Switzerland, Algeria, United Arab Republic and

### Aerial Spraying of Rubber

A conference was held at the office of the Rubber Board on the 4th November, 1965, to discuss about spraying of rubber for the control of abnormal leaf-fall disease during the ensuing spraying season. Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, presided. Representatives of planters, manufacturers and suppliers of posticides and spray oil, manufacturers of spraying appliances and managing agents, Central and State Governments and concerned officers of the Rubber Board participated in the deliberations.



At the Conference. From left to right: Shri P. S. Habeeb Mohamed, Chairman, Dr. K. T. Jacob, Director of Research, Shri T. V. Joseph, Secretary and Shri K. V. George, Dy. Director (Pathology)

The Chairman, in his introductory speech, welcomed the invitees and explained the scope and aims of the conference. Mr. K. L. Kershaw, one of the most experienced planters in the country, spoke about the importance of controlling abnormal leaf fall disease for increased production of rubber. Discussions were held at some length on the various modes of spraying, viz. high volume Bordeaux spraying, low volume air blast spraying using oil-based copper oxychloride dispersed in spray oil from the ground and aerial spraying, carried out during the 1965 spraying season and an assessment was made of the results. The practical problems and difficulties experienced while adopting the various modes of spraying were freely discussed and a number of suggestions to overcome them were put forth.

While on the programme of spraying of rubber during the 1966 season, detailed dis-

cussions were held on the availability and economics of pesticides, spray oils, aircraft, low volume air blast sprayers etc. The following tentative decisions were taken as a result of the deliberations at the conference:

- 1. In addition to conventional high volume Bordeaux spraying, aerial spraying and low volume ground spraying would also be continued during the 1966 spraying season.
- 2. During 1965, two organisations, viz. Messrs. Cambata Aviation Ltd., and Messrs Helicopter Service Ltd., had undertaken the aerial spraying operations. During 1966, it is likely that two more agencies viz. Messrs. Aviation Services, Kanpur and the Central Plant Protection Directorate, may also take part. The former two organisations will operate helicopters and the latter fixed wing aircraft.

- 3. The area that might be offered for aerial spraying during 1966 may not be more than 40 to 50 thousand acres. It is expected that the charges for aerial application of fungicides by helicopter will not be more than Rs. 20.00 per acre while that for application by fixed wing aircraft of Messrs. Aviation Services will be only Rs. 15.00 per acre. The spraying charges will be about Rs. 5.00 per acre in the case of the Central Plant Protection Directorate. The aerial spraying agencies agreed to reduce their charges if more areas are made available to them for spraying.
- 4. It was agreed that while aerial spraying is suited to large plantations, as far as small and medium sized holdings are concerned, low volume air blast spraying from the ground would be very much more economical, with equivalent, if not better, effectiveness. Messrs. Shaw Wallace & Co., Ltd., fabricators of Minimicron 77 sprayers, agreed to place on the market 1200 to 1500 units before the ensuing spraying season at a price of Rs. 990 per unit.
- 5. Regarding spray oil, the representative of Messrs. Burmah-Shell stated that they

- might not be in a position to supply spray oil during the coming year due to foreign exchange restrictions. But Messrs, Esso Standard Eastern, Inc., and Messrs, Indian Oil Corporation stated that they would be in a position to meet the entire requirements of about 10 lakh litres of spray oil and that the price would remain more or less at the same level as this year.
- 6. Considerable concern was expressed at the conference regarding the supply position of copper fungicides and the soaring prices of the same. The manufacturing firms stated that they had not yet received any foreign exchange allocations or import permits for importing copper required for manufacture of fungicides. The Chairman assured that he would personally take up the question with the Government of India so that necessary quantities of copper fungicides might be made available in time for spraying of rubber during 1966.
- The conference ended with a vote of thanks by Dr. K. T. Jacob, Director of Research and Rubber Production Commissioner.



In Conference



Question :

Which diseases affect the tapping panel of the rubber tree and what are the

Answer:

The most common panel disease in India is the bark rot caused by *Phytophthora palmivora*, particularly when rubber trees are tapped under wet conditions during the rainy season. The other diseases occasionally observed infecting the tapping panel are mouldy rot caused by *Ceratocystis fimbriata* and patch canker caused by either *Phytophthora* or *Pythhum* species. To prevent bark rot and mouldy rot, the tapping cut and a few inches of renewed bark above may be disinfected by swabbing Arctan solution at an interval of seven to 15 days during the rainy weather if tapping is continued during this season, When the fungicide dries up, it will be advisable to apply a thin coating of a wound dressing compound like wax rex treseal or rubber kote on the renewed bark at monthly or bimonthly intervals.

In the case of patch canker infection, the lesion may be cleaned well by scraping out the decayed bark and by removing the rubber pad present in between the bark and the wood. Then the scraped surface may be washed well with Arctan solution and a thin ceating of a wound dressing compound mentioned above may be applied after the fungicide has dried up.

Aretan is an organomercurial fungicide sold by Messrs. I. C. I. or their local agents. Aretan solution for application on the tapping panel and for treating patch canker could be prepared by dissolving one ounce of the fungicide in two-and-a-half gallous of water. This material may be handled with care since it is poisonous. Wax rex trescal and rubber kote are marketed by Messrs. ESSO Standard Eastern, Inc., Netaji Subhas Chandra Bose Road, P. O. Box No. 115, Madras-1 or their local agents. These materials are sold in a ready to apply form.

Question

Spraying of fungicides using the Minimicron 77 sprayer and of Bordeaux mixture are being recommended for protection of rubber trees against leaf-fall disease. Which of the two will be more efficient and economical for small rubber growers?

Answer:

Spraying of Bordeaux mixture using high volume spray machinery and spraying of oil copper oxychloride dispersion spray oil using Minimicron 77,

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both give good control of abnormal leaf-fall disease, if carried out properly. In the case of high volume Bordeaux spraying, one spraying unit can cover only one to one and a half acres per day and the cost of spraying would be in the region of Rs. 70 to 90 per acre of mature rubber; whereas, in the case of Minimicron, 10 to 12 acres can be sprayed by one unit in a day and the cost would be about Rs. 45 to 50 per acre.

Question:

During rainy days it may not be always possible to tap the trees in the morning hours. Would it be harmful to tap the trees on such days at noon or in the afternoon? Or is it necessary to discontinue tapping during the rainy season?

Answer

Late tapping can be adopted on rainy days as a practical adjustment, even though it is not advisable under normal circumstances. Total stopping of tapping during the rainy period need not be necessary unless heavy morning showers do not permit tapping as is the case in certain regions during July-August.

Question :

Even though no rains are obtained during the month of March, planters are constrained to continue tapping of trees as the tappers have to be given work. Why is it that yield is found to be low during this period? Will the practice of tapping the trees during the month of March do any harm to the trees?

Answer .

The period of leaf-fall or wintering of the rubber tree may set in by December and continue upto the middle of March. As soon as the leaves are shed and the new foliage appears on the trees it is recommended that the trees should be rested. For practical purposes, a rest of about a month is advisable. When the new leaves become mature, tapping may be restarted irrespective of the weather conditions. Low yield during this time is only a natural phenomenon.

Ouestion:

What type of manuring and care should be given for the seed at stake plants in low rain-fall areas?

Answer:

Raising seedlings in rubber nurseries which are well prepared and adequately fertilised with NPK mixture, appears to give increased girth to seedlings. In such cases, the plants in the nurseries obtain about 145 gm per sq. vd. of NPK 8: 12: 10 mixture. This amount of feeding and care of plants may not be obtainable in the system of seed at stake planting to the same extent. Considering these aspects, it is preferable to give 16 gm of NPK 8: 12:10 mixture per plant point during the year of seeding (October-November) and another 16 gm of the same mixture during next April-May. After completion of one year ie. during the immmediate post-monsoon period, regular NPK 8: 12: 12 fertiliser mixture as advocated to immature young plants in the field may be undertaken, the dose increasing from 40 kg to 320 kg from first year to fifth year. The dose of 320 kg per acre per year will have to be maintained till the area is put under tapping. This fertiliser recommendation appears to help the rubber grown from 100" to 250" of rain per annum.

Question:

Could cover crops be established along the planting rows where one year old plants are grown?

Answer:

Cover crops are established along with the planting of rubber. The creeping covers should be cut and trained to keep the planting lane free. However, to give protection to the soil against sun, mulching with dry leaves, especially around young plants, can be undertaken with advantage.

Question:

What treatment should be carried out on bark of young plants scorched by southern sun?

Answer

As a precautionary measure, very young plants may be protected by bamboo baskets to prevent sun-scorch. This would be particularly useful in exposed situations. Till the canopy starts covering, the stems of the plants should be white-washed with lime during November—December for avoiding sun-scorch.

In the case of plants already affected by sun-scorch, the dried up bark should be scraped out, washed with Aretan solution (1 oz in  $2\frac{1}{2}$  gallons water) and after drying, a wound dressing compound like wax rex treseal may be applied. When this treatment is carried out in hot weather, it is preferable to white-wash the treated surface.

Question:

It has been found to be very difficult to establish *Pueraria* in rubber plantations in the Malabar area. Are there any cover crops which could outlive the hot climate? If so, what are they?

Answer:

Leguninous cover crops are grown along with rubber and a very popular and vigorous creeper in India is Pueraria phaseoloides. This can be propagated by seeds and cuttings. In areas where cover plants fail to grow vigorously, application of rock phosphate and muriate of potash may be helpful. Further, regular weeding should be undertaken. The weeds collected should be placed in a heap for drying and not thrown over the growing covers. If it is thrown over the cover crop, it will create more patches and present further problems. In the initial stages, seeds of Purearia, Calopogonium and Centrosema should be sown as a mixture in equal quantities so that establishment of one cover ideally suited for the locality can be assured. There is no specific cover crop that can be advocated as a definite drought resistant material. However, Calopogonium mucunoides, which dies down during the dry season, but as large number of seeds are produced, may reappear with rains, can be tried.

Question:

Will not intercropping during the first year of planting help to remove stumps and other parts of the old stand and to give protection to the young plants from the sun?

Answer:

Besides affecting the growth of rubber, the practice of intercropping may also retard the progress of establishing a suitable ground cover which is very essential for soil and organic matter conservation. It is also possible to remove the stumps and other parts of old stand without resorting to intercropping. Artificial shade would be preferable, wherever shading is necessary for young rubber planted out in the field.

Question:

Three NPK fertiliser mixtures with the compositions 8: 12: 10, 8: 12: 12 and 8: 10: 12 are recommended for rubber. I would like to know which materials should be mixed in what proportion for preparing these mixtures. Would it not be cheaper if planters themselves prepare the mixtures? Does the Board recommend the use of potash for rubber?

very

Answer:

Three NPK mixtures mentioned as 8: 12: 10, 8: 12: 12 and 8: 10: 12 are recommended for nursery, for young rubber prior to tapping stage and for mature rubber under tapping, respectively.

The above mixtures are prepared by using the following ingredients.

### 8: 12: 10 (Nursery mixture)

	100	kg
Ammonium sulphate (20% N) Rock phosphate (34% P <sub>2</sub> O <sub>5</sub> ) Super phosphate (16% P <sub>3</sub> O <sub>5</sub> ) Muriate of potash (60% K <sub>2</sub> O)	 40 28 15 17	kg ",

### 8: 12: 12 (Immature Rubber mixture)

Ammonium sulphate (20% N)		40	kg
Rock phosphate (30% P <sub>2</sub> O <sub>5</sub> ) Muriate of potash (60% K <sub>2</sub> O)	_	40 20	22
		100	kg

### 8: 10: 12 (Mature Rubber under tapping)

		100	kg
Filler materials (inert)	-	5	,,
Muriate of potash (60% K, O)	-	20	,,
Rock phosphate (29% P2 O5)	-	35	33
Ammonium sulphate (20% N)		40	kg

From the above it can be seen that in addition to Nitrogen and Phosphate, Potash is included in rubber mixtures for giving balanced nutrition.

Of course, it will be cheaper to mix the fertilisers at your estate itself, provided no mistake is committed at any stage of mixing.

Question :

You recommend the use of rock phosphate in the rubber nursery. As no cover crops are grown in the nursery, how will the addition of rock phosphate help the plants?

Answer:

Several characteristics of the soil system are responsible for determining phosphorus availability to the plants. Soil pH may influence phosphate availability to plants in several ways. Among them are the effect of pH on physiological changes in the permeability of root membranes, the behaviour of soil phosphorus and competition with other ions, silicate and organic anions for plant uptake. From this it can be seen that cover crops only help to accumulate organic matter which results in increased activity of microrganisms producing organic anions which tend to release phosphate from the relatively insoluble forms. Organic matter in any form can bring about the release and availability of phosphate and thus application of rock phosphate to nursery is recommended along with incorporation of adequate quantity of compost or well rotted cattle manure.

Question .

Why is it that the G. E. C. Woods Tunnel type drier is not being used in India? Is it costly and expensive to instal? Can you give the address of the sunnites.

Anower .

The G. E. C. Woods Tunnel has not yet been introduced in India since in this country there is no scarcity for wood fuel at present. In almost all the plantations there is enough wood fuel for smoking and drying rubber. This may be one of the main reasons.

Regarding its cost and expense, the installation charges will be definitely quite considerable. The upkeep and maintenance charges will also be slightly more than the ordinary wood fuel smoke house of equal capacity.

The full address of the suppliers of the G. E. C. Woods Tunnel is as follows:

M/s Air Woods Limited, 66, Barrack Street, Colchester, England.

Indian Agent:

The General Electric Co. of India Private Ltd., Magnet House, 6, Chittaranjan Avenue,

Question :

It may be possible that the new processing methods of natural rubbe developed in Malaysia may before long come to be adopted in our country also. In that case, will not the rubber roller and the smoke house become unnecessary on our plantations?

Answer:

Yes, it is being considered how best the new processing methods can be introduced in India. Before advocating any change in the present processes, it is absolutely necessary to evaluate many factors connected with such a change. The new methods should suit the conditions prevailing in India and all its pros and cons have to be studied. It will take time. However, it may be positively stated that schemes for improvements in the processing and presentation of natural rubber will be implemented with necessary modifications to suit local conditions in the near future.

Though for the production of the new type of rubber, roller and smoke house are not necessary, still, the existing rollers and smoke houses on estates need not be scraped. In the case of existing forms of rubber such as smoked sheets and estate brown crepe grades, the technical specification scheme, where the estimation of dirt, volatile matter, ash, copper, manganese and nitrogen is done, will be introduced to specify the grades, instead of the visual system of grading practised now. Thus, only the grading system will be changed in the case of existing forms of rubbers. When the technical specification scheme is introduced, all the rubber produced by the plantation industry can be classified under that system. So, the rollers and smoke houses will be continued to be used on estates.

Question:

Is it a wrong practice to process latex into sheets on the same day it is coagulated? What harm is caused if rubber sheets are kept hanging in the sun for four or five the sun for dripping? Usually, only after dripping in the sun for four or five days are the sheets transferred to the smoke house for smoking for about a week. What are the harmful effects of such a procedure? What is the

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correct method to be followed? Is it practical to measure the temperature in the smoke house and keep it steady at 140°F?

Anguage .

When one wants to process rubber latex into sheet on the same day it is congulated, one has to add a slightly more quantity of acid. Even then, the coagulum does not attain the required hardness for proper and convenient sheeting operation. It will be very fluffy and loose. By allowing some time, viz. 24 hours, the coalescence of the particles will be greater, a 100% coagulum will be obtained and sheeting will be convenient. Only under dire necessity, i.e., when there are two or more holidays at a stretch, will it be advisable to sheet the coagulum on the same day. Otherwise, it is always preferable to sheet it on the next day.

When sun's rays fall on the wet sheet, surface drying of the sheet takes place very quickly and the occluded gases and entrapped water which are forced out of the surface dry sheet causes blisters and bubbles. Secondly, the exposure to sunlight causes degradation of the rubber and introduces slight tackiness in the sheet. That is why it is categorically recommended that the sheets should never be exposed to sunlight.

It is always preferable to drip the wet sheets in a shed where smallight is avoided. This shed should be exposed on all sides so that a good supply of fresh air hastens the dripping of water and assures uniform drying of the sheets.

As regards dripping in sunlight for four days and later smoking the sheets for a week, the sheets develop bubbles, blisters and tack and smoking for seven days gives them a pitch dark colour. Thus the purchaser gets a badly degraded rubber and the dealer always downgrades such sheets. So good rubber is spoiled by such methods.

The correct procedure is that the wet sheets should be dripped in a well-ventilated dripping shed in the absence of sunlight for 3 to 4 hours (never-exceeding five hours) and then the dripped sheets should be transferred immediately to the smoke house. There it should be dried and smoked normally for four days. During the monsoon season it may be necessary to increase this period by one day. Definitely, the sheets need not be smoked for 7 days.

It is possible to measure the temperature in the smoke house by introducing self-recording maximum and minimum thermometers. The maintenance of temperature at 140°F can be done by effectively controlling the air inlets of the furnace, and the ventilators of the smoke house and by proper supply of fuel. By some initial trial experiments these can be controlled and the required temperature obtained. If the smoke house is properly constructed as per the blueprint recommended by the Rubber Board, there is absolutely no necessity for any person to remain near the smoke house after the fire is properly lighted in the furnace.

Question:

What chemicals are used as anti-coagulants? Can ammonia and caustic potash be added to latex to prevent pre-coagulation? How should anti-coagulants be used?

Answer:

The chemicals that are used as anti-coagulants are dilute solutions of ammonia, sodium sulphite and formalin.

Caustic potash should never be used as anti-coagulant.

Anti-coagulants should be used as dilute solutions. Normally when latex is collected in the field, no anticoagulant or preservative is added either to the cup or to the bucket. But under certain field conditions, when a tendency for precoagulation is observed, dilute solutions of the anticoagulants are added (a few drops) to the cups and also to the bucket when it is half-full (nearly 4 oz) with latex.

Proportions of anticoagulants:—
Ammonia:— 25 ml of a 2% solution (of liquid ammonia) for one litre

Sodium sulphite: - 15 ml of a 3% fresh solution for one litre of latex.

The tapper should be provided with a dropping bottle of capacity of nearly 8 oz and he be instructed to put a few drops of the anticoagulant in each cup and the rest in the bucket after it is half full.

Question:

It has been recommended that santobrite may be applied to prevent mould growth on rubber sheets. Mould growth has been noticed on sheets one week after they are taken out of the smoke house. Will santobrite prevent wheel arter into a calculate of the smoke house. Whi samboth prevent this? In what proportion should santobrite be diluted? It is also seen that if the sheets are stacked in the smoke house itself, there is less of mould growth. But the sheets assume a black appearance. Why?

