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RUBBER BOARD BULLETIN

Vol. VI

1962-'63



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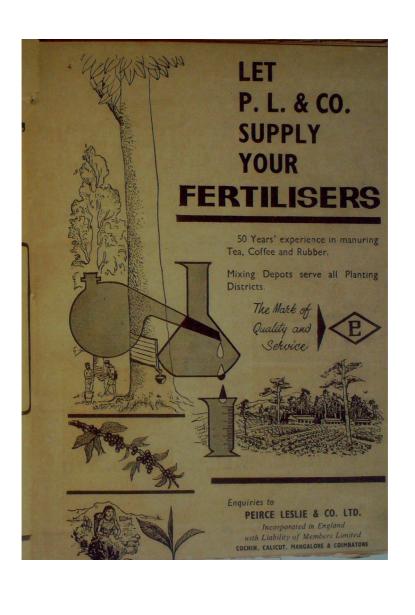
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P.	N.	Radhakrishna	Pille	ıy,	B.	Sc.	,	
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Replanting

Since 1949 the industry has been pressing its case for a subsidy to rehabilitate the estates which were overworked during the war. It had also been the industry's case that unless it undertook replanting with high yielding planting material on a large scale, it would be difficult for it to bring down cost and to meet the requirements of the manufacturing industry at a price comparable to that prevailing else-Government moved a little slow in the matter, the replanting scheme has been in operation for 5 years. When the scheme was first started in 1957 the target for end of 1961 was not more than twenty thousand acres under the subsidy scheme. From 1960 the subsidy for replanting has been enhanced to Rs. 1000/- per acre from the original figure of Rs. 300/- for large growers and Rs 400/- for small growers. Besides a rehabilitation allowance of Rs. 9/- has also been provided in the price. In fact, the assistance at present provided to the industry is more liberal than that in Malaya or Ceylon where the replanting has made the largest progress. At least another 80,000 acres require replanting before 1970, if not earlier. It is obvious that with higher yield, cost of production could be brought down and a better margin of profit obtained. In spite of these facts, the replanting scheme has not progressed satisfactorily. In Malaya and Ceylon the motto that has been adopted is "Replant or Perish." Enlightened opinion is convinced that the future of natural rubber would rest with its capacity to compete with synthetic rubber on the basis of quality and price. It is, therefore, for our producers big as well as small, to avail of the opportunity of liberal subsidy granted by the Board to replant their areas with high yielding planting material as early as possible.

The field staff of the Board has been instructed to draw up plans for replanting by small holders, in their respective jurisdictions. The Board has also addressed a letter to all the large growers to give a phased programme for replanting. It has been the experience of the Board, that the producers are generally slow to furnish information in time and in many cases it has also been observed that the information furnished is incomplete. This is not a satisfactory position. Unless the producers furnish their replanting programme before 31st December, 1962, it would not be possible for the Board to prepare a consolidated plan for the industry; nor would it be possible to justify the continuance of the allowance for rehabilitation which is due for a review now.

Obituary



Dr. T. T. CHACKO.

We record with deep sorrow the sudden and untimely death of Dr. T. T. Chacko, member of the Rubber Board, on 11th September, 1962, at Kottayam at the age of fifty two.

Dr. Chacko had taken an active part in the social and political life of Kottayam during the last two decades. He was a leading trade-unionist and a leader of the Plantation Labour. Dr. T. T. Chacko was nominated by the Central Government as a member of the Rubber Board in November, 1961 to represent labour, and he had actively participated in the deliberations of the Board especially in matters relating to labour.

Dr. Chacko is survived by his wife, a son and two daughters. We extend our sympathies to the members of the bereaved family.

International Rubber Study Group

Sixteenth Meeting Final Press Communique

Document No. 47

Washington, D. C., 1962.

- 1. The Sixteenth Meeting of the International Rubber Study Group, held in Washington, D. C., under the Chairmanship of Mr. W. Michael Blumental, Deputy Assistant Secretary for Economic Affairs, Department of State and Leader of the delegation of the United States of America, opened on May 28th and ended on June 6th 1962. The Vice Chairmen were Mr. Mahadeva, Leader of the Ceylon delegation and Dr. U. Morabito, Head of the Italian delegation. In the absence of Mr. W. Michael Blumental, Mr. B. Mahadeva acted as Chairman during the later sessions of the meeting.
- 2. The meeting was attended by delegations from Australia, Austria, Belgium, Burma, Cambodia, Canada, Ceylon, Czechoslovakia, Denmark, France, Federal Republic of Germany, India, Indonesia, Italy, Japan, Liberia, Federation of Malaya, Netherlands, Nigeria, Thailand, United Kingdom, United States of America and Viet Nam; and by observers from Argentina, Brazil, Mexico. Peru, Poland, South Africa, Spain, Sweden and Switzerland; Commission of the European Economic Community, Food and Agriculture Organisation, the Interim Coordinating Committee for International Commodity Arrangements, the International Bank for Reconstruction and Development, the International Institute of Synthetic Rubber Producers, the International Rubber Research & Development Board, and the Organisation for Economic Cooperation and Development.

3. A symposium entitled "The Future of Natural and Synthetic Rubbers" took place on May 29th, May 31st and June 1st. This Symposium had been organised by the Group to provide an opportunity to hear distinguished speakers from the natural and synthetic rubbar industry give their personal views of developments and problems facing the industry. The Group considered that the symposium was most valuable and recorded its appreciation of the contributions made by all the speakers and participants in the symposium.

The Group studied the proceedings of the symposium and came to the following conclusions:

- I. As far as natural rubber is conceraed, its vitality continues to be evident and its future appears assured, provided that the producers continue their efforts in the following directions:
 - A. By Reducing Production Costs
 - (a) Through rejuvenation programmes, ircluding both estates and small holdings.
 - (b) Through more systematic use of fertilisers and yield stimulation.
 - (c) Through exploitation of fundamental research.
 - B. By Improving the Technical Qualities of their Productions
 - (a) Through simplification of the grading system.

- (b) Through better control of the cleanliness and uniformity of their products.
- (c) Through improved methods of packing and presentation.
- (d) Through strengthening technical contacts with manufacturers
- II. As far as synthetic rubbers are concerned, their dynamic expansion has and will continue to lead to important technical advances. However, producers will wish to relate production capacity to probable world needs and to plan to maintain a reasonable balance between overall supply and demand of new rubber.
- III. As far as the future of all clastomers is concerned, the differences betbeen Natural rubber and Synthetic rubber have greatly diminished, and consequently, complementary usage of all types of elastomers is likely to develop.
- 4. The Group examined the statistical position of rubber and made estimates for natural and synthetic rubber requirements and supply during 1962. It was estimated that the world might consu ne i.e., turn into manufactured goods, some 2,130,000 long tons of natural rubber, and 2,145,000 long tons of synthetic rubber. In regard to production, it was estimated that the world production of natural rubber would be 2,145,000 long tons and synthetic production would be 2,212,000 long tons. In addition it was estimated that some 70,000 long tons of natural tubber would be delivered from government stock-piles. The estimates for synthetic rubber production and consumption do not include allowances for synthetic rubber produced in Eastern Europe and China. The Tables of estimates made by the Group are attached.

- 5. The Group noted with great satisfaction the recent publication of "International Standards of Quality and Packing for Natural Rubber Grades" (the Green Book) to become effective July 1st, 1962. For the first time all the commercial grades of natural rubber described in the Green Book have been internationally accepted. The Group appreciates the work that has been done and recommends that all member governments continue to make every effort to establish and maintain conditions that will encourage and promote the production and marketing of properly graded natural rubber.
- 6. The Group took note of the discussions and conclusions reached at the meetings of the F. A. O. Committee on Commodity Problems and the U. N. Commission on International Commodity Prade held in Rome in May 1962, on compensatory financing arrangements to meet difficulties arising from fluctuations in the export incomes of countries producing primary commodities. It was noted that a Technical Working Group was to be set up to make a detailed study of the proposals made for compensatory financing and to make specific recommendations. The Group instructed the Secretariat to keep in close touch with the progress of this study and to report to the Group on any matters relevant to the Group on any matters relevant to the work of the Group.
- 7. The Group unanimously accepted with pleasure the invitation of the Government of Japan to hold its next meeting in Tokyo in 1964.
- The Group warmly thanked the Government of the United States of America for the excellent arrangements made for the Meeting and for all the kindness and hospitality shown to delegates.

Table 1: Est Synthetic Rubber	Consu	mption in	nd 1962	Territory Ceylon Viet-Nam	100
(in 1,000 long tons)				Nigeria	80 60
Territory 1	Vatural	Synthetic	Total	Sarawak	45
United States of				Liberia	43
Atherica Atherica	440	1,210	1,650	Cambodia	42
United Kingdom	163	132	295	Other British Borneo	27
Japan	184	101	285	India	30
Federal Republic			200	Burma	13
of Germany	134	129	263	States of the French Community	6
France	128	104	232	Territory of Papua & New Guinea	5
Italy	86	74	160	Other countries	63
Canada	34	68	102	W . 1	
Czechoslovakia	50	20	70	Total production	2,156
India	52	15	67		
Australia	29	24	53	D. Delination from Control Co. L.	
Netherlands	20	15	35	B. Deliveries from Strategic Stock	pnes
Belgium and				Total Deliveries	70
Luxemburg	17	16	33	Total Beliveres	
Austria	11	11	22	Total New Supply	2,225
Indonesia	21		21	- and - and -	
Hungary	10	2	12		
Denmark	6	4	10	Table 3: Estimates Synthetic	Rubber
Federation of Ma				Production in 1962	
& Singapore	8		8		
Other countries	737	220	957	(in 1,000 long tons)	
	2 4 20	2115	4 275	USA	1,475
	2,130	2,145	4.275	Canada	170
The state of the state of		170000	1000	United Kingdom	120
Table 2: Estimated Natural Robber Supply in 1962				Italy	100
				Federal Republic of Germany	90
(in 1 000 long tons)				France	80
(in 1,000 long tons)				Japan	80
A. Production				Netherlands	45
				Australia	22
Territory				Other countries *	30
Federation of Malaya & Singapore 760 Indonesia 682 Thailand 190				Total	2,212

^{*} Not including Eastern Europe and China.

Brown Root Disease

Fomes noxius Corner Fomes lamaoensis Murr.

By

T. S. RAMAKRISHNAN, M. A., F. A., SC. & P. N. RADHAKRISHNA P LLAY, B. SC. (HONS)

Rubber Research Institute of India, Kottayam, Kerala State.

Several kinds of root diseases affect rubber trees in Asia and Africa and are responsible for an appreciable reduction of the stand especially in the earlier years of the plantation. But the intensity of infection varies in different countries. Root disease control is of prime importance in Ceylon, Malaya and Congo but in India root diseases have been of little importance so far. But with the intensification of replanting with new clones the problem may assume greater significance.

The important root diseases which affect rubber are white root disease (Fomes lignosus Klotz.), red root disease (Ganoderma pseudoferreum Wakef. (Van O. et St.), stinking root rot (Sphaerostilbe repens B. & Br.), dry root rot (Ustulina deusta Petrak), root rot (Armillaria mellea (Vahl.) Quel.) and brown root disease (Fomes noxius Corner and F. lamaoensis Murr.). Of these white root disease is common in Ceylon, Malaya and Congo and causes heavy damage. But there are no authentic records of its occurrence in South India on rubber. The fungus has been reported on tea and other hosts from North east India only. Red root disease is also prevalent in Ceylon and Malaya but not in India. Armillaria mellea is common in Congo but has not been reported either from India or from ther Assiste countries.