Dipping rubber sheets in a dilute solution of santobrite or paranitrophenol is recommended for preventing mould growth on dry smoked sheets. On some estates, the addition of a dilute solution of paramitrophenol is done before the bulking of latex. But the general practice is to dip the marked sheets in a dilute solution of these chemicals.

Usually 28.34 gm (one oz) of santobrite is dissolved in 100 litres of water and this solution is kept in a tank in which the sheets, after passing through the marking rollers, are dipped for 10 to 15 minutes before they are taken

Mould growth generally appears on smoked sheets, if the suggested treatment is not given. Secondly, the sheets should be preserved in a place

Smoked sheets should not be stacked in smoke houses. As the percentage of humidity will be less and as the temperature in the smoke house will be high there will not be any mould growth. But the smoked sheets will definitely turn pitch black in colour due to excessive smoking. Hence, smcked sheets should always be stacked in a clean packing shed where the humidity will not be very high.

Is it advisable to spread rock phosphate, muriate of potash, ammonium sulphate or any other chemical fertiliser between compost layers in compost heaps? Will there be any loss of nitrogen and other plant nutrients while decomposition takes place as it is considered that too much heat is produced during the process? Can lime and wood ash (ash from the smoke house furnace) be added to the compost?

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Answer :

The value of compost can be considerably increased by adding to every tonne of dry matter the following chemical fertilisers prior to application.

Sulphate of ammonia	10-20 kg
Rock phosphate	15-20 kg
Muriate of potash	10—15 kg

Once again, addition of lime and wood ash to the compost may have to be restricted on a dry matter basis. It may be advantageous to add 20—25 kg of agricultural lime and wood ash to every tonne of dry matter in the compost. While adding sulphate of ammonia to compost, avoid mixing lime and wood ash.

Further, incorporation of the chemical fertiliser in different compost layers can be recommended provided that there will be no percolation and sewage of rain water in the compost pits. In certain cases provision should be made to construct overhead shelters to avoid losses due to leaching.

Ouestion:

Whether soil samples for analysis can be collected from contour platforms?

Answer :

To find out average fertility status of the land, soil samples should be collected from representative locations wherever rubber root activity extends. Confining the sampling to platforms only may not be representative.

Question:

Usually seedling trees are opened for tapping at 20° height when they attain a girth of 20° or more at that height. But if the majority of trees have attained a girth of 20° at 36° height, can the trees be opened for tapping at that height?

Answer:

It is recommended that normally, in seedling trees, the first panel should be opened for tapping when they attain a girth of 22" at a height of 20" from ground level.

Opening the first panel at a higher level in a seedling tree is not usually advised for two reasons. Firstly, obtaining the required girth at that height in a seedling tree would be at the expense of delay in tapping for a year or more, with consequent loss of yield which is not desirable.

Secondly, in a seedling tree the yield during the first two or three years will be some what less if it is opened at a higher level. The rate of increase in yield as the tapping cut approaches the base of the seedling tree is about 15% per foot from a height of about 4 ft. This increase is due to the difference in the nature of the bark and the shape of the seedling tree at different heights.

But in the particular case mentioned, the trees may be opened for tapping at a height of 30°, instead of 36°, provided 70% of the trees have attained the girth of 20°. This is because, it is felt that the extension of the period in which the virgin bark and uninterrupted panels of bark of first renewal can be tapped, more than offsets the lower initial yields. When this has been tapped out, a new panel may be opened at a height of 50° on the opposite side of the tree. The tapping system should be 8/2 d/3 67%.



## For Rubber Growers

- January

  In the northern regions wintering may commence. This is the time when annual tapping rest is adopted and the panels protected with prowax or rubberkote-prowax mixture. Felling and clearing for new planting or replanting is done at this time. Time for collection of Pueraria seeds is
- February
  Wintering spreads effectively in most of the areas The trees wintered earlier will start to refoliate. This is the time when sulphur dusting against powdery mildew has to be commenced. Many of the estates are allowed to enjoy tapping rest. Marking for the next season tapping can be done. Preparation of the land for planting is continued. Collection of cover crop seeds
- Morch

  Tapping rest is discontinued and tapping commenced. Young areas are opened for tapping. Sulphur dusting rounds against powdery mildew is continued. Weeding is done in immature areas. Manuring is started. In nurseries budding is done. Towards the end of the month spraying of fungicides against abnormal leaf fall is started in large estates. In areas where planting has to be done, terracing, lining, pitting etc. are done. Stimulants may be applied on trees 20 or more years old.
- April Weeding and manuring are continued. Spraying against leaf fall also is continued. Budding in nursery and field is carried on. Preparation of land for planting is continued. The natural undergrowth is slashed. Dead woods are removed from the garden.
- May Spraying is continued. Treatment to prevent pink disease is done. Budding can be continued if necessary. Slashing of undergrowth is carried on. Sowing of cover crop seeds can be commenced.
- New flushes of young plants have to be given spraying. Nurseries are to be sprayed. The pits are filled and planting started. The tapping panels are disinfected with fungicides and water proofing with prowax or wax rex treseal is done. If needed the beds for sowing seeds can be prepared. Cover crop seeds are sown or cuttings planted.



TABLE I

Area Under Rubber as at the End of Each Year

Year	Area in acres
1950-51	170,506
1951-52	171,191
1952-53	 172,786
1953-54	 173,643
1954-55	 176,647
1955-56	 207,239
1956-57	 234,351
1957-58	 261,998
1958-59	 286,567
1959-60	 305,452
1960-61	 321,002
1961-62	348,121
1962-63	 361,142
1963-64	377,938
1964-65	383,813

TABLE II

Planted Acreage Under Different Planting Materials as at the End of 1964-1965
(Area in acres)

	Newplanted area	Replanted area	Total area
	206.014	4,360	210,374
	42,534	20,302	62,836
	92,065	18,538	110,603
Total	340,613	43,200	383,813
	Total	206,014 42,534 92,065	area area 206,014 4,360 42,534 20,302 92,065 18,538

TABLE III

Classification of Holdings and Estates According to Size as at the End of 1964-1965
(Area in acres)

		Groups	No. of units	Area	
A.	Small Holdings				
	5 Acres and be	elow		61,967	121,650
		and up to and include	ding 10 acres	5,722	42,505
	Above 10 acres			3,537	73,300
		Tota	ıl	71,226	237,455
3.	Estates (above	50 acres)			
	Above 50 and	up to & including	g 100 acres	325	23,372
	,, 500		500 ,,	239	49,286
	,, 100	,	1000 ,,	30	21,699
	,, 1000	"	1500 "	19	23,465
	,, 1500	,	2000 ,,	4	6,602
	,, 2000			9	21,994
		Total		626	146,358
		GRAND TOTAL		71,852	383,813

TABLE IV Statewise Distribution of Area at the End of 1964-1965 (Area in acres)

	STATES	HOLDINGS (50 acres & below		ESTATES (Above 50 acres)			TOTAL	
		No. of units	Area	No. of units	Area	No. of units	Area	
i.	Kerala	70,345	231,062	572	130,085	70,917	361,147	
2	Madras	854	5,942	42	11,906	896	17,848	
3.	Mysore	25	392	11	3,945	36	4,337	
4.	Andamans	1.		1	422	1	422	
5.	Tripura	1	20			1	20	
5.	Maharashtra	1	39			1	37	
	Total	71,226	237,455	626	146,358	71,852	383,813	

TABLE V
Statewise Production of Natural Rubber (In Metric Tonnes)

States	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Kerala	21,890	23,175	24,954	29,057	33,792	41,391
Madras	1,814	2,040	2,060	2,695	3,176	3,724
Mysore	437	452	402	447	468	481
Andamans	32	30	30	40	51	20
Total	24,173	25,697	27,446	32,239	37,487	45,616

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber
(In Metric Tonnes)

1	Production of		Import		Con	sumption	
Year	Natural Rubber	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total
1958-59	24,169	12,538	4,229	16,767	35,767	3,477	39,244
1959-60	24,173	15.287	5,718	21,005	40,491	4,964	45,455
1960-61	25.697	23,125	8.097	31,222	48,148	7,397	55,545
1961-62	27,446	22,528	10,121	32,649	48,410	10,186	58,596
1962-63	32,239	23,360	10,297	33,657	53,553	10,723	64,276
1963-64	37,487	26,275	8,812	35,087	61,155	11,959	73,114
1964-65	45,616	15,003	3,315	18,318	61,057	15,285	76,342

TABLE VII

Reclaimed Rubber Acquired and Consumed by Manufacturers
(In Metric Tonnes)

Year	Acquired	Consumed
1958–59	3,973	4,102
1959-60	5,177	4,969
1960-61	5,183	5,453
1961-62	6,422	6,046
1962-63	6,839	6,850
1963-64	8,251	7,982
1964-65	9,349	9,369

TABLE VIII

Stock of Natural Rubber at the End of Each Month (In Metric Tonnes)

Month	1958-59	1959-60	1960-61	1961-62	1932-63	1963-64	1964-65
April	8,723	10,035	8,571	9,696	11,003	12,818	16,129
May	9,106	9,067	8,186	9,716	10.937	12,894	16,212
June	8,756	8,138	8,128	8,462	12,193	14,003	16,798
July	8,710	8,545	8,067	8,256	12,475	14.824	16,609
August	8,619	8,968	8,489	9,235	12,218	14,239	15,913
September	8,322	8,995	9,157	9,744	12,723	14,302	16,069
October	9,523	9,810	10,265	11,291	13,917	15,605	16,312
November	11,007	10,467	10,742	12,120	15,059	17,142	17,756
December	11,587	10,793	12,993	13,359	16,334	18,314	19,110
lanuary	11,715	10,496	13,036	12,990	15,940	18.381	17,950
February	10,438	9,533	11,185	11,511	13,879	16,437	15,772
March	10,233	9,201	9,875	11,439	13,485	16,092	14,094

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Group 2	R. M. A. 2 R. M. A. 3 Cuttings No. 1	159.85 158.20 149.93
Group 3	R. M. A. 4 R. M. A. 5 Cuttings No. 2	154.34 149.93 143.32
Group 4	Precoagulated Crepe Pale Latex Crepe IX Pale Latex Crepe 1 Pale Latex Crepe 2 Pale Latex Crepe 3 FA	167.57 165.36 163.16 162.06 Q 160.96
Group 5	E. B. C. Super IX Estate Brown Crepe IX Estate Brown Crepe 2X Smoked Blanket Remilled Crepe 2	
Group 6	Estate Brown Crepe 33 Remilled Crepe 3 Remilled Crepe 4	140.01 137.81 131.74
Group 7	Flat Bark	122.37
Normal late	ex up to 35% concentrates	Rs. 161.50 plus a premium of Rs. 19.29 per 50 Kilograms of D, R, C
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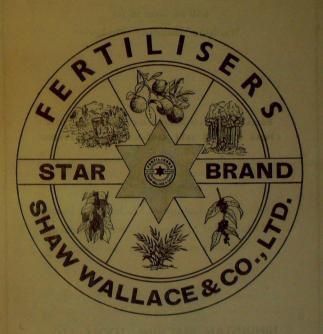
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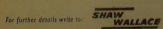
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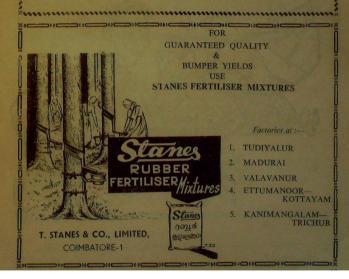
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## TATA FISON AND RALLI bonder on the mysteries of nature!

There's no explaining the Mysteries of Nature, said Tata, in his best professorial vein.

'The birds, the bees, the flowers...' said Fison, getting lyrical.

'... and girls,' said Ralli.

Unperturbed, Tata continued, 'Take this rubber sapling. Consider its life-blood, thin, white, unpretentious...'

'You've got to hand it to nature,' said Fison.

'Rosalie,' said Ralli wistfully, 'her name was Rosalie.'

"... in the rubber sapling," Tata said sternly,
"nature reveals her bounty. Tyres, suspenders,
conveyor belts, toy balloons..."

'Catapults,' added Fison.

'Now,' said Tata coldly, 'for the commercial: Rallis "Tree Brand" fertilisers produce better rubber crops. Tata Fison pesticides protect them for bigger yields.'

'I never did get to know her surname,' said Ralli sadly,



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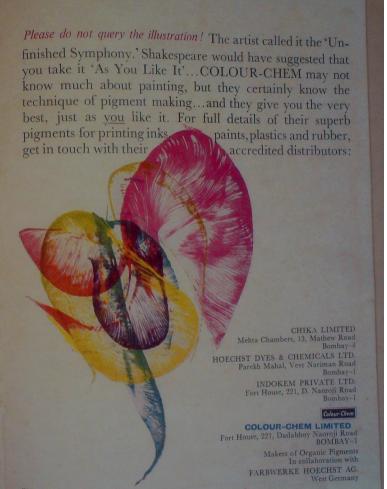
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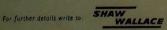
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## rubber board bulletin

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3rd May 1966.

P. K. NARAYANAN

RUBBER BOARD BULLETIN
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The Rubber Board (India)

1966

## Small Holders' Advisory Service

In agriculture, a steady and economic return from any particular crop is one of the main criteria for its expansion. In our country frequent changes could be observed in the crop pattern, depending on the price fluctuations of different crops. This is particularly so in the case of some of the cash crops. Probably this may be true in other developing countries also,

For the last two decades or so rubber cultivators in India have been getting a remunerative price for their produce. Consequently there has been phenomenal increase in the area under rubber from 2.072 lakh acres in 1955 to 4.039 lakh acres at the end of 1965. Of the present acreage of 4.039 lakh acres, 2.552 lakh acres are in the small holdings sector, the unit areas ranging from a fraction of an acre to 50 acres. The remaining 1.587 lakh acres are with large grovers having 50 acres and above. The total number of small holdings in India is at present over 76100 and the large estates are only 636 in number.

FROM the figures given above, the important position occupied by the small holders of rubber in the rubber plantation industry in India is very clear. For the successful implementation of any developmental programme for increasing rubber production in our country due consideration has to be given to the needs of this vital section of the industry.

THE Rubber Board, from its very inception, was coascious of this special situation and several aid schemes were introduced for the benefit of the small holders. The Board has now constituted a Small Holders' Advisory Service which is yet another important step in this direction.

IMPROVEMENTS in various aspects of rubber cultivation and of processing of the raw material are taking place at a very rapid pace in the foremost rubber producing countries. Per acre yields of 3000 lb and above are fast becoming realities in such countries.

EVEN though the small holdings in India account for 63 percent of the total planted area, their contribution towards the total production is only about 38 percent. The average per acre yield of small holdings in India is only about 236 bb per year. This deplorably poor yield is mainly due to the inherently low yielding planting material used and the practice of old and obsolete cultural operations by the small holders.

With the prevailing high price structure for natural rubber, perhaps it may be possible for the small holdings to exist. But at a later stage, keeping in line with the world trends, if the rubber plantation industry in India is called upon to face stiff competition from synthetic rubber, the position of small holdings will become extremely precarious. The spiralling cost of production of natural rubber is another factor which the small holders have to reckon with. The only possible way to tackle these problems successfully is to increase substantially the per acre production from the small holdings.

THE possibilities of augmenting rubber production in small holdings by popularising high yielding planting materials and other scientific methods of rubber cultivation is very bright. The Small Holders' Advisory Service attached to the Rubber Research Institute of India, has been organised with a view to bringing science to the aid of the small holders.

THE Advisory Service is envisaged to have subject matter specialists in Plant Pathology. Agronomy and Botany, to start with This unit will visit small holdings and study the prevailing conditions in individual holdings and make on the spot recommendations for improvement. It is also programmed to glive demonstrations of scientific methods of disease control and other improved cultural operations in rubber. Testing of soil samples from the small holdings will also be undertaken by the unit.

HOWEVER, individual contact of about 76100 holdings, scattered over the entire rubber growing districts, is neither possible nor practicable immediately. Officers of the Advisory Service will camp in important centres where the extension officers of the Board are stationed and visit holdings in that locality. The small holders in an area who are desirous of getting the services of the advisory unit can collectively ask for the same through the local office of the Rubber Board or through rubber growers' co-operative societies. It may not be always possible to attend to requests for visits by the advisory service of individual small holdings. The services of this advisory unit will be entirely free.

It is our earnest belief and sincere hope that small holders will utilise this important service provided by the Board to the fullest extent and thus co-operate with the Board in modernising the rubber plantation industry in the country and thereby increasing the production of rubber.

## Third Plan Target of the Rubber Plantation Industry: Achievements and Shortcomings\*

P. S. HABEEB MOHAMED

Now that the Third Plan period will shortly be over, it will be appropriate to review the targets which had been fixed for rubber under the Third Plan-achievements and shortcomings. Against the targetted acreage of 3.6 lakhs, there was an area of 3.84 lakhs acres under rubber, by the end of 1964-'65, and by the end of December, 1965, the area has gone up to 4,03,909 acres with 76,106 small holdings and 636 estates. The increase in the number of small holdings is particularly noticeable, because, by the end of 1964-'65, only 71,852 units had been registered, comprising of 626 estates and 71,226 small holdings. The production of 50,000 tonnes of rubber or more, as against the Third Plan target of 45,000 tonnes will also be achieved. During the current year the production for the period from April to November, 1965, has been 35,028 tonnes as against 31,715 tonnes for the corresponding period during the last year, indicating an increase of  $10\frac{1}{2}\%$ . The remaining portion of 50,000 tonnes also would be produced before the end of March, 1966. The calculations were upset to some extent by the strike in the rubber plantations in the Kanyakumari district during the period from December to the second week of January, which has resulted in a loss of production of about 400 tonnes which cannot be made up subsequently. Now that work has been resumed in the estates it is hoped that nothing else will happen to upset the estimates of production.

## Development Programmes

It must be pointed out, however, that certain specific targets set in the Third Plan have not been achieved. The target for replanting in the Third Plan period was 45,000 acres, against which we have replanted only about 30,000 acres which is 67 percent of the target. It must be remembered that the modest target of 28,500 acres fixed for the Second Plan period had not been achieved. Therefore, very serious efforts will have to be made to make replanting a success. The Third Plan has also provided for annual newplanting at the rate of 5,000 acres in the state sector, 2,500 acres (annual) in the estates sector, and 2,500 acres (annual) in the small holdings sector. In the public sector, due to the work done by the Plantation

Speech delivered by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, at the 52nd meeting of the Board held at Kottayam on the 5th February, 1966.



Shri P. S. Habeeb Mohamed, Chairman, Rubber Board addressing the 52nd meeting of the Rubber Board

Corporation of Kerala, and the Governments of Mysore and Madras, newplanting has been done to a substantial extent, but in the smallholdings sector, it is noticed that not much newplanting has been done as a result of direct financial assistance given either by the Board or by the State Governments. It is noticed that though the Government of Kerala had a scheme of giving loan to small growers at the rate of Rs. 750/- per acre, to be operated through the Central Co-operative Land Mortgage Bank, the benefit could be extended to less than 1,000 acres during the whole plan period. Under the scheme of loan assistance to landless persons, the Government of Kerala was able to allot an area of 6,475 acres to 1,800 persons till the end of 1962-1963. The Board's schemes of newplanting and upkeep loans have also not been able to help a substantial number of small growers. Though we had targets of extending the loan scheme to 2,500 acres annually from

1962-'63 to 1965-'66, the achievement during 3 to 4 years was only to the extent of 700 acres. This will show that though specific targets were fixed in the Third Plan period for loan schemes for newplanting by the smallholdings sector, the planting did not take place as a result of any direct financial assistance. But the tempo of newplanting continued vigorously and, therefore, the target of 3.6 lakh acres by the end of the Third Plan period could be achieved. If it is decided to continue the tempo of newplanting in the coming years, financial assistance will have to be made liberally to the small growers. There was also a scheme for giving loan assistance for the maintenance of rubber areas. Under this scheme there has not been much progress. The target fixed by the Board were 3,000 acres each for 1964-'65 and 1965-'66. So far the loan assistance was given to less than 600 acres. If the targets fixed in the Plan are to have any real meaning, very serious efforts will have to be made. It is also necessary that the shortcomings noticed in the operations of the programmes and the fulfilment of targets laid down in the Third Plan period are not repeated in future.

## Fourth Plan Schemes

One difficulty is that, at present the Planning Commission and the Government are considering only the annual plan for 1966-'67. The shape of the plan for the 4 years after 1966-'67 will be known only later. But firm action will have to be taken for achieving the targets set for the first year of the Fourth Plan. The targets are, 10,000 acres for replanting, 3,000 acres under the scheme of loan assistance to small growers, 2,000 acres under the scheme for maintenance of immature areas, the construction of 10 smoke houses mainly with a view to improving the quality of the rubber sheets produced by the small growers and organisation of some marketing societies in the co-operative sector.

A scheme of loan assistance has been forwarded to Government, for newplanting to small holders which was to be operated by the Land Mortgage Bank according to which the Board was to subsidise a portion of the interest payable by the small holders. The Government has indicated that it is desirable, if the existing scheme of the Rubber Board is modified suitably on the lines earlier suggested for operation by the Land Mortgage Bank, instead of subsidising a portion of the interest payable to the Land Mortgage Bank by the small holders. The scheme has accordingly been recast.

It is hoped that it would be possible to achieve the targets fixed for the various sectors in the first year of the Fourth Plan.

## Consumption and Import

It has been indicated earlier that the production of natural rubber has kept pace with our estimates though significant changes have been noticed in the pattern of consumption which is due to the progressive use of synthetic rubber, due to the achievement of the targets of production by Messrs. Synthetics & Chemicals, and drastic cut in import in natural and synthetic rubbers. It is noticed that there has been consumption of 14,046 tonnes of synthetic rubber for the period from April to November, 1965, as against 9,259 tonnes for the period from April to November, 1964, indicating an increase of more than 50% in the use of synthetic rubber. The import figures show that there has been an import of 15,276 tonnes of natural rubber for the period from April to November, 1965, as against the imports of 11,712 tonnes from April to November, 1964, and against an import of 15,003 tonnes for the whole year 1964-'65. The slight increase in import is due to the carry over of the import licences issued towards the end of 1964-'65 and does not indicate any liberalisation of the policy of import of natural rubber. In fact though the Board has been recommending from time to time imports on the basis of actual consummonths, the stock position of many of the manufacturers has dwindled to an appreciable extent. Even the figures of stock position with the manufacturers in previous years showed that at best at the end of every year, they had got only stocks for 2 months and it will be difficult to visualize their stock position at the end of the current financial year. It is not likely that with the shortage of foreign exchange, there would be any liberalisation in the imports of natural rubber or synthetic rybber during the coming years. Quite a number of manufacturers, particularly small manufacturers, have been hit due to the precarious position of stock with estates, small holdings and the dealers. However, on the basis of the practice in the previous years, the Board would be recommending to Government that the imports should be made during the coming year on the basis of actual consumption plus additional 4 months' stock. I am not sure whether beyond recommending the quota for imports, anything really effective can be done by the

#### A Long-term View

Any planning for the plantation industry will have to take a long-term view and the solution of the problems lies in modernising the plantation industry. The consumption of synthetic rubber will go on increasing and this is as it should be. The quota for consumption of SBR by the manufacturing units for the year 1966-'67 is likely to be of the order of 25,000 tonnes. I had indicated before that the policy of protection which was enjoyed by the rubber plantation industry was undergoing some change as a result of the emergence of a strong synthetic rubber manufacturing unit and the export orientation in our economic policy, so that the ultimate protection that the industry would enjoy would be not the result of any statutory directives, but the protection inherent in modernisation. You might remember that though the minimum price has been fixed by the Government, as it is fixed F. O. B. Cochin, any effective prosecution for violation of the conditions of purchase would be difficult, as the producers are not selling their rubber at Cochin alone. The long-term view to take is that the industry should stand on its own legs,

as the natural rubber industry does everywhere else in the world.

## Effects of Price Increase

It may sound odd with the prices obtaining in the market, which are an alltime record, to talk of modernisation and reduction of cost by scientific methods of cultivation. But a short-term view will go against the interests of the industry. Whatever price fluctuation might happen it is the long-term interest of the industry that will have to be taken into account. It might appear that the interest of the growers lies in getting the best prices available in the market. But certain consequences flowing from this view have also to be taken into account. It might even appear that there is a conflict of views between the planters, whether in the estate or the small holding sector, and the Board. It is clear that the quality of rubber sheets which have been produced in the recent months has undergone considerable deterioration, and reputed manufacturers have been reporting the presence of extraneous materials in the rubber sheets. Scissors and pieces of broomsticks are reported to have been discovered from the rubber bundles. The Board had encouraged the growth of smoke houses in the co-operative sector but the working of most of the smoke houses has suffered. Even the replanting programme which had been pursued vigorously, has not attained the desired success during 1965, because of the price fluctuations in the rubber market. Many manufacturers and even producers have been bringing to the notice of the Board the consequences flowing from the present state of affairs. The manufacturers were told that as the maximum price of rubber has not been fixed, the Board will not be able to do anything effective in the matter of controlling the quality or the price. The Board has to consider seriously whether in view of the fact that the long-term interests of the Board and the producers are the same, anything effective should be done in the matter of controlling the prices.

It is necessary to emphasise this long-term identity of interests of the Board and the producers, as the state of the rubber plantation industry is not very strong. There is the preponderance of low yielding small holdings which are heavily interplanted. The number of small holdings has gone up from 26,787 in 1955-'56 to 76,106 at the end of December, 1965. This preponderance of small holdings is high when compared with the relative proportion of small holdings in Ceylon and in Malaya. Besides, the low yield per acre in our country and the comparative yield per acre in Ceylon and Malaya have also to be considered.

## Preponderance of Low Yielding Areas

One of the main reasons for this low yield has been the preponderance of areas planted with unselected planting materials. A recent study made by the Board shows that during the last 12 years the share of high yielding planting materials has increased from 25% to 45% of the total planted area. This means that 55% of the area at the end of 1964-'65 is planted with unselected planting materials. It is presumed that by the end of 1965-'66, the percentage of area with high yielding planting materials will go up to 50%, which will mean that we would have an area of nearly 2 lakhs acres planted with high yielding planting materials. In Ceylon, the position is better. It is noticed from the Report of the Rubber Controller for 1964, that out of the total

area of 6,69,179 acres in Ceylon, the total area planted with high yielding rubber comes to 3,50,972 acres, which is more than 50%. The position in Malaya is also interesting. Out of the total planted area of 18,93,160 acres in the estate sector, 14,17,042 acres have been planted with high yielding planting materials, which is 75 percent of the estate acreage. No accurate statistics are available regarding the acreage planted with high yielding planting materials in the small holdings sector in Malaya, but it is presumed that out of the total acreage of 22,10,000 acres (small holdings), 10,00,000 acres are still under low yielding planting materials. If the estates sector and the small holdings sector in Malaya are considered, its acreage under high yielding planting materials would be 64% of the total planted area.

#### Certain Favourable Points

Though the comparison is not very favourable to India, there are some reasons for gratification in that, the area under unselected and low yielding planting materials has been coming down in our country from 80% in 1952 to 50% towards the end of 1965-'66. There is also some comfort in the thought that our rate of increase in the per acre yield of rubber in recent years has been higher than that of Ceylon. Thus the rate of yield per acre in India was 15%, i. e. from 326 lb in 1960-'61 to 375 lb in 1964-'65, while that of Ceylon was only 8%, i. e., from 417 lb in 1960 to 450 lb in 1964. It is expected that our yield per acre by the end of 1965-'66 would go up to above 400 lb and with concerted efforts we would be able to catch up with Ceylon within a period of three years. Reports show that the per acre yield in Malaysia, including both estates and

small holdings, would be of the order of 640 lb in 1963. The annual rate of increase in per acre yield for a period of years in both estates and small holdings in Malaysia is not readily available, but we have got some figures for the increase in per acre vield so far as the estates sector is concerned, where the rate has gone up from 676 lb to 817 lb during 1960-'64, which indicates an average increase of 21 percent in per acre yield. Most probably Malaysia's rate of increase during 1960-'64, will not be higher than the Indian rate of 15%. The main difficulty in India has been the very low base from which we started and therefore, the difficulty of catching up with the progress attained by major producing countries like Malaysia and Ceylon. Even then, in terms of the rate of annual increase in production and also increase in productivity India is leading, as the following figures published by the International Rubber Study Group will show:-

Countries Territories	wti	h of natural rub- r production from 1954 to 1964
India		71%
Africa		63%
Thailand		6½%
Cambodia		6½%
Malaysia	1000	31%
Vietnam		3%
Brazil		2½%
Ceylon		18%
Indonesia		1½%
Average		21%

## Rehabilitation Programme

With so many factors against the plantation industry in our country and a few points in favour, we have got to continue

implementing the most important programmes for the rehabilitation of the old and uneconomic estates and holdings. Though it would be correct to say that the rate of replanting has been very poor when compared with Malaysia's or Ceylon's, it has to be remembered that most of our area is comparatively under young rubber. This will be borne out by the fact that while at the end of 1964-'65 we had about 60,000 acres planted prior to 1938-'39 which is 16 percent of our total planted area, which could be considered uneconomic. Ceylon has got 3,18,207 acres under unselected rubber against its total acreage of 6,69,170 acres, which means that a little less than 50% of its rubber area is uneconomic and has to be replanted. So far as Malaysia is concerned, it was earlier indicated that out of the 18, 93, 00) acres of the estate acreage, 14,17,000 acres were under high yielding planting materials, mostly due to replanting and other reasons which, however, leaves about 4,76,000 acres with unselected planting materials which is 25 percent of the total planted area in the estate sector. So far as their replanting for small holders is concerned, the annual report of the Chief Replanting Officer for the year 1963 states that only 37% of the small holders' uneconomic area has been replanted so far. About 10 lakhs acres will still have to be replanted, which is nearly 45% of the total acreage under small holdings in Malaysia. (These figures may have to be revised, as we have got only the annual figures upto 1963). Therefore, in terms of acreage in Malaysia, out of the 41 lakhs acres of planted area, about 15 lakhs acres are under unselected rubber which is 37%. Considering the percentage of very old and uneconomic areas, we are not so badly off, eventhough under our rules for replanting only 44,000 acres are covered (including 30,000 acres already referred to). In addition to the 60,000 acres, mentioned earlier, which is prior to 1938 planting, we have an additional acreage of 84,000 acres planted with unselected rubber till the end of 1956-'57. Thus our unselected and low yielding rubber can be classified under three categories. (1) Pre-1938 planting— 60,000 acres (very uneconomic and eligible for subsidy). (2) From 1938-'56 (low yielding but not necessarily very uneconomic, particularly at present prices, eligible for subsidy)-84,000 acres. (3) From 1956 up-to-date (low yielding but not very uneconomic, not eligible for subsidy) - 53,000 acres. There is of course a small percentage of area reported as clonal but very uneconomic which is not eligible for subsidy under the present rules (8,000 acres). In our case the first category requires immediate replanting, while in Malaysia and Ceylon, practically the entire acreage under unselected rubber is uneconomic and requires replanting. The tremendous spurt of newplanting from 1955 onwards was not adequately supported by a system of distribution of high yielding planting materials, so that our area under small holdings with unselected rubber has shot up from 96,183 acres at the end of 1956-'57 to 1,44,095 acres at the end of 1964-'65. For the first time, the acreage under the small holdings sector planted with ordinary planting materials has come down only in 1964-'65 mainly due to the implementation of the rule that the areas planted from 1963 with unselected planting materials will not be eligible for registration and only the area planted with high yielding planting materials alone would be eligible for registration. If we had

supported the tremendous spurt of newplanting with an adeqate supply of planting materials, we would have been in a much sounder position than now.

## High Yielding Planting Materials

This brings me to my second point of arranging the effective distribution system of high yielding planting materials. The Government has been good enough to sanction foreign exchange for the import of seeds from Malaysia, but some of the good effect has been nullified by the increase in import duty. We have also expanded our acreage under the nurseries and opened up 4 Regional Nurseries. We also presume that we would be able to distribute effectively high yielding planting materials during the next planting season

#### Research Activities

The Board's research activities are also progressing well and constant attention is being paid to studies on all problems relating to productivity. Experiments on evolving high yielding strains, fixing manurial schedules for areas with different agro-climatic conditions, effective check up of pests and disease, suitable tapping systems and improved methods of processing and standardisation, are being carried out and results will be seen during the coming few years. The Director of Research has gone to Malaysia to study the conditions there.

## Co-operative Societies

One of the important activities of the Board is to organise the small holdings under co-operatives, and with this end in view,

about 20 marketing societies will be working by the end of this year with affiliated service co-operatives which would also have smoke-houses, and in addition catering to the needs of planters including short-term loans. The administration system has been re-organised in such a way that every area will have a sub-office of the Board, a nursery for supplying planting materials and a main marketing society with affiliated service co-operatives which have processing facilities, and catering to the needs of the small growers. The progressive figures of expenditure incurred from the Pool Fund will show that the activities of the Board are gathering in momentum in the co-operative sector. We are sure that every concentration of small holdings will be covered by one co-operative

#### A Note of Hope

I do not know whether there would be much scope for newplanting in the Malabar area, if the decision of the Kerala Government to acquire the private forests in Malabar area is implemented, but we will have to continue our search for areas for newplanting. With all the weaknesses in the plantation industry we can end the Third Plan period on a note of hope. With active co-operation between the planters and the Board we should be able to progress much ahead on the path of increasing production and productivity.

#### State of the Industry

The state of the industry at the end of the Third Plan period shows the following characteristics:

- (1) Highest rate of increase in production of natural rubber in the world.
- (2) One of the highest rates of increase in productivity of natural rubber (yield per acre).
- (3) Statutorily fixed price and the highest price obtained for natural rubber in the world.
- (4) Co-existence with synthetic rubber produced in the country-unusual except in Brazil.
- (5) Consumption of the entire production of natural rubber in the country by a wide network of manufacturing industries, unusual except in Brazil.
  - (6) Poor yield per acre.
- (7) High percentage of area under small holdings (63% below 50 acres and 69% below 100 acres), as against Ceylon's (30% below 10 acres and 53% below 100 acres) and Malaysia's (58% below 100 acres). In India units of 50 acres and below are defined as small holdings while the definitions in Ceylon and Malaysia are below 10 acres and below 100 acres respectively.
- (8) High percentage of small holdings interplanted with other crops thereby creating an appreciable difference between the reported area and the effective area.

## Progress of Investigations on the Improvement of Rubber (*Hevea Brasiliensis* Mull-Arg.) Planting Materials in India\*

V. K. BHASKARAN NAIR1 and A. O. N. PANIKKAR2

#### Introduction

Research on the improvement of a perennial crop such as rubber is relatively slow and laborious. Plans must therefore be very carefully prepared for a programme of work extending over several years. In the South East, the phenomenal increase in yield of rubber has been achieved after years of repeated selection of high-yielding mother trees followed by their vegetative multiplication, controlled hand pollination among the high-yielding clones and further selection from among the promising progeny. Attempts to improve the materials of Hevea in India followed very much the same pattern as in other South Eastern rubber growing countries. However, early work in this line was limited due to the lack of sufficient facilities. The appointment of additional staff and the proposed establishment of the Central Farm have now made it and a new programme of work is being initiated. A review and discussion of the work done until now will therefore be appropriate at this juncture

An outline of the work, carried out so far, in the improvement of indigenous materials since 1954 by the Rubber Research Institute of India is given in this short paper. Establishment of primary clones directly from high-yielding trees, the development of seedlings families by hand-pollination between high yielding individuals or clones and evaluation of their performance formed the principal subject of investigation.

#### Selection of high-yielding trees and establishment of their clones (Estate mother tree selection)

A normal population of Hevea trees in the plantation exhibits a wide range of variation, in form, rate and habit of growth and yield, from tree to tree. Whitby (1919) by a detailed examination of a group of about 1000 trees showed that approximately ten percent gave yields of at least double the mean yield of the entire population. The average yield of the trees in this elite group was approximately four times the average yield per tree of the remainder of the population. Actually, the yields of

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the five percent of highest yielders were nearly ten times the mean yield of the rest of the population. These striking findings by Whitby were confirmed by similar investigations by others, who followed this line of work elsewhere (Sanderson and Sutcliffe 1929; Mann 1940). Investigations of mother tree selection carried out by Cramer, Van Halten and others, (1910-1918) (Dijkman 1951) in Indonesia have clearly shown that among the vast material on the plantations, some 30 percent of the trees produced about 70 percent of the entire produce. From these findings, the idea of the mother tree selection in the commercial plantation groves and establishment of clones of the desirable high-yielding mother trees, originated. The propagation of these mother tree selections after undergoing comparative testing and further selection by the combined effort of the research personnel and planter-selectionists, has produced many of the existing popular clones.

A similar attempt has been made by us

to collect buddings of a number of mother trees from different estates. Out of these, a total number of 20 types are under observation now at the Experiment Station.