Dry root rot has been observed in South India but the pathogen is more destructive on the stem than the roots in this country. Stinking root rot is rare in India but one typical incidence was observed in an estate in Trichur district. There has been no further spread of the disease. Brown districts and is gradually spreading It is prevalent in Kanyakumari, Kottayam, Trichur and Kozhikode districts. Though observed on young and older plants, the damage is more in the pretapping years. The disease may appear even in nurseries, killing the seedlings before they are pulled out for planting The highest incidence is however among young plants between the ages of two to nine years, more so in replanted areas. In some estates, sporadic occurrence of infection has been recorded even on old that rubber trees are susceptible to this

Symptoms

The first visible symptom is a partial or extensive discoloration of the foliage accompanied by cessation of growth. Instead of the bright green foliage, purplish or reddish yellow colour develops on the mature leaves. In course of time the leaves dry up and may be shed or some may remain attached to the tree. The twigs die back and eventually the tree dies. The distribution of the disease in the plantation may be in patches or sporadic and discontinuous. In one estate which had adopted hedge

planting system, the disease spread along the planting line or row. But in other estates with square or rectangular planting, the spread was in widening patches.

The characteristic symptoms from which the disease derives its name are seen in the roots. The infection may involve one or more of the lateral roots or the tap root or both of them. The affected root is covered by a firm coating of earth and small stones cemented by the mycelium of the fungus. The mycelial growth is tawny or dark brown in the appearing as if charred. From the surface the hyphae penetrate into the inner tissues of the cortex and the wood. The infected wood becomes soft and brittle in advanced stages. On splitting the root, brown lines formed by masses of fungus hyphae may be seen traversing the wood either across or lengthwise. The infection may commence in the tap root or on the laterals. In some instances the infection is near the place of origin of the laterals while the distal portions are sound. Even the base of stem may be affected. Abortive fructifications have been observed on certain occasions espefolded felt-like growths at the base of the stem above the soil level. Fomes noxius is known to produce large, (4 to 6 inches across), hard, bracket-like fruit bodies attached to the base of the stem of old infected trees or on stumps. These are brownish purple or black on the upper surface with prominent concentric growth rings and a yellowish margin. The lower surface is grey or dark brown with innumerable minute pores representing the external openings of the spore-bearing tubes. Several of these bodies may be produced close together. But they are The spores are disseminated by

In the course of one year the young trees are killed but it takes more time in the case of older trees. In all instances the disease was associated with the occurrence of rotting stumps. The infection spreads from plant to plant by root

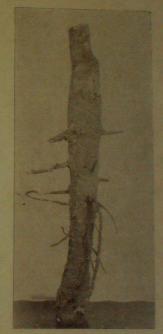


Fig. 1. The disease on the tap root of a budded plant-

contact of healthy trees with diseased ones. Roots of younger plants are more readily infected than those of older ones. Since the sporophores are rare on the estates, actual root contact appears to be the chief method of spread of the disease. The pathogen is a facultative parasite.

Pathogen

Several changes have occurred in the momenclature of the causal organism. There is still some disagreement among different authors regarding the identity of the fungus. At first the fungus was named Hymenochaete nexta Berk. Later the fungus was considered to be a Fomes and the name was changed to F. lamacensis Murr. Still later Corner (1932) working on the disease came to the conclusion that the pathogen was a new fungus and named it F. noxius. At present both the specific names of Fomes are in use though the latter is more often employed. It seems that two species are capable of producing the same symptoms on rubber.

The pathogen enjoys a wide distribution and is capable of infecting several other perennial host plants in the planting districts Among the other hosts are breadfruit, coffee, tea, Ceara rubber, jack, cocoa, Grevillea and dadap. The fungus is found at different elevations ranging from sea level to over 4000 ft. On rubber it has been observed in the plains and at 1000 ft. above sea level. Higher incidence of the disease is evident in sandy or light soils and in areas subject to inundations. The fungus usually colonises the stumps of trees left in the plantation; these may be of rubber or even jungle trees. Even logs of dead trees or rubber lying in the soil have been known to be invaded by the fungus and form sources of infection. In experi-



Fig. 2. The disease affecting the lateral roots and base of stem-

ments, portions of diseased roots placed in contact with healthy roots of rubber initiated fresh infections. The fungus may in certain circumstances grow through the soil and cause fresh infection even without actual root contact. This however occurs only when the soil is rich in organic contents. When the sporephores are developed the spores are blown by wind over long distances and these may initiate infection even though no stumps are in the neighbourhood.

Control

The control of root diseases is effective only when tackled in the initial stages of infection. Normally the growers notice the presence of the disease only when the affected trees have started drying and are beyond recovery. Under such circumstances it is advantageous to eradicate

the tree digging out all the roots also and destroying them so that further spread may be prevented. Furthermore the neighbouring trees have to be examined and given prophylactic treatment even though they are apparently healthy. This is done by exposing the main lateral roots and the tap root at the base and inspecting for any signs of infection. Any root that shows infection should be cut out and destroyed. The others are given a wash with an organomercurial fungicide. In our trials we have found that aretan (one oz. in two and a half gallons of water) and ceresan-wet (one oz. in one gallon of water) to be very effective. After this has dried a coating of prowax is applied over all the exposed area and the soil replaced. The soil at the base is again drenched with the solution of the fungicide. The same treat-ment is carried out even for plants in the of four to six weeks new shoots are produced and the tree recovers.

By adopting these methods over fifty young trees have been saved in three setates in Kanyakumari district. Only two cases of advanced infection did not recover. We found that in some affected trees new fibrous roots are developed in

tufts from above the diseased portion at about the ground level, before the operation. These were however removed during the treatment. In some of the estates where this disease is prevalent the foregoing treatment has become a routine practice and no casualty has since occurred.

The more important factor in the treatment is the removal of the source of infection which is invariably a rotting stump. It may not be economical to remove every stump on the estate. But when a stump acts as a source of infection it should be traced out and eradicated. Poisoning of the trees before felling with tree-killers containing arsenic or 2, 4, 5-T or treating the stumps soon after cutting is reported to have given encouraging results in preventing colonisation of the roots by fungi causing stump rots. However in some countries this has not prevented the occurrence of root diseases. Thus the opinion on the benefits of this method of treatment in preventing root diseases is divided.

We are thankful to the Superintendents of the estates where the experiments were conducted for their co-operation and help.

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JULY-SEPT, 1962

Tapping of Rubber Trees

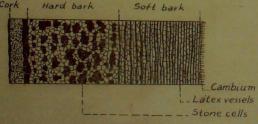
By V. K. BHASKARAN NAIR, M. Sc.

Rubber Research Institute of India, Kottayam, Kerala State

Latex is obtained from the bark of the rubber tree by tapping. Tapping is described as "controlled wounding." It consists of removing at regular intervals shavings of bark from the lower surface of a groove already made. The cut should penetrate to within one mm. of the cambium. An expert tapper will tap to an even depth of about 1 to 14 mm. from the wood. The object in doing so is to open the ends of the latex vessels blocked by plugs of coagulated latex. The present day tapping system has been evolved after a long and continuous study. The oldest practice of extracting latex from wild Hevea trees in Brazil consisted of making numerous oblique incisions in the bark by means of a sharp tool. This drastic treatment resulted in the uneven growth and wounding of bark. The herring bone system practised in Malaya in 1889 by H. N. Ridley consisted of removing a thin shaving of bark from the lower side of the oblique cut. which a thin shaving of bark is removed from the original groove at each tapping. The evolution of the tapping systems included the herring bone and its variants, the superimposed V cuts on a half circumference separated by a vertical distance of one foot and the full spiral system in which one or more similar cuts extended right round the tree girdling it more than once. The single cut systems either V or spiral or $\frac{1}{2}$ circumference of the tree are all evolved from the multiple cut systems. Tapping on alternate days has become a standard practice now. On the whole the trend throughout has been to reduce the severity of tapping and prolong the economic life of the tree.

Bark of the Rubber Tree

The term bark is generally used to mean the outer covering of the root, stem and branches of the woody plants which lie outside the cambium. Some authors use the term in a more restricted sense to denote only the thick cork layers on the surface of trees. But for the



Longitudinal Section of the Bark

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purpose of this article the term is rather liberally used to include the cork, the cambium and all the tissues that lie between them. Three main layers can be distinguished in a cross section of bark: (a) inner layer or soft bast, (b) an intermediate layer or hard bast and (c) an outer protective layer of cork cells. The latex vessels are concentrated in the layer of soft bast, being arranged into a series of concentric cylinders of interconnecting vessels. In a population of seedling trees of mixed origin there is much variation from tree to tree in the number and distribution of the latex vessel cylinders, also in the occurrence of stone cells and consequently in the thickness of the hard bark region. In a population of budded trees of a clone, however, such wide variations in bark characters do not generally occur.

The trunk of a typical budded tree is cylindrical in shape while a seedling shows a pronounced taper from the ground level to a height of about 4 feet. According to an R. R. I. M. estimation (Planters Bulletin N. S. No. 9) the difference in girth immediately above the union and at 40 inches in budded trees is seldom more than 10 per cent and the difference in total bark thickness seldom exceeds 15 per cent while in seedling trees the girth at ground level may be double the girth at a height of 40 inches. Similarly the number of latex vessel rows at the base of a budded tree is only 15 per cent more than at 40 inches while in seedlings the difference may come to 50 per cent. On account of this the best yield in a seedling tree is expected to be obtained while tapping at the low-set level.

Once Once Once	in	thre	e day
III V CEDT	1	0621	

Tapping interval

Number of cuts per tree per year 140 94 70 Bark consumption per tapping year 7"

Latex Flow

Latex vessels are living cells and the flow of latex on tapping is due to the release of turgor pressure at the cut ends of the vessels which are squeezed under the pressure exerted by the surrounding turged cells. The drop in the turgor pressure may lead to the dilution of latex as water flows into the vessels from the surrounding cells. Slowly the turgor pressure is built up again after the cut ends of the latex vessels are closed up by coagulated latex.

Area of Bark Affected by Tapping

When a tree is brought into tapping for the first time the effect of tapping is extended throughout the whole tree (Gooding, 1953). But when tapping continues the area affected gets limited in extent. The flow area extends mainly to the lower portion of the tapping cut with a small amount only coming from tissues at both sides. The size of the flow area, particularly the longitudinal length of the area beneath the cut, is dependent probably proportionally upon the relative production capacity of the tree (M. J. Dijkman).

Bark Consumption and Bark Renewal

The rate of bark consumption will depend much on the skill of the tapper. In Malaya an expert tapper would obtain maximum yield on alternate daily tapper with a bark consumption of \$\frac{1}{2}\$ inch per month. In Ceylon (Planter, February, 1962) the bark consumption based on 180 tapping days per year is calculated as follows:

The rate of consumption of bark in India is found to be comparatively less than in other countries. It is reported (Rubber Board Bulletin, 1951, No. 2) that the monthly consumption of bark in some estates is less than $\frac{1}{2}$ an inch where we could expect some loss of yield on account of this.

Bark regeneration is brought about by the activity of the cambium. The rate and extent of renewal are determined by a number of factors the most important being the inherent property of the planting material, others being the fertility of the soil, climate, tapping intensity, planting distance, tapping system, diseases etc.

Standard of Tappability

The criterion for opening any individual tree is 20 inches girth at the height of opening and no tree should be opened until 70 per cent of the trees have attained this minimum girth. Work carried out on this subject elsewhere and the result obtained (R. R. I, M. reports) are summarised below:

"A trial of 21 ciones which has shown an average girth increment of 4 inches per year before opening were reduced to 2½ inches increment during the first year of tapping. Moreover the experience is such that the clones which yield most suffer the greatest depression. Thus a delay in opening of 6 months will permit trees to increase their girth from 18 inches to 20 inches, but if tapped for that six months would have a girth of only 19½ inches, a permanent reduction in the volume of latex producing tissue"

The recommendation that 70 per cent of the trees should have attained the standard girth is based on task size. For example if only 50 per cent is accepted the tapper has to do more walking.

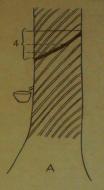
to have the required number of trees for tapping which may affect the quality of his tapping, the alternative being to reduce the number of trees which lead to the reduction in yield per task, both of which are undesirable.

Height of Opening

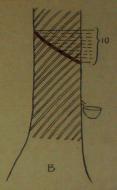
The standard height for opening the tapping cut in a seedling tree is 20 inches from ground level and in a budded tree 40 inches from the union of stock and scion. The subsequent panels for seedling trees may be opened at 30 inches and 40 inches respectively for the second and third panels, while in budded trees all panels may be opened at 40 inches except perhaps in the case of ladder tapping. However, it is to be noted that the present expert opinion on tapping of budded trees is that the first cut should be opened as high as the tapper can reach and a new cut should never be opened above the top of the old panel, except in ladder tapping. The object of this suggestion is to allow the maximum period for bark renewal and to prevent the formation of virgin bark islands on the tree as occurs, for instance, when a second panel in virgin bark is opened about 10 inches above the renewed bark. Such bark islands often yield so little as to be scarcely worth tapping.

Direction of Tapping Cut

The latex vessels run at a slight angle from right to left down the stem, that is, in an anticlockwise spiral direction upwards. The greater number of latex vessels are cut when the tapping cuts are made from high left to low right. Experiments have shown (R. R. I. C. Journal, September, 1961 and R. R. I.M. Planter's Bulletin, No. 9) that an average decrease of about 10 to 14 per cent may result if the cut slopes in the other



Incorrect Tapping Cut from Right to Left-few Vessels Cut



Correct Tapping Cut from Left to Right-many Vessels Cut

Courtsey: Rubber Research Institute of Malaya

direction, i. e. from right to left. The angle of slope of cut on a seedling tree should be made about 25 from the horizontal while in the case of budded trees the angle of slope may be cut at 30° from the horizontal, since in the latter case the bark thickness is lesser than in seedlings and the chances of the latex overflowing down the sides of a tapping cut is greater.

Tapping Depth

The best yields are obtained by tapping to a depth of within 1 to 2 mm. of the cambium since active latex vessels are concentrated close to the cambium. Good tappers do this without injuring the cambium but absence of injuries is not always a sign of good tapping because shallow tapping with poor yield can be easily done without injuring.

Time of Tapping

It is necessary to send tappers out early in the morning as late tapping will lessen the exudation of latex. This can be explained as due to rise in temperature and consequent increase in loss of water due to transpiration. So early morning is considered to be the best time for tapping for obtaining the maxi-

Tapping Knives
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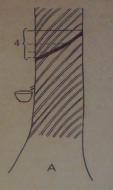
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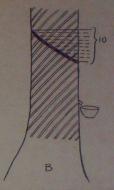
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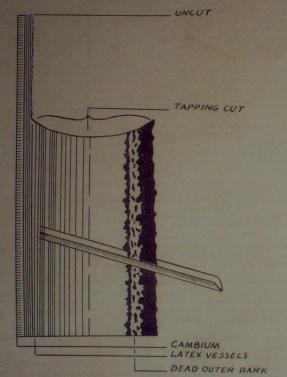
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Correct Depth of Tapping note 1 mm. Bark and Cambium left Uncut

Courtsey: Rubber Research Institute of Malaya

country while in Malaya they often go for this knife for quick tapping on large tasks,

International Notation for Tapping Systems

There is a standard nomenclature for tapping systems. According to this,

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alternate daily tapping on half circumference equivalent to an average of a quarter cut tapped per day is taken as standard 100 per cent in estimating relative intensity and is represented by the formula s/2 d/2 100%.

Relative intensity is expressed as a percentage of standard intensity and to calculate relative intensity, it is necessary to multiply the fractions of the formula and then to multiply the product by 400. On the standard system of s/2 d/2 100%, the product of the fractions is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ and as this arbitrary standard system is taken as 100 per cent intensity, multiplication by 400 is required in each case to find relative intensity. Thus: s/2 d/2 $-\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ multiplied by 4 0 = 100% s/2 d/3 $-\frac{1}{2} \times \frac{1}{4} = \frac{1}{4}$ multiplied by 400 = 100% s/2 d/3 $-\frac{1}{2} \times \frac{1}{4} = \frac{1}{6}$ multiplied by 400 = 67%

Tapping Systems in Use— h e Half Spiral Alternate Daily System and Half Spiral Third Daily System

The tapping system normally practised in India both for clones and seedlings is s/2 d/2 100%. However, we are aware that in a number of small holdings in S. India daily tapping is being adopted bast and early deterioration of trees. At the beginning it is advisable to adopt third daily tapping on seedling trees and then change over to alternate daily after two years. But if the proportion of the trees exhibiting brown bast is high on such an increase in the intensity of the tapping, the trees should then be brought back to third daily tapping. The recommended system of tapping for budded trees from the beginning is alternate daily. But in certain clones like Gl 1 the intensity may have to be reduced in the beginning, viz. third daily (s/2 d/3 67%), on account of the susceptibility of these clones to brown bast.

Change Over Systems of Tapping Leading to a Double Four System (2s/2 d/4 100%)

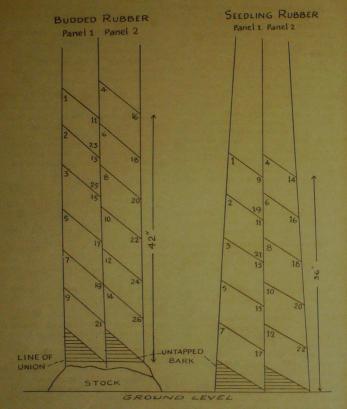
This system has been recommended by the R. R. I. of Ceylon (1961) and is summarised as follows:

"In the case of comparatively high yielding clones which are not susceptible to high incidence of brown bast in the early years of tapping the double four system may be introduced in the fourth year of tapping on a change over system as indicated in the diagram. Increased yield can be obtained at a lower tapping cost (as this system reduces the tapping task from 250 to 150 while maintaining the intensity of tapping as 100 per cent) compared with the single cut system of 100 per cent intensity.

In the case of budded trees with the initial cut opened at a maximum height of 42 inches the change over will be effected from panel 1 to panel 2, when the cut on panel 1 is about 21 inches in height at approximately the end of the third year of tapping. Thereafter a change over of cuts is made from year to year between the two panels.

In the case of seedling trees the initial cut is opened at a height of 36 inches. The change over of the tapping cut can be made at the end of the third year of tapping. Thereafter a change over of cuts is made from year to year between the two panels. On a reduced intensity of tapping of 67 per cent on the s/2 d/3 system the first change over is made when the tapping cut is approximately half way down the first tapping panel or when the bark consumption has reached approximately \(\frac{1}{4}\) of the consumption on a 12 year or 10 year cycle provided for the budded and seedling trees respectively.

If there is no intention of tapping in double cut systems in future, tapping should be continued down the whole



Change over System for Single Half-spiral cut

Courtsey: Rubber Research Institute of Ceylon

length of the first panel before the change over to the opposite panel. It is possible as per the above procedure to introduce a double cut system at the end of the ninth year of tapping in the case of budded rubber and at the end of the eighth year in the case of seedling rubber. The double four system is a more economic system than the standard s/2 d/2 100% system. The change over to double four system when made as recommended provides for the cuts on opposite panels remaining widely separated."

Intensive Tappings

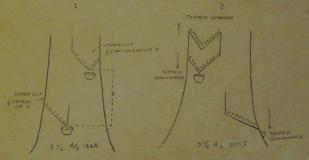
They are generally practised on old rubber trees intended for felling after some period. The practice to be adopted depends on the condition of the trees and particularly on the previous tapping system, reserves of bark and the length of time before felling. The methods which can be employed include increased frequency of tapping, extension of tapping cut and treatment of bark with yield stimulant containing hormones in vegetable oils. A tapping intensity of 133

per cent with a double cut system has proved profitable in other countries and has contributed greatly to the yield of the tree after tapping in virgin and renewed bark on the lower panels. The main consideration in this case is that the two panels should always be well separated. They should be at least 18 inches apart.

Tapping with Multiple Cuts and Upward Tapping

By introducing multiple cuts the yield per tree can be increased, but the interference of one cut with another should be kept in check. It is known that superimposed cuts if made near each other may lead to reduction in yield (Frey Wyssling).

Interference between the cuts can be overcome by tapping the upper cut upwards. With upward tapping the shavings are removed from the upper side and the cut moves up the tree away from the ground. The area of bark from which the latex flows to the upper cut



Intensive Tappings

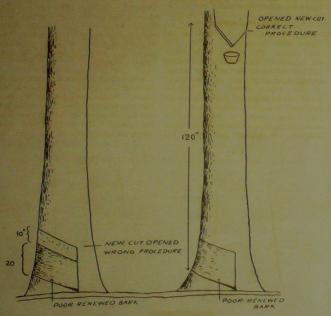
Courtsey: Rubber Research Institute of Malaya

will lie above the cut and there will be very little interference between two superimposed cuts if the upper one is tapped upwards. Moreover if the upper cut is opened just above the top of the old tapping panel it will be possible to extract latex from a part of the tree not previously exploited. For upward tapping a drawknife or jabong type may be more suitable than the Michie Golledge knife commonly used here.

Some Common Recommendations for Intensive Tapping

Four to five years before replanting—A high cut and a low cut may be made on opposite sides about 3 feet apart. These may first be tapped on every third day. (2V/2 d/3 133%)

Two to three years before replanting— The same two high and low tapping cuts may continue but with alternate daily tapping. (2 V/2 d/2 200%)



High Tapping or Ladder Tapping

One year before replanting—Continue with the existing two cuts which probably by now have been changed to the other side of the trees. Open a third high cut to be tapped upwards. Tap all cuts every third day (3V/2 d/3 200%). In case of intensive tapping systems, an yield stimulant may also be applied to extract the maximum yield. However, the recommendations given and practices adopted should vary with the conditions of trees to be tapped, climatic conditions and country. A system suitable for six months would be unsuitable for a longer period.

Ladder Tapping

This is normally recommended when tapping of renewed bark is found un-

economic. A large panel on the virgin bark above the old panel is opened usually about 8 feet from the ground. The height at which the cut is opened depends, however, on the replanting schedule and should allow for a higher bark consumption. Furthermore, it is known that when tapping virgin bark above renewed bark, the yield may show a decline as the cut approaches the junction of the virgin and renewed bark. This will be more pronounced if the renewed bark is of poor quality and under this condition a cut on virgin bark less than six inches above the renewed bark may yield very little. A ladder is used by the tapper to tap at such heights. The ladder should be light and should preferably have a platform to enable the tapper to work at ease.

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3. B. Studies in the Physiology of Latex.

Quarterly Juurnal, Sept. 1961

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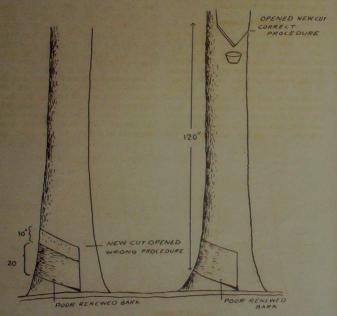
Hevea Thirty years of Research in the Far East.