A few of the types have been found to have some tolerance to the leaf-fall disease. However this requires further testing and confirmation.

During the years 1956 to 1961, these new clones from selected mother trees on estates were established in the different fields of the Experiment Station in plots of five trees or more.

Eight of these clones were brought into tapping in March 1964. The yields of these clones for the first year and their mean girth for six years taken at a height of 50 inchese from the bud union are given in Table 1, with Tjir 1 as control. During the first year of tapping, the yield of some of these clones, such as the M. clones, are higher than Tjir 1.

TABLE 1
Performance of the Estate Mother Tree Selections

				Mean gir	th-cm			Yield per tree per year-kg
SI. No.	Clone	1958	1960	1961	1962	1963	1964	1964
1. 2.	M 55 M 60	8·38 7·20 6·92	26·88 30·70 24·20	37·13 42·00 33·30	45·38 53·40 40·90	54·67 59·40 47·00	61·00 5·10 48·60	4·12 5·31 2·00
3. 4. 5.	DI D3 KKI	7·63 8·50 9·36	28·17 26·60 26·72	37·83 31·50 35·01	48·00 42·08 40·30	54·00 47·67 49·56	58·67 51·91 55·11	2·21 3·09 2·01
6. 7. 8. 9.	KK 2 KK 18 KK 25 Tiir 1	8·76 8·26 6·62	27·90 27·30 23·97	36·40 30·21 32·81	45:10 38:41 41:35	52·20 44·14 44·49	56·40 47·50 49·47	3·37 2·01 2·67

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# Hand Pollination

out from 1954 to 1959. The details of these

Twenty-three different clones were used as parents in the breeding programme carried

TABLE 2

Types used as parents in hand-pollination programme

SI. No.	Abbrevia- tion	Abbrevia- tion Full name		Series where used
1.	AVROS 255	Algemene Vereniging Rubber		
2.	СНМ 3	Planters Oostkust Sumatra	Indonesia	1, 2, 3
3.		C. H. Meares	(Malaya?)	1, 4
	Tjir 1	Tjirandji	Indonesia	1, 2, 3, 4,
4.	Mil 3/2	Millakande	Ceylon	1, 2, 3, 4, 5
5.	HC 28	Hill Croft	Ceylon	1
6.	Gl 1	Glenshiel	Malaya	1, 2, 4, 5
7.	LCB 1320	S'Lands Caoutchouc Bedrijiven	Indonesia	2, 4, 5
8.	PR 107	Proefestation Von Rubber	Indonesia	4,5
9.	RSY 23	Ranny, Shaliacary, Yendayar	India	1, 4, 5
10,	RSY 10	do.	,,	3
11.	RSY 4	do.	CONTRACTOR DESCRIPTION	3
12.	MRS	Mundakayam Research Station	, and	4
13. 14.	BD 10	Bodjong Datar	Indonesia	1, 2, 3
	Pil B 84	Pilmoor	Malaya	4, 5
15.	Wagga	Wagga	Ceylon	4, 5
16.	PB 5/60	Prang Besar	Malaya	1, 2, 4
17.	PB 5/139	Do	"	1, 2, 4, 5
18.	PB 6/9	Do	,,	4
19.	PB 6/50	Do	"	2, 3, 4
20.	PB 25	Do	33	3
21.	PB 86	Do	,,	2, 3, 4
22.	M 55	Malankara Estate	India	2
23.	Lun N	Lunderston	Malaya	4

Preliminary results of the hand-pollination attempted from 1954 to 1959 are summarised in Table 3.

TABLE 3

Hand-pollination (1954—'59) series: summary of results

		1954	1955	1956	1958	1959
1.	Number of parent clones used.	11	13	18	18	15
2.	Number of parent clones used—success numbers.	11	12	9	15	10
3.	Number of different combina-	19	21	32	32	25
4.	Number of different combina- tions made-success numbers.	14	14	8 -	25	8
5.	Number of pollinations carried out. Initial success (Percentage)	14,747 2.60	10,032 5·70	14,738 5·50	13,009	5,022 7·70
7.	Number of pods harvested. Success based on (5) and (7)	220	365	433	495	205
	above (Percentage).  Number of new legitimate	1.50	3.60	2.90	3.80	4.08
9.	families obtained.	14	13	8	22	8
0.	Number of seedlings planted in nurseries	459	281	94	917	86
<ol> <li>2.</li> </ol>	Number of the above trans- planted in fields for trial. Number of new primary clones	456	261	77	554	83
	established from the above and planted for testing.	439	230	71	420	59

All the types used as parents could not tion. But the performances of 10 of them, be tested separately at the Experiment Staplanted in 1956, are summarised in Table 4.

TABLE 4
Small scale trial of some of the parent types

				Mean gir			Yield per tre per year—k			
SI. No.	Clone	1958	1959	1960	1961	1962	1963	1964	1963*	1964
1. 2. 3. 4. 5. 6. 7. 8. 9.	PB 6/9 PB 5/139 PB 86 PB 5/60 PB 6/50 AVROS 255 LCB 1320 BD 10 Gl 1 Tür 1	9·17 7·62 6·60 8·43 6·10 8·36 9·58 8·84 9·60 6·48	18·29 16·36 13·67 16·56 14·05 17·25 19·41 18·34 17·09 13·97	29·32 25·69 22·39 24·58 24·55 28·83 33·22 29·50 24·58 24·68	39·04 33·69 29·43 31·31 33·70 37·29 40·00 36·33 34·73 33·45	48·00 40·81 36·04 37·81 41·45 42·21 46·80 44·11 39·35 41·59	55·74 46·38 40·95 43·86 47·76 48·05 52·85 48·76 42·80 47·72	60·18 × 48·97 45·07 48·42 52·95 52·96 57·85 × 54·67 48·00 52·68	1·73 1·27 0·83 0·93 0·73 0·94 0·99 0·78 1·15 0·89	5·1· 2·3 2·3 2·1 1·9 2·2 2·5 2·4 1·7

<sup>\*</sup> Opened for tapping in September, 1963.

Tjir I, one of the parent types, is used as control for comparison. As regards the yield, most of the types were better than the control Tjir I and PB 6/9 was found to be superior to the others during both the years. In girth, PB 6/9 and LCB 1320 were significantly superior while PB 86 was inferior to the control, during 1964.

The rubber tree flowers normally from February to May, and the fruits mature by August-September. The hand pollination programme was undertaken from February to April each year, from 1954 to 1959, in an estate at Punalur, where almost all the older popular clones were present. The usual procedures were followed, vide Mann 1940; Dijkman 1951; Planter's Bulletin 1953.

The fruits, resulting from the successful hand pollinations, were enclosed in net bags, to retain the seeds inside the bags, when the fruits dehisce. They were harvested when the colour turned to brown and the seeds

were planted for germination immediately. The germinated seeds were transplanted into nursery beds where they remained for 20 to 22 months and became well established. In the nursery, they were cut back at a height of 20 inches from the ground level and the tops were used as budwood for establishing clones from each seedling, to test them on a small scale in the fields. Both the seedlings and the buddings were planted in the different fields in the same season, the planting distance adopted normally, being 22' ×11'. About 5 to 6 buddings were planted in the case of each clone. Legitimate seedlings of Tjir I, and Chemara B garden seedlings wherever possible, were also planted as control, in the case of seedlings. Where the clones were planted, Tjir 1 buddings had been used as control (Nair 1963). The details of the plantings of the new seedling families and their clones are presented in Table 5.

TABLE 5
Seedling families resulting from hand-pollination and their primary clones

Series	Year of pollination	Year of planting	Seedlings	Primary clones
1.	1954	1956	Field IV	Field III
2.	1955	1957	,, V	" V-a
3.	1956	1958	" VII	" VII-a
4.	1958	1960	" XI, X-a	Kodumon Estate (P. C. K. Ltd.)
5.	1959	1961	" XII	Kodumon Estate (P. C. K. Ltd.)

Seedling families in Fields IV, V and VII and clones in Fields III and V-a are now under tapping. In the case of buddings, the intensity is S/2 d/2 100% and in the

case of seedlings it is S/2 d/3 67%, alternating with S/2 d/4 50% (weekly two tappings, once in three days and the other once in four days, alternating each other).

coagulated in the cup on two normal tapping days every month, and the dry weight ascertained. Allowance is made for the residual moisture in the lumps. For this, the actual dry weight of sample-lumps is determined from time to time.

## Review of the performance of the 1954 crosses

The seedling families of the 1954 series of pollinations and their clones were planted in Field IV and III respectively of the Ex-

The latex of all the trees under test is periment Station, in 1956. The seedlings have been opened for tapping in 1963 and their clones in 1964. Annual girth measurements, at a height of 50" above the ground level or bud union as the case may be, are recorded from 1958 onwards. In all 15 seedling families, including Tjir l control and their clones are under observation.

> The girth records of seedling families from 1958 to 1964 and their yield data for 1963 and 1964 tapping seasons have been summarised familywise and presented in Table 6.

TABLE 6 1954 series of hand-pollinations: performance of the seedling families

			1	Mean gir	th—cm			Me	ean yield	l per ar-kg
SI.	Family	1958	1959	1960	1961	1962	1963	1964	1963	1964
-		10.4	15.2	26.2	35.5	42.0	47.4	52.3	1.23	1.12
	AVROS 255×Gl 1 CHM 3 ×BD 10	12.7	23.5	35.5	45.8	55.3	61.9	69.0	1.64	2.09
3	Tjir 1 × AVROS 255	9.4	176	27.7	36.9	44.0	49.7	54.3	1.75	1.74
4	CHM 2	10.5	20.3	30.5	39.7	47.7	52.5	58.0	1.59	2.17
5	" × GI 1	10.5	19.0	28.9	38.1	45.2	50.0	54.8	1.35	1.77
6	" × Mil 3/2	11.4	21.6	33-2	42.6	49.5	54.1	59.6	1.93	2.21
7	" × HC 28	11.4	21.3	33.3	43.6	50.9	56.4	61.8	1.46	1.79
8		11.7	20.6	-32-3	42.9	50.9	56:2	62.3	1.53	2.02
9		10.3	20.0	30.8	41.5	49.8	55.4	61.3	1.71	1.80
4.37	Mil 3/2 × Gl 1	11.2	19.3	30.6	40.1	47.9	54.1	60.8	1.45	2:02
10	"× CHM 3	11.8	17.6	28.2	37.2	44.0	49.5	57.0	0.68	1.20
11		14.6	23.9	36.8	46.6	54.5	58-9	63.6	2.11	2.73
12	" PB 5/60	13.0	24-1	36.5	45.5	54.0	60.5	64-5	2.58	3.05
13	"× PB 5/139	10.4	15.9	28.5	39.1	47.6	55.0	62.5	1.06	1.43
14	"× RSY 23 Tjir 1 control.	9.4	18.3	28.8	38.6	46.1	51.8	57-3	1.40	1.55

The girth measurements from 1958 to 1964 and yield for 1964 tapping season of the

new clones have also been summarised familywise in Table 7.

TABLE 7
1954 series of hand pollinations: performance of the primary clones

SI.	Family			Mean gi	rth—cm			M	ean yield per
No.		1958	1959	1960	1961	1962	1963	1964	e per year-kg 1964
1	AVROS 255×GI	1 8.0	15.8	23.5	33.2	41.8	49.1	54.4	0.90
2	CHM 3×BD 10	9.1	19.0	30.6	40.8	51.1	57.8	60.4	1.28
3	Tjir 1×AVROS 2:	55 8.0	15.3	26.1	35.1	43.7	49.5	55.3	1.84
4	" ×СНМ 3	8.9	17.6	28.0	37.0	44.9	50.4	55.5	1.66
5	" ×G11	8.5	16.4	26.2	35.5	44.7	50.5	55.8	1.92
6	" ×Mil 3/2	10.3	19.1	30.7	41.1	49.3	56.5	63.0	2.29
7	" ×HC 28	9.2	17.9	29-1	38.9	48.3	54-5	60.5	1.73
8	Mil 3/2× "	8'2	15.9	26.2	35.9	45.7	51.8	58.5	1.72
9	HC 28 × Mil 3/2	7.2	18.0	29.7	36.3	46.6	52.2	57-1	1.58
10	Mil 3/2×G1 1	8.7	17-4	28.2	37.8	47-1	53.6	59.0	1.92
11	" ×CHM 3	8.8	18.0	27.6	36.7	45.3	52.7	56-1	1.58
12	"×PB 5/60	9.7	17-8	27-6	36.7	45'8	49.5	57.3	2.50
13	"×PB 5/139	8.1	19.1	31.4	41-4	52.5	57.0	62.3	2.04
14	" ×RSY 23	8:5	17.1	24.5	34.5	45.4	51.6	59.2	1.58
15	Tjir 1 Control	7-2	15.1	23.9	32.5	40.3	44-7	49.6	2.67

The performance of some of the seedling families as a whole, is better than the control Tjir 1 as far as yield is concerned, as may be seen from Table 6. The mean girth of the trees of most of these, is also more than that of the control. In the case of clones from these, (Table 7), no family as a whole, yielded more than the control Tjir 1 during the first year of tapping, though some of the individual clones have been found to be superior to the control (Table 8).

In girth, on the contrary, the clones of all the families were better, the difference being more marked from 1961 onwards. No definite conclusions, however, can be drawn from the performance of the families as a whole, because the individuals constituting the family show a very wide range of variation, and because each of the seedlings is a potential clone.

Since it is impossible and probably not essential to test all the types obtained through hand-pollination, a preliminary selection has to be made each year, of the promising clones which require further testing. Yield being the character of prime importance, this selection should be primarily based on this criterion, after which, secondary characters of these clones have to be telepic preserved.

Generally the clones tend to reproduce the characteristics of their respective mother trees. However, with regard to yield, this relationship is not found to be as close as might be expected as seen from Tables 6 and 7, where the performances of the seedling families and the new clones, summarised familywise, are given. This is true of the individual seedling trees and the new clones established from them.

TABLE 8
1954 series of hand-pollinations: primary selections

SI. Origin	(a) see	per tree per year- edling	kg (b) Clone 1964
No.	1963	1964	
1 Tjir 1 × AVROS 255	2.81	2.73	3.02
	2.45	3.14	3.10
	1.69	2.32	2.35
3 " × "	2.48	4.07	3.32
4 " × "	1.92	2.36	4.39
5 ,, × ,,	1.76	2.16	2.86
6 ,, × Mil 3/2	3.00	3.22	3.27
7 " × "	3.12		3.09
8 " × "	2.71	2.37	3.33
9 " × "	1.68	2.22	2.71
10 ,, × HC 28	1.74	2.29	2.89
11 " × "	3.94	5.73	2.70
12 Mil 3/2 × "	2.72	3.76	3.50
13 ,, ,,	2.14	2.41	3.06
14 ,, ,,	1.57	1.76	3.15
15 ,, ,,	2.53	3.53	3.92
16 " "	2.47	3.03	3-57
17 " "	4.08	4.21	3.20
18 "	2.21	3.23	3.71
19 "		4.77	3.45
20 ,, × Gl 1	2.08	3.43	3.06
21 ,, × PB 5/60	2.92	4.03	2.76
22 ,, × ,,	2.62	1.55	2.67
23 Tjir I Control.	1.40	1 33	

Certain types, however, have yielded more than the control in the case of both the seedlings and their buddings. There are 22 such types belonging to seven different families. Their yield performance is given in Table 8.

It may be recalled that even here performances of the above 22 types are not strictly similar in both the fields; it only means that they performed better than the control in both the tests.

In addition to the types mentioned above, there are others whose performance had been found to be quite good in any one of the fields and poor, on the other hand, in the other. Some of these will also require further testing, for a proper assessment.

These types, vide Table 8, are primarily chosen for further testing and are expected to be tried at the Central Farm of the RRII. These trials are expected to be undertaken in a phased programme during the coming years.

All the trees in the seedling and primary clone trials are kept under observation, whether they are chosen immediately for further trials or not. Types which may require further evaluation will be included in trials later on.

#### Discussion

Improvement in the quality of rubber planting material is of prime importance to the industry, and is possible only through continued efforts planned to extend over several years.

Rubber tree is propagated both by generative and by vegetative methods. The former is through seeds and the latter through budgrafts. It is found that using vegetative and generative methods in a complementary manner offers the best possibility of success from the practical viewpoint of improvement of Hevea planting materials.

Parent types for breeding programme could be chosen from clones which are found to be superior to others and also could be picked up from an existing seedling area on the basis of their desirable characters. In either case, the yield at least during the first few years of tapping has to be studied and usually only the high yielders are chosen as parent types. In the programmes undertaken from 1954 to 1959, 23 different types were used as parents. In all, 129 combinations were attempted, of which 69 combinations proved successful, as may be recalled from Table 3.

Of the five series of crosses made, the performance of the seedling families and their primary clones of the first (1954) had been mentioned above. The performances of the seedlings families indicate that some of the combinations are potentially capable of resulting in high yielding progenies. Of the 14 families resulting from the first series, ten yielded more than the control during the first and second years of tapping. Of the remaining 4, one proved to yield more than the control during the second year, though its yield had been lesser during the first year.

The yield of three families had been found to be lesser than the control during both the years. A falling yield trend was also noticed in two families. These indicate that some of these combinations could be used in large scale production of improved seeds, provided the performance of these families maintain their lead over the control. This aspect is being studied and yield records for a period of 7 years or more, may be expected to furnish a clearer picture.

Establishment of clones by means of budgrafting is aimed at an exact reproduction of the characters of the mother plants. The clones tend to reproduce the characters of their respective mother trees. In a crop like rubber, where flowers are generally croose pollinated, this method is far more reliable than propagation by means of seeds.

Of the 1954 series, 439 new clones had been established for trials on a small scale and were planted in 1956. A comparison of the yields of the mother trees and the respective clones established from them has shown that as far as yield is concerned, the relationship between each other is not very close. Clones of the mother trees (seedlings) which yielded outstandingly during the first two years of tapping, have been found to be below average in yield. Such difference in the comparative performance of mother trees and their clones had also been recorded by Sharp (1940).