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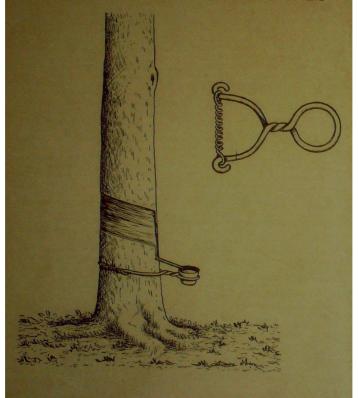
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Planting Notes

1. SUPPLYING CUP HOLDERS TO YOUNG TREES IN TAPPING



With reference to the 'Planting Notes' published on page 152 of the Rubber Board Bulletin, Vol. 'V, No. 3, January-March, 1962, which deals with cup holders (hangers) for young trees in tapping, Mr. J. N. Ross, Acting Head of the Botanical Division of the Rubber Research Institute of Malaya has been kind enough to point out about the common type of cup holders used in Malaya (see figure) and also to send us a sample of the same. We are indeed grateful to Mr. Ross and the Institute for the interest shown in the matter and the trouble taken in sending us the sample of the Malayan cup holder.

"The method is to place the cup on a loop in a wire which is fixed round the tree. The wire is spring loaded to allow the growth of the tree".

It is a very good design somewhat similar to the types of cup holders that are being tried on some large estates in India at present. Though the cost of the cup holder and springs has been stated as M. \$. 50/r per thousand, it is doubtful whether it will be possible to get the same made in India at such cheap rates.

We are, however, glad to recommend this type of cup holder for wider use in India, subject to cost consideration.

measures will have to be incurred. The

2. LOCATION FOR RUBBER (Hevea Brasiliensis) CULTIVATION

The ideal location for commercial plantations of rubber should have a warm, humid, equable climate with a temperature range of 70° to 95° F and evenly distributed annual rain fall of 70 to 80 inches with a minimum duration of dry rainless period. The rubber tree is, however, a hardy accommodating itself to varying conditions. Though the tree may survive in some areas with varying climatic conditions, the yield of latex may not be high enough to be as profitable as under ideal conditions or it may involve heavy capital expenditure to earry out ameliorative measures.

most important consideration besides the actual quantity of rain is the absence of prolonged dry periods extending over three or four months. The shorter the dry season the better. Hot dry winds during summer are harmful in that they cause drying of bark and branches and retard the growth. In regions exposed to high winds the initial growth is considerably retarded and wind damage in older trees may reduce the population appreciably. Though some clones are able to resist wind damage better than others, areas with high winds are not ideal for rubber.

Rainfall

The intensity and distribution of rainfall are important limiting factors. A minimum of 60 inches per year, but well distributed throughout the year is necessary. Higher rainfall is favourable and 80 to 100 inches will be desirable. But good rubber estates have been raised in regions with 150 to 200 inches per annum. Diseases will be severe in such locations and expenditure on protective

Climate

Temperature conditions influence the growth of rubber. This is a tropical plant and thrives in a warm moist climate. It grows well in all places when a temperature range of 70° to 95° F exists. A slight deviation may not be harmful but areas with a long winter with minimum of 50° F or a hot summer of over 105° F may not be suitable. But

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some protected pockets with temperature nearer the ideal may be available in other states.

Elevation

The land may be flat, undulating or hilly, but very steep slopes are to be avoided. The trees grow well and give good yields from sea level to an altitude of 1000 ft. But above this elevation the rate of growth of the tree slows down and the incidence of diseases increases. The trees come into tapping much later than those at lower elevations. Plantations above 1000 ft., may not be as profitable as those below and more expenditure on protective measures may become necessary.

Soil

Rubber grows satisfactorily in a moderately fertile well drained loamy soil with sufficient humus content to improve its water holding capacity. Water-legged areas or those subject to prolonged inundation extending to months are to be avoided. Rubber does not come up well in areas with the water table less than 2 ft., from the surface. Inundation by floods in rivers for a few days may not be objectionable. If drainage can be improved by provision of drainage channels to take away the excess water the adverse influence of water logging can be reduced. Growing of cover crops may be helpful in conserving soil moisture, adding humus to the soil and preventing soil erosion.

Heavy clays, hard-pan, rock or hard

laterite within 4 feet of the surface of the soil are not favourable.

A study of the local flora will be very helpful in determining the suitability of the area for rubber cultivation. Good, tall, ever green forest growth is indicative of fairly fertile soil and its usefulness for rubber. The presence of bush cover of stunted, thorny, xerophytic vegetation proclaims the aridity of the region and its unsuitability. Gravelly hill slopes with sparse grassy growth are to be avoided. Rubber is a hardy tree which can adapt itself to poor land and adverse conditions to some extent, but the returns will be poor and capital outlay high under such conditions

Reaction of Soil

The reaction of the soil should also be taken into account. The optimum pH for rubber cultivation is between 4.5 and 6. The tolerance limits are pH 3.5 and 7.5. Beyond these limits the growth of rubber will be severely affected. Sandy loams or clay loam are preferred In gravelly hard soil the tree will be stunted and yield below average.

The presence of water sources in the vicinity or in the plantation is desirable. Large quantities of water will be needed to raise nurseries, for the factory (if smoked sheets or crepe rubber are to be manufactured), for spraying if necessary and for the use of labour and other staff on the plantation. The availability of labour and facilities for approach, communications, and transport should also be taken into consideration while establishing commercial plantations.

Snails and Slugs

By

T. S. RAMAKRISHNAN, M. A., F. A. Sc. & P. N. RADHAKRISHNA PILLAY, B. Sc. (Hons.)

Rubber Research institute of India, Kottayam, Kerala State.

Snails and slugs are known to cause damage to young rubber in many of the eastern countries like Ceylon, Malaya, Indonesia etc., for a long time. It has also been reported that in Ceylon, slugs moved up even older trees and drank the latex as it flowed down the tapping cut or after collecting in the cup. In some instances these creatures appeared in large numbers and caused loss of rubber.

But greater damage is caused when they infest the young plants.

In South India, these pests have been observed in several districts causing damage to young plants. They are nocturnal in habit and are not seen on the plants during day time and may be missed to be noticed. Recently, extensive damage was caused to young plants under two years of age in a plant-

under two years of age in a plantation near Chalakudy. In the months of August and September these pests were found to have affected the apical shoots of several plants extending over several acres. Normally they are however known to infest rubber only in the drier months. These creatures destroyed the terminal bud. It resulted in the development of new lateral buds which were also attacked. The apical portion presented a clubbed appearance with a cluster of shortened lateral shoots with arrested growth. All these shoots remained green and stumpy with small green scale-like structures instead of normal leaves. Later from these shoots were consumed by the pests. Thus instead of having a leader shoot with a number of storeys of leaves, the apical portion is converted into a cluster of malformed short shoots. This affects the normal growth of the plants and may render them useless. Some of the plants dry up and die. In some instances fasciated



Affected Shoots with the Snail

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The land may be flat, undulating or hilly, but very steep slopes are to be avoided. The trees grow well and give good yields from sea level to an altitude of 1000 ft. But above this elevation the rate of growth of the tree slows down and the incidence of diseases increases. The trees come into tapping much later than those at lower elevations. Plantations above 1000 ft., may not be as profitable as those below and more expenditure on protective measures may become necessary.

Soil

Rubber grows satisfactorily in a moderately fertile well drained loamy soil with sufficient humus content to improve its water holding capacity. Water-legged areas or those subject to prolonged inundation extending to months are to be avoided. Rubber does not come up well in areas with the water table less than 2 ft., from the surface. Inundation by floods in rivers for a few days may not be objectionable. If drainage can be improved by provision of drainage channels to take away the excess water the adverse influence of water logging can be reduced. Growing of cover crops may be helpful in conserving soil moisture, adding humus to the soil and preventing soil erosion.

Heavy clays, hard-pan, rock or hard

laterite within 4 feet of the surface of the soil are not favourable.

A study of the local flora will be very helpful in determining the suitability of the area for rubber cultivation. Good, tall, ever green forest growth is indicative of fairly fertile soil and its usefulness for rubber. The presence of bush cover of stunted, thorny, xerophytic vegetation proclaims the aridity of the region and its unsuitability. Gravelly hill slopes with sparse grassy growth are to be avoided. Rubber is a hardy tree which can adapt itself to poor land and adverse conditions to some extent, but the returns will be poor and capital outlay high under such conditions

Reaction of Soil

The reaction of the soil should also be taken into account. The optimum pH for rubber cultivation is between 4.5 and 6. The tolerance limits are pH 3.5 and 7.5. Beyond these limits the growth of rubber will be severely affected. Sandy loams or clay loam are preferred In gravelly hard soil the tree will be stunted and yield below average.

The presence of water sources in the vicinity or in the plantation is desirable. Large quantities of water will be needed to raise nurseries, for the factory (if smoked sheets or crepe rubber are to be manufactured), for spraying if necessary and for the use of labour and other staff on the plantation. The availability of labour and facilities for approach, communications, and transport should also be taken into consideration while establishing commercial plantations.

Snails and Slugs

By

T. S. RAMAKRISHNAN, M. A., F. A. SC. & P. N. RADHAKRISHNA PILLAY, B. SC. (Hons.)

Rubber Research Institute of India, Kottayam, Kerala State.

Snails and slugs are known to cause damage to young rubber in many of the eastern countries like Ceylon, Malaya, Indonesia etc., for a long time. It has also been reported that in Ceylon, slugs moved up even older trees and drank the latex as it flowed down the tapping cut or after collecting in the cup. In some instances these creatures appeared in large numbers and caused loss of rubber.

But greater damage is caused when they infest the young plants.

In South India, these pests have been observed in several districts causing damage to young plants. They are nocturnal in habit and are not seen on the plants during day time and mry be missed to be noticed. Recently, extensive damage was caused to young plants

under two years of age in a plantation near Chalakudy. In the months of August and September these pests were found to have affected the apical shoots of several plants extending over several acres. Normally they are however known to infest rubber only in the drier months. These creatures destroyed the terminal bud. It resulted in the development of new lateral buds which were also attacked. The apical portion presented a clubbed appearance with a cluster of shortened lateral shoots with arrested growth. All these shoots remained green and stumpy with small green scale-like structures instead of normal leaves. Latex from these shoots were consumed by the pests. Thus instead of having a leader shoot with a number of storeys of leaves, the apical portion is converted into a cluster of malforned short shoots. This affects the normal growth of the plants and may render them useless. Some of the plants dry up and die. In some instances fasciated



Affected Shoots with the Snail

STITTABILITY OF SITES FOR RIBBER PLANTATIONS

Rainfall	Well distributed. 80-160° per annum, with the least duration of dry period. As the rainful increases above this, disease will cause heavy damage and protection costs will increase.	Well distributed, 60° of annual rainfall without prolonged dry period.	Areas with 50° or less of rainfall; over 2010; diseases will make it unprofitable to grow rubber and tapping days will be fewer; areas subject to 4 or more months of drought.
Climate	Warm moist climate with a temperature range of 70-95° F.	Slight deviation, say, 60° to 100° F may be passable.	Areas with winters of 50° F or hor summer of over 105° F
Prevailing Winds.	Places devoid of high wind or strong gales, absence of dry hot winds in summer-	Some clones may be able to resist wind damage to some extent, winds affect growth, cause stem-breaks or loss of trees; protected areas better.	Wind swept areas or region subjected to strong gales or hot scorehing winds,
Elevation	Flat, undulating or hilly areas from sea level to 1000 ft.	As the elevation rises above 1000 ft. growth is retarded and damage by diseases increases.	Elevations above 2000 ft. may not be profitable with many of the high yielding clones.
Soil	Should be moderately fertile, loany soil, well drained, a depth of 4 ft, without hard pan or rock or heavy clay within 2 ft, of surface.	Soils which can be improved by mainting, by degigned draininge chamels, raising over cross, etc. may grow a fairly good explimated from for a few days by floods in rivers, but drained away quickly need not be rejected.	Very steep, eroded soils, shallow soil o sand, shan 2 ft. from surface, heavy day on sand, subject to water legging, or prolonger inundation; water table within 2 ft. from the surface.
pH of Soil	4.5-6.	3.5–7.	Highly alkaline soils are unsuitable below 3
Local flora	Good tall evergreen forests indicate fertility & suitability (Tropical & sub-tropical flora)	Area with fairly good growth or trees may be selected.	Stunted thorny bush cover of xerophytes gravelly hill slopes with sparse grassy growth (grass lands).
Water	Presence of water sources in the locality factory use, spraying, for the use of labour	to supply sufficient water for nursery, for and other staff on the estate.	No water resource in the neighbourhood Areas with too bigh water table and marshy areas.
Communi- cation	Facilities for approach, communications can be imported	& transport, availability of labour. Labour	Difficult to approach or lacking in communications.

shoots develop from the affected portions. The plants that are in the single-stemmed stage are attacked while others with branches are rarely visited.