On evaluation it was found that 169 individuals of the seedling families yielded

TABLE 8

1954 series of hand-pollinations: primary selections

Sl. Origin		per tree per year- edling 1964	(b) Clone 1964
No.		2.73	3.02
1 Tjir I × AVROS 255	2.82	3.14	3.10
2 ,, × Gl 1	2.45	2.32	2:35
3 " × "	1.69	4.07	3.32
4 " × "	2.48	2.36	4.39
5 " × "	1.92	2.16	2.86
6 " × Mil 3/2	1.76	3.22	3.27
7 " × "	3.00		3.09
8 " × "	3-12	2:37	3,33
9 " × "	2.71	2.22	2.71
10 " × HC 28	1.68		2.89
11 " × "	1.74	2.29	2.70
12 Mil 3/2 × "	3.94	5.73	3.50
13 " "	2.72	3.76	3.06
14 ,, ,,	2.14	2:41	3.15
15 " "	1.57	1.76	3.92
16 ,, ,,	2.53	3.53	3.57
	2.47	3.03	
	4.08	4.21	3.20
	2.21	3.23	3.71
co v Cl I	2.08	4-77	3.45
DD 5/60	2.92	3-43	3.06
	2.62	4.03	2.76
22 ", × ", 23 Tjir 1 Control.	1.40	1.55	2.67

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On evaluation it was found that 169 individuals of the seedling families yielded better than the average performance of the control, Tjir 1 seedlings. On the other hand, only 44 out of the 439 new clones recorded such a performance with Tjir 1 budgrafts as control. Out of these, 22 types recorded greater yield than the control, with respect to the seedling family trial, as well as the primary clone trial and are thus common to both. These are now chosen for further tests thus leaving 147 seedling trees and 22 clones for further materials. As discussed above the yield of the clones need not necessarily show a close relationship to that of the mother tree and hence, the need for great caution when selection is mainly based on the yield of the mother trees. This has also been stressed by Sharp (1940).

These preliminary discussions are based mainly on the yield of the first and second years of tapping in the case of the seedling families and mainly on the first year's yield as regards the primary clones. Therefore both are kept under observation, so that their further performances are recorded and revisions and additions in the selections could be done, as and when required.

#### Summary

An outline of work carried out by the Rubber Research Institute of India since 1954 in the selection and improvement of Hevea is presented. Earlier performance of some of the clones developed from selected mother trees has been found to be promising.

Seedling families were established by breeding between selected clones. Some of the families have been found to be superior to the six of the (Table 4) parent types in the first and second years of tapping.

From the trees belonging to the legitimate families new clones have been established.

Some of these exhibit good performance and are promising. The promising types have been chosen for further tests. General methods adopted for the selection of types have been discussed.

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### References

DUKMAN, M. J. 1951 Hevea—Thirty years of research in the Far East, University of Miami Press, Florida.

MANN, C. E. T. 1940 Improvement in the quality of rubber planting material. *Jour.* R. R. I. M. 10, 108—125.

NAIR, V. K. B. 1963 Short history and guide to the Experiment Station of the R. R. I. I. Rubber Board India. (Unmublished)

PLANTERS' BULLETIN 1953 5,29-34 R. R.

Sanderson, A. R. and Sutcliffe, H. 1928 Vegetative characters and yield of *Hevea*. *Jour. R. R. I. M.* 1, 75—90.

SHARP, C. C. T. 1940 Progress of breeding investigations with *Hevea brasiliensis*. *Jour. R. R. I. M.* 10, 34-66.

SHARP, C. C. T. 1951 Progress of breeding investigations with Hevea brasilinesis—II.

Jour. R. R. I. M. 13, 73—99.

WHITBY, G. S. 1919 Variation in Hevea brasiliensis. Annals of Botany 33, 313—321.

# A Note on the Use of Translocated and Contact Herbicides\*

K. C. ANANTH., M. R. SETHURAJ and K. T. JACOB\*\*

#### Introduction

In Malaysia, during the post war years, sodium arsenite was preferred for its general effectiveness against a wide range of weeds and its relative low cost. But it has a serious disadvantage because of its high toxicity to animals. Moreover, rubber trees are also susceptible to arsenite poisoning. So, extensive screening trials to choose a substitute for arsenite have been carried out in Malaysia from a range of weedicides like sodium chlorate, T. C. A., dalapon and aminotriazole and fernaxone.1 In recent years studies were extended to newer chemicals like Paraguat (Gramoxone). 2-6 From a critical analysis of the results obtained, no weedicide was found to give satisfactory results, although dalapon has shown definite promise in the control of grass weeds, when applied alone and in combination with aminotriazole,7,8 DMA (an organic derivative of arsenite) has been suggested as a possible substitute for arsenite.5 Some preliminary trials conducted in Southern India also suggested that no weedicide was capable of giving effective

control of weeds present in the rubber plantations.9 The effect of most of these weedicides, especially of the contact types, is short-lived. In the use of paraquat, it has been suggested that rapid eradication is not essential and that the cost of the chemical can be minimised by using just sufficient quantity to kill the weed over a period of time, instead of using a high rate for rapid killing.10

In order to investigate the possible uses of translocated and contact herbicides, series of experiments with the available range of herbicides were started at the Experiment Station attached to the Rubber Research Institute of India. Studies were undertaken in areas predominantly infested with grass weeds, such as Pennisetum poly-

#### Experiments and Results

A. A trial on the efficacies of tafapon bladex-O (liquid formulation containing 0.24 kg of 3-amino 1, 2, 4-triazole per litre.), and bladex-P (formulation containing

<sup>\*</sup>Contribution from Agronomy Division, Rubber Research Institute of India-

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Mann, C. E. T. 1940 Improvement in the quality of rubber planting material. *Jour. R. R. I. M.*, 10, 108—125.

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Jour. R. R. I. M. 10, 34—66.

SHARP, C. C. T. 1951 Progress of breeding investigations with *Hevea brasilinesis—II. Jour. R. R. I M.* 13, 73—99.

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In order to investigate the possible uses of translocated and contact herbicides, series of experiments with the available range of herbicides were started at the Experiment Station attached to the Rubber Research Institute of India. Studies were undertaken in areas predominantly infested with grass weeds, such as Pennisetum poly-

#### Experiments and Results

A. A trial on the efficacies of tafapon bladex-O (liquid formulation containing 0.24 kg of 3-amino 1, 2, 4-triazole per litre.), and bladex-P (formulation containing

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320 gm of amino triazole (3-amino, 1, 2, 4-triazole) and 480 gm of sodium salt of 2, 2-dichloropropionic acid per kg) was initiated during June 1965. The treatments employed were as follows:—

- A. Tafapon  $-5 \text{ kg/ac} + 2\frac{1}{2} \text{ kg/ac}$
- B. Bladex-O 10 lit/ac +5 lit/ac
- C. Bladex-P  $-1 \text{ kg/ac} + \frac{1}{2} \text{ kg/ac}$
- D. Unweeded control.
- E. Handweeding. once

The design of the experiment was 5×5 Latin square, plot size being 10′×10′. Bladex–O and bladex–P were sprayed on 18-6-'65 and tafapon on 19-6-'65. The plots under hand weeding were clean weeded with spade on 20-6-'65. There was intermittent drizzle and the spraying was carried out during the breaks. Necessary precautions were taken to avoid spray drift

Within four weeks, the inhibitory effect of tafapon on the growth of Pennisetum polystachyon, the predominant grass weed of the experimental area, was evident. Bladex—O and bladex—P, although induced some initial chlorotic symptoms, were not effective in checking the growth of this grass. Plots under hand weeding treatment showed some amount of re-generation of grass and dicot weeds. Gradually the grasses under tafapon treatments dried. However, during September, regeneration of grass weeds and soft weeds was seen. Even after three months, the grasses under tafapon treatment have failed to flower, although these weeds under all other treatments have put out ear heads profusely.

A second half dose application of tafapon, bladex-O and bladex-P was carried out on 28-10-'65. The second spot application of tafapon was very effective compared to bladex-O and bladex-P. Tafapon application resulted in complete drying of the grasses within another six to eight weeks' duration. Regeneration of dicot weeds, mainly Boriria Sp., has occurred in these plots. In the hand weeded plots Pennisetum and other grass weeds have regenerated.

A quantitative assessment of the weed growth was made during January, 1966 by taking the weight of the total weed growth in each plot. The results are presented in Table 1.

The data in the Table 1 revealed the usefulness of tafapon in the grass control. The treatments A and E were significantly superior to the rest of the treatments, but however, there was no significant difference between A and E. Treatment C was significantly better than B and there was no significant difference between treatments C and D and D and B. The plots treated with tafapon showed regeneration of soft weeds which should be considered as an essential attribute for prevention of subsequent establishment of grasses. (Fig. 1)

B. In order to find out the sub-toxic concentration of tafapon to cover crops another trial was conducted. Tafapon at the rate of 1, 2 and 4 kg/ acre was sprayed against grass weeds growing among cover crops on 17-9-1965.

Within four to five weeks, the grasses were dry in plots sprayed at the rate of 4 kg/ac, while no visible damage, even at this concentration, was observed in cover crops (Pueraria). However, phytotoxic symptoms were clearly evident (in cover crops) after a lapse of three months. Lower concentrations, which were not very effective against grasses after four weeks, could suppress the growth of grasses and cover crops.

Thus tafapon, at the concentrations effective against grasses also affected the cover crops adversely.

C. In an effort to study the comparative efficacies of contact herbicides, series of screening trials were conducted at Rubber Research Institute of India with the available range of herbicides: (Gramoxone, PCP emulsion and Sodium chlorate).

The results of the experiments are summarised in Table 2.

### Discussion and Conclusions

From an assessment of the results so far obtained, it is evident that the efficacy of tafapon against grasses is superior to other translocated and contact herbicides used. Despite the quick and effective action of gramoxone, PCP and sodium chlorate, due to lack of persistency, regeneration of grasses and soft weeds would soon occur. Tafapon is highly persistent in plants, and its action is slow and effective, but specific to grasses. Repeated applications are necessary for chemical control but the number of applications required for tafapon would be less than that would be necessary with contact herbicides. The failure of weed control by bladex-O and bladex-P may be due to the use of concentrations which appear inadequate to control Pennisetum, the major grass weed found in our experiment.

Efforts to use tafapon for the selective control of grasses growing among cover crops was not successful since the concentrations used adversely affected the leguminous covers. From this it would appear that tafapon's selective activity is relative rather than absolute. However, it can well be hoped that further studies exploiting its relative selectivity in relation to certain growth phases of grasses and legumes might give encouraging results.

## Acknowledgements

The authors wish to thank the various manufacturing and distributing firms for the free supply of adequate quantities of herbicides. Acknowledgement is also due to Shri G. Subbarayalu, Statistical Officer, Rubber Research Institute of India, for help in the statistical analysis of the data.

#### References

- 1. RRIM. Plant. Bulletin, 1959, 44, 100
- Rep. Rubber Res. Institute. Malaya, (1961), 1962, 22
- 3. Rep. Rubber Res. Institute, Malaya, (1962), 1963, 28
- Rep. Rubber Res. Institute, Malaya, (1963) 1964, 24
- Rep. Rubber Res. Institute, Malaya, (1964), 1965, 21
- Rubber Res. Institute, Ceylon, Ann. Rev., (1962), 1963, 99
- 7. RIEPMA Kzn, P., J. Rubber Res. Institute Malaya., 1962, 17, 130
- 8. J. Rubber Res. Institute Malaya, 1963, 18, 15
- RAMAKRISHNAN, T. S. and RADHA-KRISHNA PILLAI, P. N., Rubber Board Bull, 1963, 7 (1) 20
- JEATER, R. S. L., Weed Res., 1964, 4, 133.

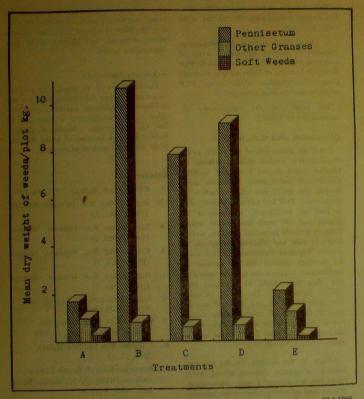


Fig. 1. Mean dry weight of weeds as affected by different treatments. Weighings made as on 20-1-1966.

Mean dry weight of woods as an 20th James 10

Treatment	Mean dry weight	Mean dry weight of weeds in kg/plot Pennisetum Other small grasses	Dicots	Total
. Tafapon Bladex-O Bladex-P Unweeded control Handweeding	1.700 10.720 7.850 9.140 2.100	1.000 0.791 0.570 0.646 1.180	0.305 nil nil 0.150 S.E: L.S.D:	2.604 11.195 8.192 9.657 9.657 3.310 0.682 : 2.101

Conclusion: A

sion: A E C D

TABLE 2

Summary table showing comparative efficacies of herbicid

Remarks	(0)	After 5 days of application After 15 days all the grasses superficial soort of grasses and soft weeds regenerated, were noticed. Leaves of Preemege herbicides used that few plants of Borilas y, have had no effect whatso-Sesamum (wild) and Euga- ever in checking the regeneratem was found to be alive ration.
Observation	(9)	After 5 days of application superprisal scoreh of grasses were noticed. Leaves of the few plants of Borina sp. Seamum (wild) and Enparorum were scorehed but the stem was found to be alive and turgid even at the terminal tender portions.
Plot size	(c)	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Date of imposing treatments	(4)	21-6-'65
Sprayer	(c)	Mist Blower knapsack sprayer
Treatments	(2)	Basal application of gramo- xone 1 pt acer. Later treat- ments superimposed.  a. Sinazine 8 lb/ac b. Cotoran 4 lb/ac c. Atrazine 8 lb/ac d. Prometrine 4 lb/ac e. Tenoran G. Prometrine 4 lb/ac e. Tenoran
Expt.	(1)	2/65

Toble ? (continued)

()	After 15 days all the grasses regenerated. Mimosa and Setbania regenerated quick. If than other soft weeds. Since the regeneration was from the existing plants or grass clumps the presence herbicides have had no effect.		It is possible that Minosa pudica leaves closed due to the air blast su papay chemicals did not contact properly to give any effective kill.
(9)	After 5 days of application scorch of folinge of all vegetation was observed. They were short stubby grass and Penniseum Sp. Pegronia thompsomit leaves were scorched, hairy stems uniffected. Mimosa sp. partially affected. Sorbina sp. partially affected. Bortria is sp. complete leaf scorch ria sp. complete leaf scorch	Not affected.	1. All gensess and general vegetations showed disviped was apparent on the 3rd day feetl.  2. Grass ear heads from illers which were exposed were found killed. When pulled out from the sheath 2-3° of stem was found green and turgid.  3. Minoza leaves showed turgid.  4. Minoza leaves showed turgid.  6. external stimuli. However leaves from the same plant responded to external stimuli. However leaves from the same plant responded to external stimuli. Where no external stimuli where no external circuit when mical injury was visible.
(5)	14'×14' 14'×14' 14'×14' 14'×14'	14'×14'	14′×70′
(4)	21-6-'65		21-6-765
(3)	Mist Blower knapsack		Miss Wer
(2)	a. Gramoxone 1 pt/ac b. Gramoxone+ 1 pt/ac c. Gramoxone+ 1 pt/ac Agral-Cotoran 4 lb/ac d Gramoxone+ Agral-Simazine 8 lb/ac	e. Control	Sodium chlorate 25 lb/ac
1=	9		岩

C	

(1)	(2)	(3)	(4)	(5)	(9)	0
4/65	a. Sodium chlorate b. Sod. chlorate+ Simazine	-op-	21-6-'65	14'×14' 14'×14'	-op-	Regeneration of all types of weeds was evident. Since the regeneration was from the existing plants or grass clumps simazine was not effective.
29/1	Gramoxone † pt/ac 1 pt/ac 1½ pt/ac 1½ pt/ac	sulg glns			1. All grasses and soft weeds in the plots showed leaf scorch.	
	PCP 12% 2 gl/ac Emulsion 3 gl/ac 4 gl/ac	apsack 2 sprayer.	26-6-'65	14'×14' Randomis- ed Repli-	2. The higher concentra- tions appeared to give a rapid kill.	Regeneration of all types of vegetation was evident in a fortnight duration. Greeces
	Sod. chlorate 10 lb/ac 15 lb/ac 20 lb/ac			cated 4 times	3. However, sodium chlo- rate sprayed on to the plants could show leaf scoreh within minutes of spraying.	regenerated from the old clumps vigorously.
Note:-	Tafapon, Simazine, Attacline, Prometrine:	netrine :	M/s Tata F M/s Ciba Pr M/s ICI (In Western In Burman She	M/s Tata Fison (P) Led., Bangalore. M/s Cha Private Led., Bombay. M/s JOT (India) Private Led., Madras. Western India March Go., Bombay. Burmah Shell of India Led., Bombay.	ngulore, yy, Madras, mbay, Sombay,	e antour

# Preliminary Studies on the Use of Pre-emergence Weedicides in Rubber Plantations\*

M. R. SETHURAJ, K. C. ANANTH and K. T. JACOB\*\*

#### Introduction

In rubber plantations, the space between the planting rows is generally sown with leguminous cover crops and the planting rows are kept free of weeds. Control of weeds in the planting rows and in cover crops, is usually done by hand weeding in this country. But the quick regeneration of weeds, especially during the rainy seasons, demands repeated hand weeding. The initial slow growth of cover crops, exposes them to competition from weeds till complete ground coverage by the cover crop is attained, and frequent hand weeding in the cover crops, is certainly laborious. Chemical weed control has the advantage of easiness and quickness of control over hand weeding. However, the cost of the herbicides has to be considered before any recommendation can be made. The present study is therefore of a preliminary nature and only the effectiveness of the herbicides

The techniques of chemical weed control in the planting rows and in the inter-rows

should be obviously different. Weed control in the planting rows, using post or preemergence weedicides, is of a non-selective nature. Contact and translocated weedicides can be used against standing weeds. After the area is clean weeded, persistent types of pre-emergence weedicides can be used to check further growth of weeds, at least for a few months. 1-2 The duration of control depends on the adsorption and leaching in the soil and the decomposition of these herbicides. The duration of persistence in soil reported for triazines and substituted ureas, varies with the soil and climatic factors. 1-4

The control of weeds in cover crops, using herbicides, poses special problems, because of the selectivity warranted. Possibilities of using post-emergence contact weedicides for this purpose seem remote. Recent work using pre-emergence weedicides for selective control of weeds at the initial stages of cover crop establishment have yielded some encouraging results. 5, 6 Selectivity of the soil acting herbicides depends on the differences in the habit of root system and in the

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inherent resistance of the crop and the weeds. Either the selection of a weedicide to which the cover crop might be resistant or the adoption of a method of application which would prevent direct contact of cover crop roots with herbicide solutions at toxic level, would provide the possibility of selective weed control. Efforts to find out premergence weedicides with optimum qualities of persistence and selectivity have not been very successful so far. 6.7 While the triazines and substituted ureas are persistent, they lack selectivity. However neburon has recently been reported to be showing some degree of selectivity. 5.6

In other leguminous crops like Peas, use of simazine for selective control of weeds was made possible by sowing the crop seeds at a depth of 5 cm and postponing the application till the seedlings were 5 to 15 cm high.<sup>8</sup> Seed depth as a factor, influencing the degree of weed control, obtained with simazine, has been discussed by Weiss.<sup>9</sup>

With this background, field trials to study the effective persistence of preemergence weedicides in soil and laboratory investigations on the possibilities of using these herbicides for the selective control of weeds during the initial stages of cover crop establishment, were taken up-

## Experiments and Results

A. Cotoran WP 80 (N'—(3-trifluoromethyl phenyl)—N, N—dimethyl urea) and simazine WP 50 (2—chloro—4, 6—bisethylamino—1, 3, 5—triazine) were chosen, to study their comparative effectiveness. A suitable area was selected in the Experiment Station of the Rubber Research Institute of India, where there was luxuriant growth of Pennisetum polystachyon, (Photoplate I) and a thorough hand weeding was done. The

soil is lateritie with poor depth and recorded a pH of 4.5 to 5.0. A  $2\times5$  experiment was faid out with six replications arranged in randomised block design. Plot size was 3 sq. yards. Five levels;  $0, \frac{1}{2}, 1, 1\frac{1}{2}$  and 2 kg a. i / ha were employed.

Weedicides were sprayed on 27-4-1965 as water suspensions, employing a A. S. and P. W. hand spray pump with a Tee Jet nozzle. The first quantitative assessment of the weed growth was made after three months (27-7-65), when in some of the treated plots, the weed growth was visually as high as 50 per cent of that of the control. Assessment of weed growth was made, taking into account both the number of weeds and percentage of weed cover, using a 1'x1' wooden quadrat frame placed in the plots at three spots at random. This wooden frame had further been divided into four quadrats using twine. The number of weeds, estimated by counting, in each subquadrat was multiplied by 1, 1, 1 or 1 according to the area covered by the spread of weeds in the subquadrat, and the sum total calculated for each plot by adding up the products arrived at, at three spots. From the 'weed growth index' thus obtained, the percentage weed growth was calculated, taking the 'index' in the control plot as cent percent weed growth. This method of assessment was found to be suitable for a stand of heterogenous weed population. Results are presented in Table 1 and Fig. 1. The final assessment of the weedgrowth was made after fifteen weeks (9-8-'65), when the cessation of effective persistence of the weedicides was visually apparent. The method of assessment was by taking the dry weight of the total weeds grown in each plot (Table 2).

Upto a duration of three months, as can be seen from Table 1, cotoran was slightly

superior in its effectiveness at the higher dose compared to that of simazine, while at the lowest dose, simazine was slightly more persistent than cotoran.

The data on the dry weight of the total weed growth in each plot, after fifteen weeks' duration (Table 2) show that there is no significant difference between the efficacies of the two weedicides used. Among the levels of simazine employed, 1 and 2 kg a. i. / ha are found to be significantly better than 1 kg a. i. /ha, as well as control. Generally the linear effect of simazine is found to be significant within the range tried, indicating the increasing persistency of simazine when higher doses are applied. Levels of cotoran at the rate of 11 and 2 kg a. i. / ha were significantly superior to the lowest level and control. The increasing efficiency of cotoran with higher levels, when compared to simazine, is clearly brought out in the data, indicating the significance of linear effect.

Periodical visual observations undertaken at fortnightly intervals also indicated definite effect of these chemicals when compared to untreated plots. Hemidesmus indicus, Sesbania sp. and Curculigo villosa were the weed species which showed some resistance to both the weedicides. In addition to these species, control plots supported Boriria sp. Mimosa sp. and Penniseium polystachyon (photoplate IV). Certain amount of soil wash has occurred by rain during June and July from the treated plots, which were almost free of weeds at that time (Photoplates II and III).

B. A laboratory investigation on the tolerance of Calopogonium mucunoides, against available range of pre-emergence weedicides (simazine, cotoran, atrazine, prometryne and tenoran) was carried out.

Seeds were grown in petridishes filled with sand moistened with water suspensions of the weedicides at different concentrations (10, 100 and 1000 mg/litre of water).

Simazine, cotoran, atrazine and prometryne severely damaged the seedlings after the first leaf stage, while the effect of tenoran was only slight compared to control. Cotoran at higher levels has inhibited the chloroplast development also.

C. A study on the effect of depth of sowing on the phytotoxicity of cover crops to simazine, applied on the soil surface was taken up. Plastic containers with drain holes at the bottom were filled with sieved soil and seeds of Calopogonium mucunoides, Pueraria phaseoloides and Centrosema pubescens were sown at different depths (0, ½ and 1") and simazine at the rate of 2 kg /acre was applied on the soil surface. Pots were watered with equal quantities of water, once in three days.

While the seedlings of Calopogonium and Pueraria were severely damaged in all treatments, the degree of phytotoxicity in Centrosema seedlings, appeared to be the function of depth of sowing. With deeper sowing the degree of injury was reduced.

D. In a current work on the persistence of simazine, atrazine, cotoran and diuron in soil, an interesting observation on the effect of seed depth was accidentally obtained. The area where the experiment is laid out, had previously a good establishment of cover crops. The weedicides at five levels  $(0, \frac{1}{2}, 1, 2 \text{ and } 4 \text{ kg/acre})$  were sprayed on the soil surface on 8-11-1965.

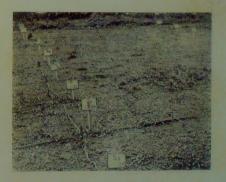
After three weeks it was observed that some cover crop seedlings (Pueraria and Centrosema) had emerged in many of the treated and control plots.

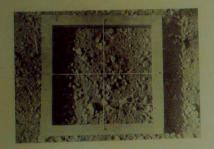


Photoplate I

Grass infestation—a view

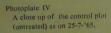






Photoplate III

A close up of the treated plot
(at 2 kg a. i/ha of herbicide) as





Cover crop seeds were traced at a depth of 1" and more. Even after three months from the date of imposition of treatments no toxic symptom appeared in the cover crops which have established at random in many of the treated and control plots. However, no cover crop growth could be noticed in plots with the highest level of all the four weedicides. In the plots which received the weedicides at the rate of 2 kg per acre the cover crop establishment was less, compared to the lower levels and control. The total precipitation recorded between the date of spraying and 17-12-65 was 184.15 mm and since then, dry weather prevailed.

### Discussion and Conclusions

Efficacy of pre-emergence weedicides depends to a large extent, on the duration of persistence in soil. Persistence of any pre-emergent weedicide varies widely with different climatic and soil factors. In spite of the variations reported in the behaviour in soils under different conditions, certain common aspects on the nature of persistence and the factors influencing it can nevertheless be drawn from such reports. Factors such as temperature, organic and clay content of soils, nature of soil colloids, soil moisture and pH, formulation of the herbicide, and the nature of cation on the exchange complex, etc., have a direct influence and factors such as physical properties of the soil and climate have an indirect influence on the presistence of herbicides in soil. 10 In areas with a high rate of rainfall, downward percolation of the surface applied herbicides would certainly be high. Under such conditions, the solubility of the herbicides can act as a factor influencing the duration of persistence. The preemergence weedicides used in the present

study-simazine and cotoran-at the highest doses applied, would be completely dissolved in 2" and 0.1" of rain respectively, considering their solubility in water. With further rain, a proportionate downward movement can theoretically be expected if solubility alone as a factor is considered. Between the time of application and the time of first quantitative assessment, a rainfall of 977.39 mm was recorded. In spite of this, the persistence of both simazine and cotoran in the top soil was not lost. This shows that the downward movement of simazine and cotoran was surprisingly much slower than would be expected from theoretical considerations on the basis of solubility. This points to the fact that other important factors, listed above, are operating to hold back these herbicides in the top layer of soil. The soil where the experiment was conducted is lateritic, with moderately high organic content. The influence of the physical properties of soil on the persistence of herbicides is indirect, by affecting the amount of moisture present at the soil surface and its percolation through the soil profile.10 The adsorption of herbicides in any soil largely depends on its organic and clay content. The increased amounts of organic matter in a soil were reported to be associated with increased adsorption of s-triazines like simazine, atrazine, propazine, prometon and prometryne.12 Investigations on the nature of presistence of substituted ureas have brought out that the only soil property correlated with the adsorptive power was organic matter content.15

In the present study, it can be noted that although the solubility of cotoran is eighteen times that of simazine, there was no significant difference in the duration of effective persistence between these two herbicides. This is an indirect indication that soil factors

TABLE 1

Effects of Cotoran and Simazine on Weed growth (3 months after application)

Rate of application	Percentage weed grov Simazine	wth compared to control Cotoran	
	47.02	55.69	
½ Kg a. i./ha		34.47	
1 Kg a. i./ha	38.40	29.88	
1½ Kg a.i./ha	27.77	14.26	
2 Kg a. i./ha	19.00	100.00	
Control	100.00	100.00	

TABLE 2

Dry weight of weeds/plot (gms) along with percentage over control (Final assessment)

Herbicides	Simazi	ne	Cotora	n
Level	Mean Dry weight in gms/plot	Percentage over control	Mean Dry weight in gms/ plot	Percentage over control
Kg a. i/ha	Average and the second	79.0	174.1	64.2
20 12 11 11	214.3		125.7	46.3
	110.6	40.8		28.8
11	132.6	48.9	78.0	
1½	86.6	31.9	49.7	18.3
		grams/plot = 10	00%	
Control		neral Mean = 13		
	THE PERSON NAMED IN	S. E. = 28		

L. S. D. = 82.4

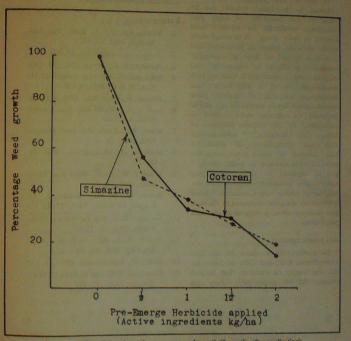


Figure 1. Eeffect of simazine and cotoran on weed growth (3 months after application)

were more important in determining their behaviour in soil.

In spite of some suggestive indications obtained, no conclusive remarks can be made on the possibility of using preemergence weedicides for selective weed control in cover crops. A thorough study on the duration, nature of persistence and movement in soil of these pre-emergence weedicides as affected by various soil and climatic factors is necessary to examine such possibilities. As it is well known that biochemical tolerance of certain plant species against certain weedicides can well be exploited for selective weed control as exemplified by the inherent tolerance of Maize against simazine,14, 15 investigations with new formulations of weedicides like neburon, to which cover crops are reported to be resistant to some extent,5.6 can be expected to yield encouraging results. The indication obtained from our laboratory studies that Centrosema is more resistant to simazine compared to Pueraria and Calopogonium, is suggestive of such possibilities.

## Acknowledgments

The authors wish to thank Messrs. Tata Fison Private Ltd., and Ciba of India for the free supply of simazine WP 50 and cotoran WP 80 respectively. They also

wish to acknowledge the assistance rendered by Shri G. Subbarayalu, Statistical Officer. Rubber Research Institute of India, in the statistical analysis of data.

#### References

- 1. RIEPMA Kzn, P., J. Rubb. Res. Inst. Malaya, 1962, 17, 191
- 2. \_\_\_\_\_, Ibid, 1962, 17, 204.
- 3. Hanson, N. S., Weeds, 1962, 10, 192
- 4. HOCOMBE, S. D. AND GREEN, D. H., P. A. N. S. C, 1962, 9, 128
- 5. RIEPMA, P., Weed Res., 1965, 5, (1), 52
- 6. ——, World Rev. Pest. Control 1965, 4, (2), 64
- Anon, Rep. Rubb. Res. Inst. Malaya, 1962, 1963, 28
- 8. Marlow, H., Dt. Landwist., 1964, 15, (5), 233
- 9. Weiss, P. W., Aust. Weed Res. Newsletter, 1062, (1), 19.
- BAIDY, G. W. AND WHITE, J. L., J. agric. Fd chem., 1964, 12 (4), 324
- Talbert, R. E. and Fletchall, O.H., Weeds, 1965, 13, (1), 46
- 12. HANCE, R. J., REP. A. R. C. Weed Res. Org. 1960—64, 1965, 20
- 13. ROTH, W., Experimentia, 1958, 14, 137
- 14. Hamilton, R.H. and Moreland, D.E., Science, 1962, 135, 373

# NEWS AND NOTES

## All Kerala Rubber Growers' Seminar

A three day All Kerala Rubber Growers' Seminar was organised on the 18th, 19th and 20th February, 1966, at Palai, by the Meenachil Taluk Rubber Planters' Cooperative Society with the active co-operation of the Rubber Board.

About one hundred delegates representing all parts of the Kerala State and the Kanyakumari district of the Madras State attended the seminar. The seminar met in five sessions and many important topics were discussed at length and suitable recommendations made. Cultural programmes were also arranged on all the three days of the seminar.

#### Inauguration

The seminar was inaugurated by Dr. K. T. Jacob, Director of Research and Rubber Production Commissioner, Rubber Board, who was the Director of the seminar, on the morning of the 18th February, 1966. In his inaugural speech Dr. Jacob reviewed the progress of rubber research in India and compared it with the progress achieved in Malaysia. Referring to the conditions in Malaysia, which he had opportunity to study at first hand during his recent visit to that country, Dr. Jacob stated that the research programmes initiated in India were proceeding on the right lines. He said that though the average yield of rubber in India was low when compared with Malaysia, we could improve our production and even catch up with other countries within a few years by adopting intensive methods of cultivation



Dr. K. T. Jacob inaugurating the seminar

and scientific techniques. He complimented the Meenachil Taluk Rubber Planters' Co-operative Society for organising the seminar and expressed the hope that the seminar would make useful suggestions and recommendations with a view to improving the rubber plantation industry in the country.

Shri Thomas Joseph Kottukappally, Chairman, Palai Municipal Council and Chairman of the Seminar Committee, presided over the inaugural meeting. Shri K. N. G. Menon, Field Officer, Rubber Board Sub-office, Palai and Secretary of the Seminar Committee, welcomed the gathering and Shri P. J. Thomas, Secretary, Meenachil Taluk Rubber Planters' Co-operative Society, proposed a vote of thanks.

## First Session

The first session of the seminar held in the afternoon of the 18th February, was presided over by Shri A. K. Rajapadmanabhan, Development Officer, Rubber Board, Shri P. Mukundan Menon, Officer on Special Duty in the Rubber Board, presented a paper on "Preparation of Land for Rubber Cultivation." Shri Menon dealt with the importance of soil conservation, adhering to the recommendations regarding number of plants in an acre, raising of cover crops and avoiding intercultivation and intercropping as far as possible, in rubber cultivation.

Many delegates participated in the discussions that followed and everybody agreed that intercultivation and intercorpping in rubber estates were detrimental to the growth and yield of rubber plants and that the practice should be discouraged.

## Second Session

The second session of the seminar was held in the forenoon of the 19th February under the Chairmanship of Shri K. M. Joseph, Deputy Rubber Production Com-missioner, Rubber Board. A paper on the "Determination of Suitability of Planting Materials " was read by Shri Chacko A. Kallivayalil, a leading and experienced planter. Shri Chacko was of opinion that there was no justification in the present circumstances for maintaining any differentiation between big and small planters in the matter of recommending the use of planting materials. It had been proved beyond doubt that buddings were far superior to cional seedlings in yield and hence the future policy should be to encourage the planting of budded plants especially by small growers who have come to occupy an important position in the rubber plantation

industry. Shri Chacko also stated that efficient arrangements should be made for distribution of high yielding planting materials in sufficient quantities.

There was lively discussion on the points raised by Shri Chacko in his paper. The following were the main recom mendations made by the seminar. (1) No distinction need be maintained between large and small rubber growers while considering the suitability of planting materials. (2) Small rubber growers should be encouraged to plant budded plants in larger numbers instead of clonal seedlings, according to suitability of land and other factors. (3) Clonal seedlings need not be eliminated from the recommendations (4) The Rubber Board should make efficient arrangements for the supply of sufficient quantities of budded plants.

#### Third Session

Shri K.A. Paul, Superintendent, Mooply Estate, presided over the third session in which Shri K. V. George, Deputy Director (Pathology), Rubber Research Institute of India, presented a paper entitled "A Rational Approach for Plant Protection in Rubber Estates." Shri George explained the importance of plant protection in increasing the production and yield per acre of rubber in the country and he discussed in detail the various diseases affecting rubber in India and their treatments.

The seminar recommended that spraying of copper fungicides using Micron sprayers against abnormal leaf-fall disease should be encouraged by making available to rubber growers necessary information, equipment and facilities on a larger scale.

### Fourth Session

Shri K. C. Sankaranarayanan, Managing Director, The Plantation Corporation of Kerala Ltd., was the chairman of the fourth session. Prof. V. J. Mathai, Professor of Economics, St. Thomas College, Palai, presented a paper on the "Problems Facing Small Rubber Growers." Prof. Mathai said that the main problems facing small rubber growers in Kerala were the very low acreage of small holdings, scarcity of land for development, scarcity of capital for investment, lack of technical know-how, lack of organisation and co-operation among growers, indebtedness and unhealthy influence of outdated beliefs and traditions. Prof. Mathai suggested that small rubber growers should

organise themselves under co-operative institutions to solve their problems and to improve their position.

Shri Mathew Zacharias, Deputy Commissioner, Sales Tax and Agricultural Income Tax, spoke on the marketing problems in relation to rubber. He urged that co-operative rubber marketing societies should be encouraged so as to eliminate illegal transactions in rubber which was causing loss of revenue to the State and income to the growers.

The discussions that ensued were very lively, lengthy and interesting and the delegates seemed to be very much interested in the subjects as they touched some of the basic problems of small rubber growers.



A view of the seminar

The main recomendations made by the fourth session of the seminar were the following (1) A "floor acreage" should be fixed by statute for rubber estates so as to discourage uneconomic holdings. (2) Though inter-cultivation and inter-cropping are harmful to rubber plants, considering the poor economic position of most of the small holders, the rules regarding the number of other trees that could be allowed to be retained in replanted areas should be liberalised, treating it as a human problem.

(3) Considering the increased cost of replanting, the replanting subsidy should be raised to Rs. 1500 per acre. (4) The scheme started by the Rubber Board for training rubber tappers should be enlarged and extended to meet the increasing demand for expert tappers. (5) The extension, advisory and publicity activities of the Rubber Board should be further developed so as to educate small rubber growers in improved scientific methods of cultivation and processing. (6) A large rubber manufacturing unit should be established in the co-operative sector in Kerala so that rubber growers need not depend on the whims and fancies of private manufacturers and dealers to get good price for their produce. (7) The small rubber growers should be given more effective representation on the Rubber Board. (8) Rubber growers should submit accurate and detailed statistics regarding acreage, production etc. to the Rubber Board as without such statistics it would not be possible for the Board to draw up development programmes for the industry.