As stated above these creatures were not visible during the day-time on the plants. But a number of them were collected from the area where they were hiding under the mulch or the foliage of weeds. Towards the evening they start

climbing the stem to the top and during the night eat the green shoots or buds and drink the latex that flows out of the wounds. With the rising of the sun they again retreat into the safety of the ground covers or weeds.

The slug is a dark grey fleshy creature about two to three inches in length. It has a flat base (foot) on which it moves leaving a trail of mucilage indicating its



Photographs of slug (above) and snail (below) (enlarged 1½ times national size)

path. Two retractile pin-like antennæ project from the head. A dark fleshy mantle, sometimes spotted, covers the middle portion of the body. This molluse lacks a prominent shell. The snail is a close relative of the slug but is provided with a conspicuous spirally coiled shell by which it can be differentiated.

Control

Different methods of control have been advocated. Collection of these pests by hand-picking and destroying them is very efficient. This will be practicable only

when the area is limited. Land snails are palatable and may be used as food. These hide under the undergrowth and may not be readily spotted during the day.

Spreading poison baits in the area is another method. In the earlier years calcium assenate was used. Briquetts made up of 5 per cent of calcium assenate and the rest of bran (1 lb. calcium arsenate and 16 lb. of bran) are distributed over the area. In recent years however this is being replaced by baits containing metaldehyde. A mixture con-

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taining one part of metaldehyde, 2 parts of rice bran, 6 parts of slaked lime and 6 parts of cement is made and then water added while kneading and then made into small briquettes or balls. These are distributed on the ground among the plants. The slugs and snails are attracted by these baits and are killed because of the high toxicity of meta to the molluscs. The calcium arsenate bait though not as efficient as meta baits are more permanent in action. Meta is not readily

available in India. Meta is also used as a spray. An emulsion of 250 c. c. linseed oil, 250 c. c. skimmed milk and 750 gm. metaldehyde is made in 100 litres of water and sprayed on the stem and apical shoots. Spraying parathion or dieldrex over the parts frequented by these animals is also reported to be efficacious. Gammexane is another insecticide which may prove useful. These may be brushed on the stem for a length of a foot as a repellant.

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Subscribers for Rubber Board Bulletin are requested to send in their renewal subscriptions without waiting for reminders. While sending subscriptions, subscribers may indicate the edition (whether English or Malayalam), the period, and the subscription number. In case of new subscriptions, the fact should be indicated.

Subscribers will note that in cases where renewal subscriptions are not forthcoming in spite of reminders, supply of Rubber Board Bulletin will be automatically stopped.

We are sure subscribers will co-operate with us by prompt remittance of renewal subscriptions with necessary particulars.

Secretary, Rubber Board.

I. Pink Disease

Pink disease is virulent during the rainy season in South India on rubber trees. This disease is found on plants of all ages, but the greatest damage is caused to plants of 2 to 12 years of age. Infection starts in the rainy months (July/August) but dead branches become in September/October.

As young plants of 2 to 12 years are highly susceptible to this disease, rubber growers are advised to be on the look out for symptoms of this disease especi-ally in their young rubber and adopt adequate and timely control measures if Pink disease is caused by the fungus Peilicularia salmonicolor or Corticium

Symptoms

The characteristic symptom of pink disease, and the one from which it derives its name is the appearance upon the surface of the infected bark of a salmon-pink incrustation produced by the fungus. On the young plants, the disease is seen on the main stem at varying heights but on the older plants it may comprehen on the main stem. it may commence on the main stem especially at the forks where the branches arise or on the branches themselves. The stem of plants below three years is



quickly infected and the bark all round the infected part may be destroyed resulting in a ringing effect as a result of which the upper portions wilt and dry up. Dried leaves do not fail off but remain attached to the dead shoots. This occurs mainly in the months of September to November. From below the affected portion one or more new shoots are produced. On plants between 4 and 20 years, the infection is usually located at the forks or where several branches arise close together on the main stem or along some of the branches. The prevalence of the disease in an estate or holding is often noticed only after the distal portions have been killed and the leaves and branches have dried up.

In the initial stages, latex exudes from the affected part. This is followed by fine white thread-like mycelial growth which soon envelop the affected portion. These grow very fast on the surface for a distance of 2 to 3 feet under favourable conditions. Sometimes this develops a pink colour. Large portions of bark are killed and pieces may fall off exposing the wood. Copious flow of latex may also take place and long streaks of blackened coagulated latex formed on the sturface. As a result of destruction of bark, many of the dormant buds on the stem below the point of infection begin to sprout and several new shoots are developed.

Infection

The fungus is capable of entering healthy plant tissues through unwounded bark. The cortical tissues are rapidly invaded. The superficial spread of the fungus is far in advance of internal spread. Rapid spread of infection takes place during wet weather. In a plantation, the disease may occur at random, scattered or adjacent groups of plants may be affected. The spread of infection

to neighbouring plants has often been observed. In the infected tree the disease progresses internally within the bark. Externally the progress can be observed following the line of flow of rain water down the stem. From the fork it may pass on to one or more branches, Small bits of infected bark carrying live mycelium of the fungus may be blown about by wind and may start fresh infection. Air currents, wind blown rain drops and other agents also carry the fungus and help to spread infection.

A higher incidence of the disease has been noticed in holdings with closely planted trees and with thick bush covers leading to higher humidity. The disease is of high importance during the immature period and in the early years of tapping, but in mature plantations, the damage caused is negligible. The loss of trees can go up to 10% in the early years if timely control measures are not adopted. As the canopy of the infected tree may be partially or wholly destroyed, the growth is retarded and tapping is delayed. Even when only one or two of the top branches are affected, significant reduction in the rate of girthing has been noticed.

Control Measures

When an outbreak occurs in a stand, prophylactic treatment would appear advisable.

1. In initial stages of infection when the outer bark alone has been infected in small patches, it may be sufficient if the surface is painted with Bordeaux mixture or Bordeaux paste, after light scraping of the bark. As a prophylactic measure, the stem and branches of the infected tree and the neighbouring healthy ones are also to be protected by spraying Bordeaux mixture or pinating Bordeaux paste.

- 2. In more advanced stages of infection when the shoot has been killed, the affected stem should first be sprayed with Bordeaux mixture. Then it is to be cut at a point about a foot and a haif below the diseased point. The portions thus removed should be burnt off immediately and never left on the plantation as they will become source of infection to the healthy plants. After the removal of the diseased portions, the rest of the stem and branches of the treated as well as the neighbouring trees should be sprayed with Bordeaux mixture. The cut surface should be painted with Bordeaux paste or any other suitable product. It is essential that the diseased bark is sprayed with Bordeaux mixture before cutting the branches or stem as this operation will inactivitate the spores of the fungus present on the surface. Otherwise the fungus is likely to be distributed during the process of cutting and removal of the infected shoots.
- 3. In young plantations prevention is better than cure. Where pink disease is prevalent it is advisable to spray the stem and main branches of all the plants with Bordeaux mixture before the monsoon

II. Manuring

Rubber trees have to be regularly manured commencing from the time of planting, as the soil in the rubber growing areas in our country are highly impoverished. Manuring increases the yield and keeps the tree in full vigour. Manure must be applied at the proper time and at the recommended rates in the nursery, to the young plants in the field and to trees under tapping.

Manuring Schedule 1. Nursery

Sufficient organic manure such as welldecomposed compost or cattle manure

starts as a prophylactic measure. The forks have to be carefully sprayed as infection often starts there. This operation can be combined with the spraying of leaves for protection of leaf fall disease during March to May.

For protecting the stem and the forks it is advisable to use Bordeaux paste made up as follows:

Take one pound of finely powdered copper sulphate and two pounds of fresh powdered slaked lime. Mix the two powders thoroughly. To this add sufficient water or linseed oil to make it into a fine paste. (One part copper sulphate, 2 parts lime and 3 parts linseed oil).

This paste can be applied with a brush to the stem and the fork and the base of the branches. A distance of about 2 feet above and below the fork is to be protected. If linseed oil is used, make sure that the quality of the oil is good and not adulterated with turpentine, kerosene etc. as otherwise the bark of the tree may get damaged.

Adoption of adequate control measures at the right time is no doubt essential for prevention or cure of any disease.

and rock phosphate should be incorporated in the soil at the time of preparing the nursery bed. The quantities recommended by the Board for this purpose are a minimum of one metric tonne of compost or well rotten cattle manure and 200 Kilograms of finely powdered rock phosphate to the acre. An NPK Mixture having the composition 8:12:10 is recommended for plants in the nursery. The first application of the mixture may be made one to two months after planting at the rate of 85 gm, per yard of row. Manuring may be repeated at three monthly intervals until the plants

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II. Manuring and rock phosphate should be incorporated in the soil at the time of preparing the nursery bed. The quantities recom-mended by the Board for this purpose are a minimum of one metric tonne of compost or well rotten cattle manure and 200 Kilograms of finely powdered rock phosphate to the acre. An NPK Mixture having the composition 8:12:10 is recommended for plants in the nursery. The first application of the mixture may be made one to two months after planting at the rate of 85 gm. per yard of row. Manuring may be repeated at three monthly intervals until the plants have attained the normal size for transplanting or upto 3 months before budding. Manure is applied in lines between rows and raked in with a hand rake. Care should be taken to prevent fertilizer particles falling on the leaves or near the tender stems as this would cause damage to the plants.

2. Young Plants in the Field

Manure is applied to young plants

 Ist Year: 2 to 3 months after planting
 225 gm (8 oz) per plant

 2nd Year: 15 months after planting
 450 gm (1 lb) ,

 3rd Year:
 450 , (1 ,) ,

 4th Year:
 550 , (1¼ ,) ,

 5th Year:
 680 , (1½ ,) ,

 6th Year: and subsequent years
 910 , (2 ,) ,

The September-October application is to be made during the temporary break in the monsoon when a dry interval of 4 to 5 weeks will be usually available.

3. Trees in Tapping

For bearing trees it is recommended that an NPK Mixture having the composition 8:10:12 may be used at the rate of 1,800 gm. (4 lb) per tree per year in two instalments of 9:00 gm each in March-May and September-October.

Mode of Application

For the first three years fertilizers may be applied around the base of each plant but sufficiently away from it in annular bands to the extent of root development. It is to be lightly forked into the top two or three inches of soil. Where mulching is carried out, the fertilizer mixture could be advantageously spread on the soil before placing the mulch on it. From the 4th year onwards fertilizer may be applied either in pockets scattered through the area in which the feeding roots occur or it may be spread in square or rectangular patches in between rows, each patch serving four trees. Here also the fertilizer jis to be lightly forked into the top two or three inches of soil.

preferably in two applications viz. in

March-May (premonsoon) and September -October(post monsoon). It is now time

for the Second application of manure.

NPK mixture of the 8:12:12 composition

may be used for planted young rubber.
The September-October manuring for

young rubber of different ages is recom

mended at the following rates:

Question Corner

(We welcome your questions on any matter connected with the rubber industry. Questions will be published with answers in "Rubber Board Bulletin" for the benefit of our readership. Your questions should be addressed to "The Editor, Rubber Board Bulletin, P. B. No. 43, Kottayam, Kerala State).

Ouestion:

What is meant by soil pH? I would like to know how soil pH is related to rubber cultivation.

Answer:

Soil pH is a measure of the acidity or alkalinity of the soil solution. All arids will give positively charged hydrogen atoms (ions) in solution and the concentration of these hydrogen ions is measured on a scale known as the pH scale. The most important reference point for the scale is that of pure water which is neither acidic nor alkaline, but neutral. The mid point of the pH scale, numbered 7, is a measure of the hydrogen ions present in a given volume of pure water; pH values less than 7 are acidic while those greater than 7 are alkaline.

Soil pH is related to many aspects of rubber cultivation, especially in the nutrition of the plants and the use of different fertilizer materials. For instance pH value of a soil is directly related to the availability of plant nutrients in the soil.

In soils having low pH values, phosphates will be less available to plants and in soils with high pH values iron will not be readily available to plants.

Further for most plant species there is a pH range which appears to be the most satisfactory for optimum growth. In the case of rubber it grows well in soils below pH 7 (i. e. slightly acidic soils). The most commonly quoted pH range for satisfactory growth of rubber is from 4 to 6.5 on the pH scale.

Question

Please let me know what spacing I have to adopt for planting rubber.

Answer:

We generally recommend such spacings as would provide an initial stand of 170 to 180 trees per acre in the case of planting with budded stumps and 200 to 250 in the case of planting with clonal seedling stumps. Some of the common spacing adopted to give the recommended stand per acre are:

	1. For budding
In hilly areas	$22' \times 11' = 180$ pits per acre
	$30' \times 8' = 181$,,
In flat areas	$16' \times 16' = 170$,,
	2. For clonal seedlings
In hilly areas	$20' \times 10' = 218$,,
	25' × 8' = 218 ,,
In flat areas	14' × 14' = 222 ,,
	15/ 15/ 102

On steep slopes where contour terraces are necessary for soil conservation, the

terraces for planting may be 22 to 30 feet apart to reduce cost. The distance

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between plants in the terrace may be 8 feet or more to obtain the minimum stand. Such "avenue planting" also facilitates tapping and collection of latex.

A higher initial stand is necessary for clonal seedlings as against budgrafts, as the plants in a seedling population on account of thin genetic variability show considerable variation in growth and yield. In the case of budgrafts, multiplication being effected vegetatively, the inherent or genetic qualities are uniform in all plants of any one clone. In other words, variations in growth and yield in a clone would be due to environmental conditions and for that reason only

limited. If planting materials to be used are seedling stumps prepared after proper selection for health and vigour in the nursery, a lower initial stand of about 200 should be sufficient.

The final tapping stand, that is, the stand per acre during the third or fourth year of tapping required for budgrafts as well as clonal seedlings is more or less 140 per acre. To reduce the stand a gradual and judical thinning out of undesirable plants selected on the criterion of growth during the immature period and of yield during the early years of tapping should be effected.



FROM THEORY TO PRACTICE in RUBBER FABRICATION

BY

JOHN HELEN

Write to the C. M. S. Press, Kottayam, Kerala for descriptive literature about the book.

News and Notes

1. Fertilizer Festival at Kumarakom

The first of the Hundred Fertilizer Festivals that are proposed to be celebrated in different parts of Kottayam district was conducted at Kumarakom on 18th August, 1962. Shri R. Gopalaswamy, District Collector, Kottayam, planted a coconut seedling and inaugurated the the festival at 10 A M. at a public meeting held in the premises of the Kumarakom High School, Shri C. K. Mani, District Convener, Bharat Sevak Samaj, Kottayam, welcomed the gathering. Shri Gopalakrishnan Nair, Chief Commercial Officer, FACT, spoke on the occasion. A symposium on the use of chemical fertilizers for crops was also held later in the day. Officers of the Rubber Board, the FACT and the Agricultural Department took a leading part in the discussions. A large number of

agriculturists enthusiastically participated in the discussions and aired their views.

Presiding over a public meeting in the evening, Shri E. P. Paulose, Hon'ble Minister for Food and Agriculture, Kerala State, exhorted agriculturists to use more and more chemical fertifizers and thus increase the production of food crops as well as commercial crops.

An agricultural exhibition was also organised in connection with the Fertilizer Festival. The Rubber Board and the FACI participated in the exhibition.

There was a programme of variety entertainments in the evening.

2. Meeting of the Indian Rubber Industries Research Association

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Shri R. Gopalaswamy, Collector, Kottayam district, at the Rubber Board's Stall

22nd July, 1962, at New Delhi. Dr. Rama Varma, Chairman, attended the meeting as the Rubber Board's representative.

Distribution of Tjir 1 Clonal Seeds and Seedlings

In order to encourage the use of clonal seeds and seedlings, which are high yielding planting materials for planting rubber, the scheme of distributing them at subsidised rates to small growers and at cost price to large growers and nursery owners was continued during the current seedfall season also. Unlike last year, clonal seeds were available this year in plenty. Hence the Board was able to meet the demand for seeds almost in full. Two grades of Tjir 1 clonal rubber seeds—Grade 1 for direct seed-at-stake planting and grade II for budding—were distributed this year. It is estimated that about 44 lakhs Grade I and about 47,000 grade II seeds were distributed to about

3000 parties. About 60,000 Tjir I clonal seedling stumps were also distributed to rubber growers from the Board's nursery at Karikattur. 918 yards of budwood of R. R. I. M. Clones and 326 yards of budwood of other clones were supplied to rubber growers during this year's planting season.

4. Hiring of Sprayers

The Board had drawn up a scheme to supply sprayers on loan or hire to rubber growers' co-operative societies during the spraying season, this year, for spraying rubber owned by the members of the societies. This was in addition to the sprayers that were already being loaned free of rent to individual growers from the Field Offices of the Board. As per this scheme a total of 46 Gator—koff sprayers were supplied free of charge to 16 co-operative societies during the period April-June 1962 for spraying

rubber owned by the members of the societies. The sprayers were distributed from the Head Office of the Board at Kottayam and the sub-office at Kozhikode. The societies which were supplied with sprayers had been requested to provide the statistics of the rubber area sprayed with the sprayers supplied by the Board and these figures are now being compiled.

5. Committee Meetings

A meeting of the Import/Export Committee of the Rubber Board was held on 21st July, 1962, at the Office of the Tariff Commission, Bombay.

The Small Holdings Development Committee and the Planting Committee met on 14th August, 1962, at the Board's Office, Kottayam.

The Executive Committee met at the Board's Office on 28th September 1962.

6. Delegation to Malaya

As decided by the Board at its 42nd Meeting held on 28th June, 1962, a

delegation consisting of Dr. Rama Varma, Chairman, Rubber Board, Dr. V. R. Narayanan Nair, Shri Chaeko Kallivayalil and Shri K. J. Kurian, will be leaving for Malaya on 6th October, 1962. The delegation will tour Malaya for two weeks and study the different aspects of the rubber industry there and hold discussions with the concerned authorities The delegation will be returning to India on 22nd October, 1962.

7. Appointments, Leave etc.

Shri S. K. Moorthy, Secretary, Rubber Board has been granted earned leave for sixty days with effect from the 6th August, 1962. Shri T. V. Joseph, Statistical & Accounts Officer, Rubber Board, has been appointed to officiate as Secretary, Rubber Board, vice Shri S. K. Moorthy, granted leave.

Shri T. P. Peter, Cost Accountant, Ministry of Finance, Government of India, whose services have been placed at the disposal of the Rubber Board, joined duty on the 13th August, 1962.

RUBBER STATISTICS

TABLE I

Recorded Planted Acreage under Rubber at the End of Each Year

Year	Area in acres
1950	170,506
1951	 171,191
1952	 172,786
1953	173,643
1954	176,647
1955	207,239
1956	 234,351
1957	 261,998
1958	286,567
1959	 305,452
1960	321,002
1961	 348,121

TABLE II

Total Planted Acreage at the End of 1961 and Planting Mate ials Used

(Area in acres)

Planting materials	New planted area	Replanted area	Total acreage	
Ordinary	209,895	4,159	214.054	
Budded	35,535	17,140	52,675 81,392	
Clonal	70,766	10,626		
Total	316,196	31,925	348,121	

RUBBER STATISTICS

TABLE III

Classification of Holdings and Estates According to Size at the End of 1961

					No	of units	Area in acres
A.	Small Holdings (50 a	cres & belov	v)				
	5 acres and below					54,581	104,757
	Above 5 acres and u	pto and inc	luding 10 a	cres		5,124	38,401
	Above 10	"	50	,,		3,162	66,€01
		Total				62,867	109,759
B.	Estates (above 50 ac	res)					
	Above 50 acres and	up to & inc	luding 100	acres		294	21,173
	,, 100	,,	500	,,		223	45,928
	,, 500	15	1000	**		32	21,966
	,, 1000	"	1500	**		18	22,056
	,, 1500	,,	2000	**		6	10,105
	Above 2000 acres					7	17,134
		Total				580	138,362
	GRA	ND TOTAL			5000	63,447	348,121

TABLE IV
Statewise Distribution of the Planted Area at the End of 1961

(Area in acres

STATES			DINGS s & below)	(At	ESTATES bove 50 acres		TOTAL
	STATES	No. of units	Area	No. of units	Area	No. of units	Area
-	77 -1-	62,302	204,909	530	123,345	62,832	328,254
	Kerala	548	4.536	39	10,878	587	15,414
2.	Madras	17	314	10	3,717	27	4,03
3. 4.	Mysore Andamans			1	422	1	42:
	Total	62,867	209,759	580	138,362	63,447	348,12

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

States	1957	1958	1959	1960	1961
Kerala	21,840	22,513	21,603	22,680	24,490
Madras	1,877	1,752	1,704	2,030	2,076
Mysore	405	437	437	447	400
Andamans	25	15	28	35	26
Total	24,147	24,717	23,772	25,192	26992

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber since 1957

(In Metric Tonnes)

2 10		Import		Con	sumption		
Year	Production	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total
1957	24,147	9,832	3,591	13,423	32,273	3,080	35,353
1958	24,717	12,068	3,579	15,647	35,312	3,304	38,616
1959	23,772	14,718	4,748	19,466	39,282	4,410	43,692
1960	25,192	22,949	8,466	31,415	45,941	6,561	52,502
1961	26,992	21,693	8,992	30,685	48,319	9,600	57,919

Consumption of Reclaimed Rubber (In Metric Tonnes)		Export of Natural Rubber (In Metric Tonnes)		
Year	Quantity	Year		Quantity
1957	3,898	1957		36
1958	4,116	1958		Nil
1959	4,526	1959		Nil
1960	5,327	1960		Nil
1961	5,929	1961		Nil

TABLE IX
Stock of Natural and Synthetic Rubber at the End of Each Month 1957—1961

Months	1957	1958	1959	1060	1961
January	9,127	11,829	12,716	11,842	15,427
February	8,437	10,742	11,189	11,389	14,835
March	7,479	10,157	11,442	10,959	12,532
April	7,693	10,161	11,330	10,048	12,507
May	8,213	10,613	10,448	10,210	12,323
June	6,874	10,235	9,456	10,485	11,194
July	6,478	10,120	9,819	10,086	10,716
August	6,950	10,084	10,142	10,400	11,133
September	9,004	9,683	10,122	10,894	11,755
October	10,597	10,795	11,178	12,506	13,754
	11,763	12,549	12,033	13,216	14,437
November December	11,473	12,953	12,271	16,227	16,172

[Published in the Gazette of India, Extraordinary, Part II-Section 3- Sub-section (ii)-New Delhi, Saturday, April 28, 1962/Vaisakha 8, 1364.]