#### Fifth Session

In the fifth and final session of the seminar presided over by Shri K. P. Phalgunan, Deputy Registrar of Co-operative Societies, Rubber Board, a paper



Shri P. S. Habesh Mohamed delivering the valedictory address. Rt. Rev. Dr. Sebastian Vayalil, Bishop of Palai, is on his right.

entitled "Co-operative Movement and Small Growers" was presented by Shri J. Y. Joseph, President, Kanjirappally Rubber Marketing Society. There was general discussion on the role that co-operative societies should play in the small holding sector of the rubber plantation industry and the ways and means of improving the working of the societies. The seminar recommended that unlicensed dealing in rubber should be completely eliminated and that the Market Intelligence department of the Board should be further strengthened for this purpose. Another recommendation was that loan facilities should be arranged for upkeep and maintenance of areas under tapping as in the case of immature areas. It was also recommended that a federation of rubber marketing co-operative societies should be organised at an early date.

#### Conclusion

The All Kerala Rubber Growers' Seminar concluded with a public meeting in the evening of the 20th February 1966. Rt. Rev. Dr. Sebastian Vayalil, Bishop of Palai, presided. Delivering the valedictory address Shri P. S. Habeeb Mohamed, Chairman, Rubber Board, said that seminars, as the one arranged at Palai, were very useful and essential for disseminating new ideas and techniques among the rubber growers. He stated that the long-term prospects of the tubber plantation industry depended on reducing the cost of production of natural rubber. The Chairman repudiated the suggestion that the Rubber Board was work-

ing against the interests of the rubber growers in regard to price of rubber and said that the interests of the Board and the growers were the same and there was no need for any apprehension that the Board would do anything against their interests. He explained the long-term repercussions of the recent increase in the price of natural rubber on the plantation industry.

Dr. K. T. Jacob read and presented the recommendations made by the three day seminar. Dr. V. R. Narayanan Nair and Shri M. M. Jacob addressed the meeting. Shri Thomas Joseph Kottukappally welcomed the gathering and Shri K. N. G. Menon proposed a vote of thanks.

### Ninth Indian Standards Convention

The Indian Standards Institution has been holding annual conventions in various important industrial centres in the country with a view to creating standards and quality consciousness among the public and for furthering the cause of the standards movement. Such conventions have proved to be a useful forum for exchange of ideas and for discussions among industrialists, manufacturers, agriculturists, technologists, scientists, consumers and others connected with production, distribution and consumption of industrial goods and agricultural produce.

The ninth such convention was held at the Visveswara Industrial Trade Centre, Bangalore, from the 12th to the 19th December, 1965. Over a thousand delegates representing industrial and agricultural undertakings in the private and public sectors and scientific institutions participated in the convention. The Rubber

Board was represented at the convention by Shri A. K. Rajapadmanabhan, Development Officer, Shri K. V. George, Deputy Director (Pathology) and Shri V. K. G. Nair, Librarian.

The convention was formally inaugurated by Shri S. Nijalingappa, Chief Minister, Mysore State, on the 13th December. Shri T. N. Singh, Union Minister for Industry, presided over the function and Shri Jehangir J. Ghandi, Vice-president, ISI, gave a lecture on 'Standardisation—Some Problems and Tasks.'

Nine technical sessions were held. In the fourth technical session dealing with 'Implementation of Agricultural and Food Standards,' 25 papers were presented and discussed. The question of fixing proper standards for natural rubber was also discussed while the session was considering the subject of grading.



Shri S. Nijalingappa, Chief Minister of Mysore, inaugurating the convention-



# Rubber Growers' Seminar at Arumana

Outside the Kerala State, rubber is grown on a large seale in the Kanyakumari district in the Madras State where climatic conditions are most suitable for rubber cultivation. More than 16,000 acres are under rubber in that district. There are over 900 estates there, out of which about 850 are small holdings.

The small rubber growers in the Kanyakumari district have organised a rubber marketing society with headquarters at Arumana. It is estimated that about 50 per cent of the small rubber growers have become members of the society. For the benefit of the small rubber growers of the district, a seminar was organised on the 19th December, 1965, at the Government Senior Basic School, Arumana, under the joint auspices of the Kanyakumari District Rubber Growers' Co-operative Rubber Marketing Society and the Rubber Board.

The seminar was inaugurated by Shri G. Daniel, Vice-president, Kanyakumari District Co-operative Bank. Shri Muhamed Abdul Hafeez, Joint Registrar of Co-operative Societies, presided and Shri K. M. Bhoothalingam Pillai, President of the Society, welcomed the gathering.

Discussion classes on different aspects of rubber cultivation were conducted from 10 AM to 5 PM. Sarvashri A. K. Raja-padmanabhan, Development Officer, C. M. George and P. N. Radhakrishna Pillai, Senior Research Assistants, K. P. Phalgunan, Dy. Registrar of Co-operative Societies and P. K. Narayanan, Information Officer, led the discussions.

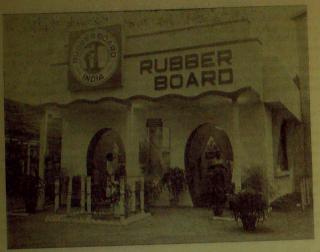
The seminar concluded with a public meeting in the evening which was inaugurated by Shri P. S. Habeeb Mohamed, Chairman, Rubber Board. Shri Mohamed Abdul Hafeez presided and Sarvashri C. John Wilson, Panchayat Union Commissioner and J. V. Abraham, Vice-president, Arumana Panchayat, spoke on the occasion. Shri K. V. Thampi, President, Arumana Panchayat, proposed a vote of thanks. Over 250 rubber growers part icipated in the seminar. Earlier Shri T. Sundararaj, Secretary of the Society, read and presented a memorandum detailing the needs of the local rubber growers and the Society.

#### Kottayam Municipal Exhibition

The Board participated in the National, Agricultural and Industrial Exhibition organised by the Kottayam Municipality at Kottayam from the 17th December, 1965 to the 24th January, 1966. Other participants in the exhibition included the Coir Board, Kerala Agriculture Department, Kottayam Medical College, FACT, Kerala

Electricity Board, Arecanut Committee, Indian Navy, Southern Railways and ALIND. The exhibition was inaugurated by Shri R. Prasad, Adviser to the Governor of Kerala, on the 17th December, 1965.

At the Board's Stall at the exhibition, photographs, charts and models dealing with the various development schemes of the



A view of the Board's stall

Board were exhibited so as to give an idea January, 1966, with a public meeting president development activities of the Board. ed over by Shri S. Gopalan, District The exhibition concluded on the 24th Collector, Kottayam.

### IRMRA Technical Seminar and Exhibition

The Second Technical Seminar organised by the Indian Rubber Manufacturers Research Association was held at Bata Club, Batanagar, Calcutta, on the 9th and 10th February, 1966.

In the absence of Dr. S. Husain Zaheer, Director General, Council of Scientific and Industrial Research and President, IRMRA, Dr. D. Banerjee, Vice-president, IRMRA,

inaugurated the seminar on the 9th February The seminar was attended by a large number of rubber manufacturers, technologists and scientists. Mr. J. Vyoral, Managing Director, Bata Shoe Co. (P) Ltd., welcomed the guests and the delegates.

Dr. D. Banerjee gave a lecture on "Indian Rubber Industry Looking Ahead." Some of the distinguished guests made short

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At the inauguration of the seminar. From left to right: Dr. D. Banerjee, Shri Lalit Mohan Jamnadas, Dr. S. L. Kapur, Shri Vyoral, Shri J. N. Bek and Dr. V. B. Chippalkatti.

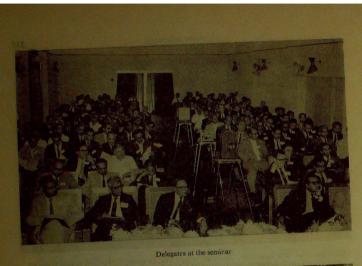
speeches wishing the seminar success. The inaugural session concluded with a vote of thanks to the chair by Shri L. M. Jamnadas, Secretary of the IRMRA.

The seminar was divided into four sessions, viz, (1) raw materials for the Indian rubber industry, consisting of (a) polymers-scope of development of natural and synthetic rubbers and (b) rubber chemicals, (2) man-made fibres for the rubber industry, (3) machinery for Indian rubber industry, and (4) research testing and training programme for the Indian rubber industry.

In all, 28 papers were presented at the seminar out of which eight were by foreign delegates. About 20 papers were presented in the first session thus giving a prominent place for the raw materials for the Indian rubber industry.

Dr. A. Seetharamiah, Industrial Adviser (Chemicals), Directorate General of Technical Development, Government of India, was the chairman of the first session, Dr. V. B. Chippalkatti, Director, Shri Ram Institute for Industrial Research, Delhi, that of the second and Mr. J. N. Bek, General Production Manager, Bata Shoe Co. (P) Ltd., that of the third and fourth sessions.

Aimost all aspects of the Indian rubber industry were exhaustively discussed at the seminar. The utilisation of indigenously available raw materials in polymer blends, machinery etc. with a view to saving valuable foreign exchange was emphasised. At the same time it was stressed that necessary precautions were to be taken to see that the quality of the product conformed to the specific standards. The papers presented at the seminar were instructive and thought-provoking.





Shri P. S. Habeeb Mohamed inaugurating the exhibition

Representing the Rubber Research Institute of India, Dr. N. H. Sivaramakrishnan, Deputy Director, Chemistry/Rubber Technology, participated in the seminar and presented a paper on "Preliminary Observations on Oil Extension of Natural Rubber Using Different Emulsifier System."

The IRMRA had organised an exhibition of rubber products and allied materials at Shyam Park to synchronise with the Technical Seminar. Shri P.S. Habeeb Mohamed, Chairman, Rubber Board, inaugurated the exhibition in the afternoon of the 12th

February, 1966. Dr. D. Banerjee delivered the welcome speech and Shri D. Bose, Convener of the Exhibition Committee, proposed a vote of thanks.

There were 29 stalls in the exhibition. The Rubber Board participated in the exhibition and put up an attractive stall wherein photographs, charts and statistics highlighting its development activities were displayed.

The exhibition came to a close on the 20th February, 1966.



Inauguration of the exhibition-another view

### Dr. K. T. Jacob Visits Malaysia

Dr. K. T. Jocob, Director of Research and Rubber Production Commissioner, Rubber Board, paid an official visit to Malaysia and Singapore during January-February 1966. The purpose of the visit was to study at first hand the working of the Rubber Research Institute of Malaya and its research programmes, the possibilities of getting high vielding planting materials from Malaysia, the working of the Small Holders' Advisory Service of the RRIM and the possibilities of developing and fostering better understanding and co-operation between the Rubber Research Institutes of Malaya and India. Dr. Jacob left India for Malaysia on 26th January 1966.

While in Malaysia, Dr. Jacob visited the

Rubber Research Institute of Malaya in Kuala Lumpur, the Experiment Station in Sungi Buloh, the Prang Besar Estates, and the Chemara Research Station. He also visited a number of large rubber estates and factories in Malaysia and Singapore.

Dr. K. T. Jacob held thorough and detailed discussions with the Director, departmental heads and other research officers of the RRIM, on the various aspects of the rubber plantation industry in Malaysia and the progress of rubber research. He had also discussions with estate and factory owners and others connected with the rubber industry.

Dr. Jacob returned to India on the 12th February, 1966.

### Shri T. Nambi Nair

Shri T. Nambi Nair retired from the post of Development Officer of the Board on the 30th December, 1965, after a meritorious service of two years. Shri Nambi Nair joined the service of the Board in December, 1963.

Shri Nair's official career began in 1927 when he entered the service of the Madras Government in the Labour Department in that year. He continued in that post till 1934 when he was appointed in the Revenue Department in the Madras Secretariat. In 1947, he was promoted as Assistant Secretary in the same department. Shri Nair served as Secretary of the Madras Sales Tax Appellate Tribunal from 1952. When the Kerala State was formed in 1956, Shri Nambi Nair's services were transferred to that State

and till 1961 he was Deputy Secretary in the Revenue Department in the Kerala Secretariat. He served as Joint Secretary



Shri T. Nambi Nair

in the Public Works Department from 1961 to 1963. Later he was appointed as Special Officer for Land Reforms till December, 1963, when he joined the Rubber Board as Development Officer.

As Development Officer Shri Nambi Nair strived hard for the successful implementation of the various development schemes of the Board including the Replanting Subsidy Scheme and the Newplanting Loan Scheme,

### Shri C. R. Subramonian

Shri C. R. Subramonian, who has been Finance and Accounts Officer in the Rubber Board, retired on the 17th February, 1966, after serving the Board for three years.

Shri Subramonian, who had considerable experience in matters pertaining to Finance

and Accounts, served the Board at a time when there was all round development and expansion in its activities and he succeeded in reorganising the Accounts Department of the Board with a view to making it function efficiently in the new set up.



Shri C. R. Subramonian

Shri Subramonian's official career began in 1926 when he was appointed as auditor in the office of the Accountant General, Madras. He continued in that post up to May, 1942. In that year he was deputed to the office of the Controller of Supply Accounts, New Delhi, where shortly afterwards he was promoted as Superintendent. Shri Subramonian was transferred to Bombay in the same year. After a few years' service, he was promoted as Assistant Accounts Officer. In May 1952, he was deputed to the Coffee Board, Bangalore, as Accounts Officer. Shri Subramonian retired from Government Service in June, 1961, but continued in the Coffee Board till June, 1962. He joined the Rubber Board as Finance and Accounts Officer on the 18th February, 1963.

### Small Growers' Training Centre

The best way in which the modernisation of the rubber plantation industry in India can be achieved and increased yields obtained is by training the smallholders of rubber

in improved and up to date methods of cultivation, processing etc. At present as per published statistics the area under rubber in the Indian Union is about 3,83,000 acres out of which about 2,37,500 acres, comprising of nearly 71,226 units, are owned by small holders. These persons have normally very little knowledge of scientific plantation methods. Knowledge on improved cultural and plant protection methods and modern processing techniques are the basic requisites of a planter for obtaining better yield and producing high grade rubber. This means that the small grower should be aware of all modern plantation techniques. With this object in view, the Board at its 51st meeting held on 16-10-1965 decided to start a Small Growers' Training School at

the R. R. I. I from 1966.

As per the scheme, four training courses, are envisaged in an year, each of eight weeks duration. The period of the courses will be April to May, July to August, October to November and January to February. The number of candidates admitted to each course will be limited to 15 in the first instance. If facilities are available, more candidates will be admitted in due course. The course is essentially intended for owners of small holdings or their sons, dependants or nominees.

### Loans to Small Growers of Rubber from the Pool Fund

The Rubber Board has now approved a new scheme to assist registered small growers to extend their plantation by bringing additional land under rubber cultivation to a minimum of 5 acres and a maximum of 50 acres and also to assist in maintaining their immature areas. This new scheme will be implemented from 1966 onwards. The old schemes i.e., the Newplanting Loan Scheme and Upkeep Loan Scheme will cease to function hereafter. But the permits and applications pending action, under these two schemes, shall continue to be operated as per the rules laid down therein.

### Salient features

The salient features of the new scheme are given below:

- (1) The new scheme combines the existing Newplanting and Upkeep Loan Schemes of the Board.
- (2) Loan assistance is made available to all "Small Growers," i. e., planters who own rubber area upto and below 50 acres.

- (3) For newplanters, under this scheme, the loan payable shall be Rs. 1,400/- per acre against a minimum security of Rs. 1,800/- per acre. Loan is payable in seven yearly instalments. The first and second year instalments shall be Rs. 500/- and Rs. 250/- per acre respectively and the subsequent five instalments at the rate of Rs. 130/- per acre. Loan is granted to raise the existing small holdings to a minimum area of 5 acres, within a radius of five miles, and above that and upto 50 acres, which may situate even in other districts or State.
- (4) For maintenance, under this scheme, the maximum loan payable is Rs. 900/- per acre against a security worth Rs. 1,000/-. The first instalment begins from the second year of planting. First instalment shall be Rs. 250/- per acre and subsequent instalments at the rate of Rs. 130/- per acre. Maintenance loan will be granted from the year in which they apply till the end of the 7th year of planting.
  - (5) Minimum eligible area, under this scheme, shall be one acre.

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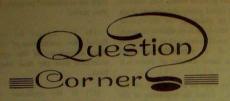
- (6) The loan granted under this scheme is repayable in equal yearly instalments from the 10th year of planting. In the case of newplantings the loan is repayable in seven equal, yearly, instalments and in the case of maintenance, it is repayable in equal amounts in the same number of years as it was paid.
- (7) The loan shall be interest-free for the first nine years. From the beginning of the 10th year interest will be charged at the rate of 5% per annum and it is recovered along with the loan instalments.
- (8) Defaulters will be charged a penal interest of  $2\frac{1}{2}\%$  in addition to the normal interest chargeable.
- (9) The area newplanted or maintained under this scheme shall be the first security. If this is found inadequate, additional securities shall be called for.
- (10) If a small grower who has newplanted rubber with loan assistance under this scheme plants or acquires more rubber area in any year and if by that his total rubber area exceeds 50 acres, his permit is liable to be cancelled and amount paid till then, will be repayable in equal instalments, in the same number of years as it was paid, together with 5% interest.
- (11) The applicant should have clear title to the land in respect of which the loan is applied for. Lands under Kuthakapattom' or 'Puramboke' will not be eligible for the loan assistance.
- (12) Loans will be granted for areas which are at or below an elevation of 1,500 ft. M. S. L.
- (13) The land newplanted with rubber or maintained with a loan, under this scheme,

shall be maintained properly throughout the loan period.

- (14) The lawyers' fee, incurred by the Board, for verification of title deeds and other documents of the applicant shall be recovered fron the first instalment of the loan.
- (15) If the applicant withdraws his application or the application is found defective and not acceptable to the Board, after legal scrutiny by the Board's lawyers, the lawyer's fee incurred by the Board, shall be recovered from the applicant. The applicant is bound to remit the amount within 30 days of receipt of the notice from the Board.
- (16) Rubber areas, which are at present getting any financial aid from the Rubber Board, will not be eligible for loan assistance under this scheme. Applications submitted already for newplanting and maintenance loans in or prior to 1965, either granted or rejected by the Board, may not be eligible for loan under the new scheme.