MINISTRY OF COMMERCE AND INDUSTRY Notification

Rubber Control
New Delhi, the 28th April 1962.

S. O. 1274 — In exercise of the powers conferred by sub-section (1) of section 13 of the Rubber Act, 1947 (24 of 1947) and in supersession of the Government of India, Ministry of Commerce and Industry Notification S. O. 663 dated the 24th March, 1961, the Central Government hereby fixes with effect from the 28th April, 1962 for all classes of business the following maximum and minimum prices, exclusive of sales tax, for the various grades and qualities of rubber and latex of different conventrations excluding the cost of container as mentioned below, namely the cost of container as mentioned below.

Grade of		F. O. B. Coch	F. O. B. Cochin for 50 kilograms				
rubber	Quality of rubb	er Maximum prio	Minimum price Rs				
(1)	(2)	(3)	(4)				
Group I	R. M. A. IX	162.60	161.50				
Group .	R. M. A. 1	162.60	161.50				
Group 2	R. M. A. 2	160 95	159.85				
Oloup 2	R. M. A. 3	159.30	1:8.20				
	Cuttings No. 1	151.03	149.93				
Group 3	R. M. A. 4	155.44	154.34				
Oloup .	R. M. A. 5	151.03	149.93				
	Cuttings No. 2	144.42	143.32				
Group 4	Precoagulated Crepe	168.67	167.57				
Group .	Pale Latex Crepe IX	166.45	165.36				
	Pale Latex Crepe 1	164.26	163.16				
	Pale Latex Crepe 2	163.16	162.06				
	Pale Latex Crepe 3 FAQ	162 06	160.96				
Group 5	E. B. C. Super IX	157.64	156.54				
	Estate Brown Crepe IX	153.23	152.13				
	Estate Brown Crepe 2X	149.93	148.83				
	Smoked Blanket	153.23	152.13				
	Remilled Crepe 2	144.97	143.87				
Group 6	Estate Brown Crepe 3X	141.11	140.01				
	Remilled Crepe 3	138.91	137.81				
	Remilled Crepe 4	132.84	131.71				
Group 7	Flat Bark	123.47	122.37				
Normal la	itex up to 35% concentrates	Rs. 162.60 plus a	Rs. 161.50 plus a				
1101111111		premium of Rs. 19.29	premium of Rs. 19.29				
		per 50 Kilograms of	per 50 Kilograms of				
		D. R. C.	D. R. C.				
Latex con	centrates of 36% to 50%	Rs. 162.60 plus a	Rs. 161.50 plus a				
	(both inclusive)	premium of Rs. 36.38	premium of Rs. 36.38				
		per 50 Kilograms of	per 50 Kilograms of				
		D. R. C.	D. R. C.				
Latex cor	ncentrates of 51% to 60%	Rs. 162 60 plus a	Rs. 161.50 plus a				
	(both inclusive)	premium of Rs 47.40	premium of Rs. 47.40				
		per 5) Kilograms of	per 50 Kilograms of				
		D. R. C.	D. R. C.				

Our Cover



New Building of the Rubber Board and the Rubber Research Institute of

Chairman: DR. RAMA VARMA Secretary: T. V. JOSEPH

RUBBER BOARD BULLETIN

OCTOBER—DECEMBER 1962

Vol. VI.

V. K. Bhaskaran Nair

T. S. Ramakrishnan P. N. Radhakrishna Pillay

C. M. George T. S. Ramakrishnan

P. N. Radhakrishna Pillay T. S. Ramakrishnan

P. N. Radhakrishna Pillay



No. 2.

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The views expressed by contributors and advertisers are not necessarily those of the Board.

Issued by

RUBBER BOARD KOTTAYAM



"We must have faith in ourselves and I am certain that, that faith and our preparations will triumph. No other result is conceivable. Let there be this faith and fixed determination to free our country from the aggressor.

We must steel our wills and direct the nation's energy and resources to this one end. We must change our procedures from slow moving methods of peace time to those that produce results quickly.

Military strength is not by itself enough. It has to be supported fully by the industry of the nation and by increasing our production in every way that is necessary for us. I would appeal to all our workers not to indulge in strikes or any other move which comes in the way of increasing production. That production has to be not only in the factory but also in the field."

-Jawaharlal Nehru.

RUBBER STATISTICS

The Rubber Act and Rules require the producers, dealers and manufacturers to submit to the Rubber Board statistics of production, sales, stocks and imports in prescribed form. Producers having holdings of 50 acres and below are exempted from this obligation. Only minimum information is required to be furnished. Still the information furnished to the Board is often incomplete with few exceptions. However strict the Board can be in enforcing the law, unless the parties concerned also realise the need for accurate statistics in planning the development of the industry, the information furnished to the Board will have its own limitations. Even in the matter of production the Board cannot claim to have reliable information. According to the method of calculation adopted till now the estimated production for 1962 was 31,357 tonnes. This shows an increase of 16:17 per cent over the previous year. The imports were regulated on that basis. But there were complaints that excessive imports were allowed and consequently the domestic producer faced difficulties to get the control price. The actual imports were only 34,207 tonnes which was 13,793 tonnes less than what had been recommended for import. The decline in demand for domestic rubber, had there been a real decline might have been due to the determination of the gap between demand and production by under-estimating the latter or over-estimating the former or by

It is generally admitted that an average yield of 600 lbs. can easily be attained in estates which have used high yielding planting material. There are estates which have reported 800 lbs. and more from high yielding planting material. The average of 600 is, therefore, only reasonable. In estates, from unselected seedlings, an average yield of 400 lbs. can be taken as normal. In taking 400 lbs. the increasing use of yield stimulants and the area that is being put under slaughter tapping have been taken into account. In the case of smallholders, an average yield of 500 lbs. per acre from high yielding planting material and 220 lbs. per acre from unselected seedlings would appear to be fair. On the basis of the above assumptions, i.e. 600 lbs. from high yielding planting material and 400 lbs. from unselected seedlings in estates, and 500 lbs. from high yielding planting material and 220 lbs, from unselected seedling in smallholdings, the production would work out to 35,826 tonnes that would mean an average yield of 379 lbs. per acre which would look more reasonable as compared with the average yield of 529 lbs. reported by a representative cross-section of the public limited companies.



43rd Rubber Board Meeting

Chairman's Speech

Friends.

I welcome you to the 43rd meeting of the Board. We are meeting today when the country is facing a naked aggression by a malevolent enemy. By this time it would have been clear to the enemy, our solid determination to throw him out of the borders of our motherland. I need not remind you that in this hour of trial the rubber industry has to perform a duty the importance of which cannot be exaggerated. To move food, arms and equipments to our Jawans in the front, we may require more and more vehicles which can only ply on tyres for which rubber is one of the essential raw materials. We have, therefore, to produce not only more rubber, but have also to see that it reaches the right place in times at the fair price fixed by Government.

I am confident that with the co-operation of the planters, labour and others connected with the industry, it should be possible for the Board to evolve plans to meet the demand for rubber for the defence of our motherland at this critical juncture. I take this opportunity to appeal to all those who are connected with this industry to extend their unstituted co-operation to the Board to ensure supply of rubber to meet the essential requirements of our defence forces.

I want to remind you that the dangers in the frontier should not make us forget problems facing this industry. Today I want only to touch upon two vial matters on which immediate attention is required. Since 1949 the industry has been pressing its case for a subsidy to

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rehabilitate the estates which were overworked during the war. It had also been the industry's case that unless it undertook replanting with high yielding planting material on a large scale, it would be difficult for it to bring down cost and to meet the requirements of the manufacturing industry at a price comparable to that prevailing elsewhere. Today a new threat in the form of synthetic rubber is also on the horizon. Though Government moved slowly, today the industry cannot complain that the assistance extended by the Board is not liberal enough to encourage replanting. Besides a cash subsidy of thousand rupees for every acre replanted, a rehabilitation. allowance of Rs. 9/- has also been provided in the price. In fact the assistance at present extended to the industry is more liberal than that in Malaya and Ceylon where the replanting has made the largest progress. In spite of this liberal assistance, the progress of replanting has been slow so far. The total area replanted up to the end of 1961 was not more than 20,000 acres under the subsidy scheme. At least another 80,000 acres require replanting before 1970 if not earlier. The field staff of the Board has been instructed to draw up plans for replanting by small holders, in their respective jurisdictions. The Board has also addressed a letter to all the large growers to give a phased programme for replanting. It has been the experience of the Board, that the producers are generally slow to furnish information in

time and in many cases it has also been observed that the information furnished is incomplete. This is not a satisfactory position. Unless the producers furnish their replanting programme before 31st December, 1962, it would not be possible for the Board to prepare a consolidated plan for the industry; nor would it be possible to justify the continuance of the allowance for rehabilitation which is due for a review now.

Closely connected with replanting comes the question of planting material. I am glad to inform you that the Board has been able to establish this year a nursery of 50 acres at Karikkattoor. The Board expects to meet the entire requirements of planting material for replanting by small holders from the next planting season onwards. I am also to inform you that the Planting Committee at its last meeting decided to recommend to Government to amend the Rubber Rules to enable the Board to issue licences for newplanting as well as for replanting only with approved high yielding planting material. This makes it necessary to bring stricter control on the collection and sale of seeds. As we have no seed garden of our own all that we can do is to demarcate areas in private estates considered suitable for seed collection and enforce stricter control and inspection of collection and despatch from those centres. I would request those estates which would like to get recognition as seed collecting areas to remove

the unselected seedlings (rogue trees) before the flowering season starts from the
area to be demarcated for seed collection.
The Board has a responsibility for ensuring the quality of seeds used as planting
material and it cannot fail in its duty in
keeping sufficient vigilance to ensure the
quality of the seeds. I may also mention
that arrangements have been made to
make available in the country budwoods
of all popular high yielding clones in
Malaya. Subject to the availability of
foreign exchange arrangements can be
made for the import of limited quantities
of seeds of high yielding clones also.

The above observations reflect the impressions gathered by your Delegation which went to Malaya recently. I hope to make available to the members, the detailed report of the Delegation next month. I want to take this opportunity to express our gratitude to the Federal Government of Malaya, Rubber Research Institute, and the planting community in Malaya for the warm welcome and assistance extended to the Delegation to study the various aspects of the Rubber Plantation Industry there.

"Awake, arise, understand the opportunities you have and stop not till the goal is reached."

DR. S. RADHAKRISHNAN

43rd Meeting of the Rubber Board

The 43rd meeting of the Rubber Board was held at 10, 30 A. M. on 15th November, 1962 at the Rubber Research Institute of India Buildings, Puthuppalli, Kottayam. The following members were present.