### Additional Assistance

- (1) In the case of "small-holders" (those whose total rubber area does not exceed 15 acres) for newplanting under this scheme the cost of planting materials, if supplied by the Board, or through co-operative societies, may be reimbursed. If seeds have been used, the cost thereof shall be calculated at the rate of 2 seeds prit.
- (2) Manure at concessional rate shall be supplied to newplantings under this scheme done by smallholders.



Question :

A green shrubby plant which grows luxuriously, has come to stay as a great menace in rubber plantations. The remedy to get rid of this weed may be suggested.

Answer .

The weed referred to can be easily spotted out as Eupatorium oderatum. This weed should be eradicated at the initial stage itself without which the growth of the rubber trees is found to suffer very much. This is a dicot weed and can be killed by the use of contact or hormone types of chemicals. They are:—

- 1. Contact weed killers:—
  Gramoxone, PCP emulsion, Sodium Chlorate
- Selective hormonal type:—
   Dicots: Fernoxone, (I. C. I; 2, 4-D); Bladex H (Burmah-Shell;
   2, 4, 5-T); Bladex C (Burmah-Shell; 2, 4-D)

Any one of these chemicals if judiciously used will effectively kill the Eupatorium. In rubber, weed control to a great extent is brought about by the establishment of suitable cover crops. Therefore, continuous and large scale operation of weed control, either by human labour or weedicide chemicals cannot be considered economical. While applying weedicide the spray drift should be avoided to prevent any possible damage to young rubber plants. Whatever may be the method of initial control subsequent and economical weed control is possible only by the establishment of suitable creeping covers.

Question

Does scorching of leaftips of rubber plants indicate magnesium deficiency? If magnesium is used, it is said that the quantity of fertilizer to be applied can be reduced. If so, why not apply dolomite which is cheap?

Answer:

Deficiency of magnesium is frequently noticed in rubber plantations especially in replantings. This deficiency can be corrected by adding 10 kilograms of commercial magnesium sulphate to every 100 kilograms

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of rubber mixture at the time of application. The marginal scorch of leaftips may be due to potash or calcium deficiencies. The characteristic symptom of magnesium deficiency is yellowing of the laminae between the veins, the veins however remaining green.

Dolomitic limestone is a good corrective for magnesium deficiency (in place of magnesium sulphate), the dozage being 100 kg/acre. The dolomitic limestone should be applied as a basal application and it may be sufficient if this is applied once in 3 or 4 years to correct any possible deficiency of magnesium.

Question:

Fish guano is known to be a good organic manure. Is it advantageous to mix it with rubber mixture and apply? Or, is it advisable to apply fish guano alone? What is the nutrient analysis of fish guano?

Answer:

As far as is known fish guano is prepared out of Sardine, Mackerel etc. After boiling and pressing the fish in hydraulic or hand presses to remove the entire oil content or water etc, the residue is dried on mats or cement barbeques.

A good quality fish guano will be of light yellow colour and should not contain more than 5% sand. This quality analyses 7-8% nitrogen and 8-9% phosphoric acid. Besides, this manure contains about 60% organic matter. As such we have no experimental results to conclude that fish guano can fully or partially replace the recommended inorganic fertilizer mixture. The purity of fish guano and the economics are debatable points and hence one has to come to any conclusion only after considerable trials with different materials.

Ouestion:

It is stated that it would be economical to purchase straight fertilizers and then mix them. But will any harmful chemical reactions take place while mixing nitrogenous fertilizers and muriate of potash?

Answer:

Purchasing of various ingredients in straight forms to compound NPK mixture at the estate or holding would be cheaper than purchasing mixed fertilizers. Ammonium sulphate and muriate of potash can be mixed together and these two are chemically compatible. Therefore, such mixing cannot do any harm. Sometimes when ammonium sulphate and rock phosphate are mixed together, ammonia may be produced. The nitrogen loss due to this mixing is only negligible.

Question:

What are the manurial contents of smoke house furnice ash (burned repeatedly) in forms of potash, nitrogen, phosphoric acid and other trace elements? Is it good for manuring rubber trees?.

Answer:

The manurial contents of smoke house furnace ash depend mainly on the type of fuel used in the furnace as there will be wide variations in the

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content of minerals among the various kinds of fuel woods. It is reported that wood ashes may contain from 3 to 25 percent of potash depending upon the type of wood used. Ashes resulting from the burning of twigs and small branches are richer in potassium than those secured from trunk wood. Soft wood ashes contain less potassium than hard wood ashes.

The composition of the ash obtained from old rubber trees is given below.

Potash as K<sub>2</sub>O — 15. 60 per cent Phosphoric acid as P<sub>2</sub>O<sub>5</sub> — 3. 80 per cent Calcium as CaO — 34. 40 per cent

In addition to this, the ash may contain 3—4 percent magnesia and other trace elements in very small quantities. No nitrogen will be present in the ash. Since most of the estates use rubber wood in the smoke house furnace as fuel, the figures given above may give a rough idea about the manurial contents of ash obtained from smoke house furnace.

There is no harm in applying furnace ash to rubber which will give potash. But it should not be mixed with the rubber fertilizer mixtures or with any nitrogenous chemical fertilizers for use, as it is alkaline in reaction and will cause the liberation of nitrogen from the mixtures or straight nitrogenous fertilizers. It has to be applied separately, either one to two months before or after the application of nitrogenous fertilizers or fertilizer mixtures containing nitrogen.

Question:

Considerable variations in the yield of latex are observed on certain days of the same month. Better yields are usually obtained after good showers. Dripping of latex continues for several hours on certain days of the month. What is the reason for this phenomenon? How does humidity affect yield of rubber trees?

Answer:

It is well recognised that there will be considerable variations in the day to day yield of latex from a rubber tree, depending upon the climatic conditions. In order to realise the influence of good showers and high humid conditions on the yield of the rubber tree, an understanding of the origin of latex and the mechanism of the flow of it from the bark is essential. Latex is a physiological product of the tree and it occurs in specialised tissues of the bark called latex vessels. It contains about 60-65% water and the necessity of adequate water supply to the tree for the formation of it in the latex vessels is therefore obvious. The flow of latex by tapping the bark is caused by a sort of pressure emanating from the turgor of the latex vessels. When the latex vessels are cut open by tapping the bark, the pressure is released and latex forced to flow out. After a certain quantity of latex has thus flowed out, the turgidity of the vessels is released and the pressure due to it reduced.

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When it reaches a state of equilibrium with that of gravity the flow of latex ceases. The open ends of the vessels soon become plugged and sealed up by the natural coagulation of latex at those points. Conditions which encourage transpiration (loss of water through leaves) tend to reduce the force of turgor resulting in reduced yield of latex. As humidity is one of the most important factors controlling the transpiration rate, it directly influences the turgor of the latex vessel and the flow of latex on tapping will be reduced. High humidity, on the other hand, lowers the transpiration rate with the consequent. increase in turgor pressure and flow of latex. So it can be concluded that one of the reasons for the variation in day to day yield of latex is possibly the change in humidity from day to day within the same month.

Ouestion:

Plants will either die or perish if chemical manures are applied too closeto the foot of the plants. Why?

Answer:

When soluble chemical fertilizers are applied too close to the foot of the plants, the concentration of salt in the soil solution around the foot of the plant will increase depending upon the quantity and type of fertilizer, The increased salt concentration at the immediate vicinity of the plant may result in increased osmotic pressure in the soil solution and in case the osmotic pressure in the soil solution becomes greater than that of the cell sap, plasmolysis and consequent injury of the plants may result. In some cases, even when the salt concentration in the soil solution is not sufficient to injure the plant as mentioned above, death or injury may result by some of the soluble chemical fertilizers coming in contact with the plant by interfering with the metabolism of the plant. It is, therefore, important that the soluble chemical fertilizer materials should be applied properly (sufficiently away from the foot of the plant) for avoiding injury to the plants.

Question:

Dark clay soils ('kari' soil in backwater regions) are said to be rich in nitrogen and possess too much acidity. Rubber plants have been seen to be growing in raw clay much more vigorously than plants growing in higher elevation. Does not this mean that rubber plants could tolerate too much acidity? What must be the pH level of soil in which rubber could thrive well?

Rubber is a crop which is well known for its acid tolerance. It is reported that acidic soils are preferable for rubber cultivation and the commonly recommended pH range for satisfactory growth of rubber is from 4:5-6:5 It is an accepted fact that heavy clays are very sticking and impervious when wet and they become compact and hard during dry weather. Percolation of water and drainage will also be extremely difficult in clays. The 'kari'

soils being heavy clays, though rich in nitrogen, are not therefore preferred for rubber growing due to lack of drainage and aeration.

Question

Is it injurious to rubber trees if waste water from the coagulating shed is drained to the field?

Incupr :

The discharge of waste water from the coagulating shed into the rubber field may have some injurious effect on the growth of the plants if large quantities are continuously allowed to drain the field for a long period. On the other hand, occasional discharge of the waste water from the coagulating shed may have some beneficial effects to the plants as the waste serum contains all the plant nutrients in small quantities and, therefore, has some manurial value.

Question:

It is said that certain growth hormones and trace elements for efficient growth and root formation are lacking in our soil resulting in stunted growth and disease. Is any study being undertaken in India in this regard?

Answer:

Experiments with growth hormones and trace elements are being carried out by the Rubber Research Institute from last year onwards. As and when certain useful results are obtained the same will be published.



### For Rubber Growers

April

Weeding and manuring are continued. Spraying against leaffall also is continued. Budding in nursery and field is carried on. Preparation of land for planting is continued. The natural undergrowth is slashed.

Dead woods are removed from the garden.

Spraying is continued. Treatment to prevent pink disease is done.

Budding can be continued if necessary. Slashing of undergrowth is carried on. Sowing of cover crop seeds can be commenced.

June

New flushes of young plants have to be given spraying. Nurseries are to be sprayed. The pits are filled and planting started. The tapping panels are disinfected with fungicides and water proofing with prowax or wax rex trescal done. If needed the beds for sowing seeds can be prepared. Cover crop seeds are sown or cuttings planted.

New flushes in nursery and young plants are sprayed. Planting is continued. If trees are tapped during this month panel protection should be given. Seed collection is done if available.

New flushes in nursery and young plants, in regions where shoot rot is prevalent, are sprayed. Treatment against pink disease is done. Seed collection is continued. Panel protection is given in areas where tapping is done. Rubber seeds are sown.

September This is the time for weeding and manuring. Sowing of seeds can be continued. Repeated inspection and treatment of pink disease should be done. Young rubber buddings planted out during June—July should be given shade. Yield stimulants may be applied on trees 20 or more years old.

May

July

August

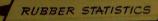


TABLE I

Area Under Rubber as at the End of Each Year

Year		Area in acres	
1950-51		170,506	
1951–52	THE REAL PROPERTY.	171,191	
1952-53		172,786	
1953-54		173,643	
1954-55	AND REAL PROPERTY.	176,647	
1955-56		207,239	
1956–57		234,351	
1957–58		261,998	
1957-58		286,567	
1959-60	W. O. P. S.	305,452	
1960-61		321,002	
1961-62		348,121	
1962-63		361,142	
1963-64		377,938	
1964-65	the sent of the last	383,813	

TABLE II

Planted Acreage Under Different Planting Materials as at the End of 1964-1965
(Area in acres)

Planting		Newplanted area	Replanted area	Total area
Ordinary Budded Clonal		206,014 42,534 92,065	4,360 20,302 18,538	210,374 62,836 110,603
	Total	340,613	43,200	383,813

TABLE III

Classification of Holdings and Estates According to Size as at the End of 1964-1965

(Area in acres)

	(Area	in acres)		
	Groups		No. of units	Area
5 Acres and	res and up to and includi	ng 10 acres	61,967 5,722 3,537	121,650 42,505 73,300
. Estates (abo	Total		71,226	237,455
(40	ove 50 acres) and up to & including " " " " " "	100 acres 500 ,, 1000 ,, 1500 ,, 2000 ,,	325 239 30 19 4	23,372 49,286 21,699 23,465 6,602 21,994
	Total		626	146,358
	GRAND TOTAL		71,852	383,813

TABLE IV Statewise Distribution of Area at the End of 1964–1965 (Area in acres)

	STATES		HOLDINGS icres & below)	(	ESTATES Above 50 acres)	La	OTAL
		No. of units	Area	No. of units	Area	No. of units	Area
1.	Kerala	70,345	231,062	572	130,085	70,917	361,147
2.	Madras	854	5,942	42	11,906	896	17,848
3.	Mysore	25	392	11	3,945	36	4,337
4.	Andamans			1	422	1	422
5.	Tripura	1	20			1	20
6.	Maharashtra	1	39			1	37
	Total	71,226	237,455	626	146,358	71,852	383,813

TABLE V
Statewise Production of Natural Rubber (In Metric Tonnes)

States	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Kerala Madras Mysore Andamans	21,890 1,814 437 32	23,175 2,040 452 30	24,954 2,060 402 30	29,057 2,695 447 40	33,792 3,176 468 51	41,391 3,724 481 20
Total	24,173	25,697	27,446	32,239	37,487	45,616

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber (In Metric Tonnes)

30/3 31	Production		Import		Cons	sumption	
Year	of Natural Rubber	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total
1958-59 1959-60 1960-61 1961-62 1962-63 1963-64 1964-65	24,169 24,173 25,697 27,446 32,239 37,487 45,616	12,538 15,287 23,125 22,528 23,360 26,275 15,003	4,229 5,718 8,097 10,121 10,297 8,812 3,315	16,767 21,005 31,222 32,649 33,657 35,087 18,318	35,767 40,491 48,148 48,410 53,553 61,155 61,057	3,477 4,964 7,397 10,186 10,723 11,959 15,285	39,244 45,455 55,545 58,596 64,276 73,114 76,342

TABLE VII

Reclaimed Rubber Acquired and Consumed by Manufacturers

(In Metric Tonnes)

Vee	Acquired	Consumed
Year 1958–59 1959–60 1960–61	3,973 5,177 5,183	4,102 4,969 5,453
1961-62 1962-63	6,422 6,839	6,046 6,850 7,982
1963-64 1964-65	8,251 9,349	9,369

TABLE VIII Stock of Natural Rubber

Month	1000 00			t Each Mo	(	ciric tonn	cs)
	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1001
April	8,723	10,035	0.571		1002 03	1903-04	1964-65
May	9,106	9,067	8,571	9,696	11,703	12,818	16,129
<b>June</b>	8,756	8,138	8,186	9,716	10,937	12,894	16,212
July	8,710	8,545	8,128	8,462	12,193	14,003	16,798
August	8,619		8,067	8,256	12,475	14,824	16,609
September	8,322	8,968	8,489	9,235	12,218	14,239	15,913
October	9,523	8,995	9,157	9,744	12,723	14,302	16,069
November	11,007	9,810	10,265	11,291	13,917	15,605	16,312
December	11,587	10,467	10,742	12.120	15,059	17,142	17,756
January	11,715	10,793	12,993	13,359	16,334	18,314	19,110
February		10,496	13,036	12,990	15,940	18,381	17,950
March	10,438	9,583	11,185	11,511	13,879	16,437	15,772
viarch	10,233	9,201	9,875	11,439	13,485	16,092	14,094

	Rubber Position in India (M. Tonnes)	
100 M/4 100 M	April '65 to January '66	April '64 to January '65
Production	Zara de la companya della companya d	
Natural	45,983	41,682
Synthetic	14,804	11,234
Consumption		
Natural	53,322	49,878
Synthetic	17,795	12,331
Import		
Natural	15,496	12,749
Synthetic	2,420	2,806
Stock at the end		
Natural	20,525	17,950
Synthetic	8,055 RE	SEARCH INST. 11,084
		No. 1.1.1.5. U
NO. 4]	Ost Dot	0.17-1-68 0
	J. Dat	"ION"





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'... and girls,' said Ralli.

Unperturbed, Tata continued, 'Take this rubber sapling. Consider its life-blood, thin, white, unpretentious...'

"You've got to hand it to nature," said Fison.

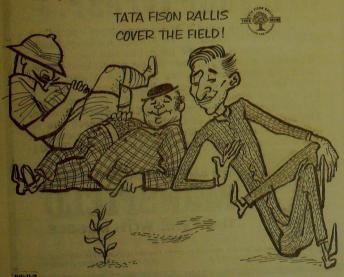
'Rosalie,' said Ralli wistfully, 'her name was Rosalie.'

'... in the rubber sapling,' Tata said sternly, 'nature reveals her bounty. Tyres, suspenders, conveyor belts, toy balloons...'

'Catapults,' added Fison.

'Now,' said Tata coldly, 'for the commercial: Railis "Tree Brand" (ertilisers produce better rubber crops. Tata Fison pesticides protect them for bigger yields.'

'I never did get to know her surname,' said Ralli sadly,





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Reserves (including Share Premium)	85,00,000	1,00,00,000
Deposits	51,45,38,335	59,11,12,449
Advances & Bills Discounted	33,48,03,373	37,25,37,620
Dividends	13,58,350	16,11,639
Number of Deposit and Borrowing Accounts	7,85,127	9,80,766
Number of Branches	203	204
Personnel	2,983	3,179
Shareholders	4,769	4,876

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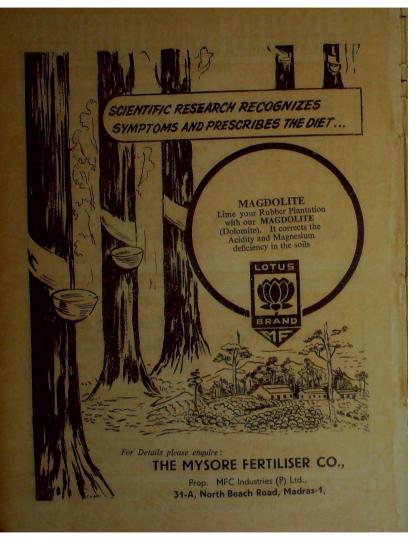
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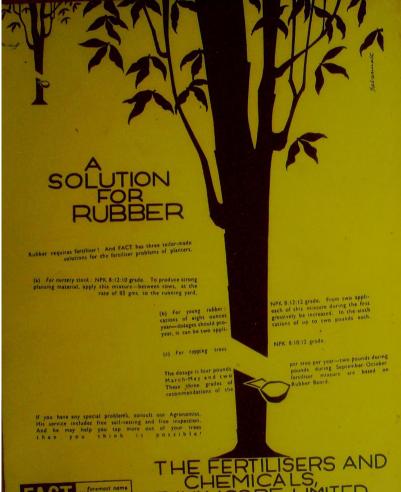
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