1.	Dr. Rama Varma (Chair	man)
2.	0.117 0 00 1	Mem
3.	" George John	"
4.	" Joseph Jacob	,,
5.	" K. Karunakaran	22
6.	Mr. C. H. S. London	,,
7.	Sri A. T. Mathyoo	,,
8.	" Michael A. Kallivayalil	,,
9.	Dr. M. S. Nair	,,
10.	Dr. V. R. Narayanan Nair	,,
11.	Sri K. M. Philip	,,
12.	" P. Ramalingam	22
13.	Smt. Rosamma Punnoose	,,
14.	Sri K. Srcenivasan	51

Before proceeding with the deliberations the Chairman Dr. Rama Varma moved a resolution expressing deep regret on behalf of the Board, at the sad demises of Sarvashri P. Kurian John and Dr. T. T. Chacko, who have been associated with the Board in the past in various capacities. The members endorsed the resolution and as a mark of respect to the memory of the departed souls the members stood up and observed silence for two minutes.

Then the Chairman made the presidential address which is reproduced elsewhere. The following resolutions were unanimously approved by the members.

- (1) "Resolved that the recommendation made by the Executive Committee to levy from estates of 15 acres and above, a fee of Rs. 10/- per acre on replanting applications from 1963 onward, be approved."
 - (2) The Board resolved unanimously to approve the recommendation of the planting committee made at its meeting held on 14th August 1962 and to ratify the action taken by the Chairman thereon.
 - (3) "Resolved that the recommendations made by the Small Holdings Development Committee to get Rule 30-A amended so as to provide utilisation of the Pool Fund for the schemes of assistance to small holders be approved and that the action taken thereon by the Chairman be ratified."
 - (4) "Members of this Board view with great concern the crisis confronting the country, due to communist China's aggression and recommend to the planters, manufacturers and workers of the country to contribute their utmost to the defence efforts by way of money, men and material.

The meeting concluded at 12-30 A. M.

Development of vegetative propagation for Rubber trees

V. K. BHASKARAN NAIR M. Sc. Rubber Research Institute of India.

The development of a simple method of vegetative multiplication for Hevea namely budgrafting led to the selection and making of clones of high yielding seedling trees. Buddings and graftings are widely practised in various kinds of horticultural perennial crops. The art of graftage itself is not new. Some kinds of graftage were recognised as a horticultural practice by the ancients even before the time of the birth of Christ. (Andriance and Brison, 1955). It is a significant fact that at those early periods in agricultural history the unreliability of seeds and the importance of graftage were appreciated in the propagation of

The early planting of the Far East with rubber was all with unselected seedlings originated from the few Wickham seedlings of the late 19th century. Early studies on yield analysis of the vast materials on the plantation has shown that a small percentage of the stand always produced the major share of the entire product thus showing that a major percentage of the area was being used uneconomically, thus pushing the cost of maintenance. A remedy for this could be found only in using selected

materials for planting. It was felt that Hevea could be improved either by vegetative selection or generative selection.

The first efforts at budding rubber were made from 1910 to 1913 by Van Heltan in the Cultuurtum at Buitenzorg, Java (Cramer, 1956). They were resumed in 1916 and the first account of the work was published in 1918. Preliminary investigations were begun about a year later in Ceylon and Malaya. By 1927 budgrafting has become popular in the Far East to the extent that the method has been launched on a commercial scale.

In the beginning mother tree selections were organised by observing a large number of plantation trees and selecting the desired ones out of them. The first step towards selection was taken by the estate tappers under the guidance of research workers and plantation assistants. The selected mother trees were critically studied for some years and vegetatively propagated as clones. The tendency was at first to make small experimental plantings of these clones made from high yielding trees on the estate and distributing the further selected ones as

primary clones. Soon the industry realised the possibilities that lay hidden in the budgrafting and took more and more interest in that direction.

The Research Institutes of the Far East like the Avros have taken in hand the creation of clones, studying and multiplying. In certain cases such institutes with intimate collaboration with the plantation have originated clones in their region carrying the names of the institutes eg. Avros. Plantations themselves taking the responsibility of selecting, testing, and popularising of clones were also common, thus proudly carrying the name of the plantation where they were created like Tjiranji, Bodjong Datar, Prang Besar, Glenshiel and Millakande.

While budgrafting became an estate practice there came a new era in the selection work which consisted of artificial crossing, producing legitimate seed-lings from which buddings were also established. This led to the selection of secondary clones. This was effected by (a) selection of hand pollinated seedlings

obtained by crossing primary mother trees (b) selection of seed obtained by hand pollination of primary clones growing in clone planting or selected seed gathered from seed gardens to primary clones.

In the beginning secondary mother trees were selected in the same way as the primary mother trees namely (1) tapping the seedlings for a short period when they attained tappable size. (2) selecting the desired types (3) multiplying and distributing them to experimental plots for further observations. This brought the time necessary for the selection of secondary clones to 17 to 20 years i. e. 5 to 6 years more when compared with primary clone selection since the buds taken first in those cases were from aged trees, which were directly taken to the experimental plots for further testing.

In the secondary clone selection it was possible to make direct comparisons between the performance of a budding and a mother tree since the age difference



 Removing the anthers from a male flower by taking out the staminal column complete



2. Inserting the anthers and staminal column into a freshly opened female flower

between the mother plant and budding item of study and observation for planwas found to be less and both could be assembled in specific layouts.

Until this time the seeds germinated in nurseries when reached the age for transplanting were then stumped and transplanted to the field. The tops were usually discarded. But the tops always consisted of a good number of axillary buds, and if these were utilised several buddings could be established from each one of them. With this method when followed it was found that a comparison of the mother plant and its buddings of almost similar age would be possible and saved considerable time in the selection period.

Methods were also being developed for grading nursery plants which could facilitate the detection of poor yielders and eliminate them early.

Thus from the early part of this cen-Many failed to reproduce the promise of their mother trees and were discarded. But still, promising clones recommended for commercial planting are increasing considerably. In the course of years it has become a custom to abbreviate their names. Many of the older clones developed from the primary clone selection are still favoured in planting circles, even though newer ones are welcomed to the field with equal zeal. Systematic studies of these clones in relation to varying habitats and their morphological peculiarities are now becoming an

tation experts and research personnel as a guiding principle in the choice of planting materials.

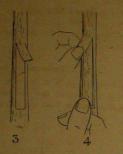
Technique of Budding

Budding is a form of grafting which consists of taking an 'eye' or bud with a small portion of bark attached from a



Two stages in the conventional method of budding

young branch and inserting it in a corresponding cut made in the stem or branch of another plant. In Hevea normally young healthy seedlings 1 to 2 vear old are selected for stock. A rectangular piece of bark is removed from the stock and in its place is inserted a piece exactly similar in shape (scion) with a bud in the centre taken from the clone which it is desired to propagate. Full and well formed buds from healthy



Same two stages in the green budding operation

shoots should be selected. Precision in fitting the bud bark with the incision in the stock, prevention of the admission of air and water between the scion and stock by providing appropriate bandages and shade from the sun's direct rays, are important factors for success. After union of stock and scion has taken place which should be 3 weeks or later the bandage may be removed and subsequently the stock pruned back.

Some New Developments in Budding Practices

Now clones are reproduced by budgrafting on seedling stocks when these are usually. 10 months or more old. But it was found that buddings could be successfully carried out on seedlings 2 to 5 months old. Green buds obtained from near the base of new flushes of growth were used for this. By budding seedlings while they were still small, stum-

ped buddings could be produced one year after sowing the stock seed. Green buddings also could be raised in polythene bags in nurseries and transplanted with a length of scion which was not cut back and with an und istributed root system. This might lead the plants to tappable size a few months sooner than would normally be expected.

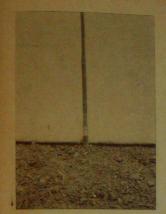


Bud sticks are cut from the bushy plants

Experimental buddings carried out on 2½ to 5 months old seedling stocks at our Experiment Station have given promising results. It is intended to give more details of this work in a later issue of this Bulletin.

Propagation by Cuttings

For the last many years vegetative propagation in rubber is being done by budding on seedling root stocks. Studies of the effect of seedling root stocks on buddings indicate that the root system may modify the vigour, yield and latex quality of the scions. Therefore the effect of a given root stock on the scion



Budded on a 4 month old stock

0.5"×12" polythene strip used for bandaging.

could be either adverse or beneficial. On the contrary clonal root stock has the advantage of uniformity.

It was found that young shoots could be successfully rooted by keeping under a suitable mist control system. However, their performance in field conditions requires careful observation.

Summary

The development of vegetative propagation for *Hevea* namely budgrafting led to the selection and making of clones of high yielding seedling trees. It is found that by this method commercial plantings could be established with a uniformly high production. The research institutes

n the Far East with the intimate cooperation of the plantation took steps
for selecting primary mother trees from
existing trees of the plantations. These
mother trees have produced the primary
clones. Later there followed a new era
in the selection work which consisted
of artificial crossing of primary mother
trees or primary clones thus producing a
secondary type of clones. Much work
has been carried out in the testing of
these clones by the research institutions
and the plantations concerned. During
the course of the selection work
thousands of clones have been discarded



12 weeks old budding (scion length 43 cms) Budded on 2½ month old stock at our Experiment Station nursery

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Budding on 3 to 4 months old stocks which have been lifted as budded stumps and transplanted into polythene bags

but many are made available for the use of the commercial plantings. These include both from the primary and secondary level selections. Systematic studies of these clones in relation to varying habitats and their morphological peculiarities are now becoming an item of study and observation for plantation experts and research personnel, as a guiding principle in the choice of planting material. The technique of budding is discussed. The green budding methods if made successful in field practices may lead the plants to tappable size a few months sooner than would normally be expected. It is found that vegetative propagation by cuttings will also be possible by introducing the young shoots under a mist control system.

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Mist propagation of cuttings

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Planters' Bulletin 45

" " 62

Proceedings of the Natural Rubber Research Conference, 1962

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I hotograph of a budding killed by spearhead

Spearhead
Drying of Bark
above the
Bud Union

T. S. RAMAKRISHNAN M. A., F. A. SC. P. N. RADHAKRISHNA PILLAY B. SC. (HORS)

In young plantations in S. India it can be observed that the snag of the stock often turns black and is invaded by

several fungi including *Diplodia*. In some instances the fungus goes deeper especially when callus covering over the

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stock has been delayed. When thicker stock plants are used this is more evident. The point of entry is on the side opposite to the budded area. Water may collect between the snag and the growing callus and hasten the rotting. This type of damage is more in some clones (Gl 1 and LCB 1320) when the stock side is facing south or west and no protection against sun is provided. In this country a hot sunny period extending over 3 or 4 months is prevalent and exposure of the area to the hot sun causes drying of the young bark. The ground heat is also added to this.

Diplodia is prevalent throughout the planting districts and it infects through wounds or dead tissues. Under favourable conditions it grows down into the stock or up into the stock or up into the stock an extended dry patch broader below and tapering to a point above (shaped like a spear head) develops. This may have serious consequences. The bark is discoloured or is lost and the exposed wood is grey to black and overgrown by Diplodia and other fungi. If left untreated the plants dry up or are broken at this place. In some estates about 10 per cent of the

plants have been lost. The damage has been observed in Kanyakumari, Kotta-yam, Trichur and Cannanore districts. It is likely to occur in other areas also. In Indochina also similar damage has been reported. This country also has a prolonged dry period.

The primary factor in the causation of this damage being sun's hear, measures to alleviate this have to be taken as a preventive measure. The fungi observed are weak parasites and can be kept out by the initial protection of the cut surface of stock. The stocks should be cut at a steep angle so that water may easily run off. The cut surface should be protected with a fungicide. Bordeaux paste can be used. A coating of prowax may be given to hasten the healing of the wound. The brown bark region from the ground level up to the upper limit must be whitewashed as a protection against sun's heat. In the first year shading of the vulnerable part may be necessary. The plants could be saved if the affected portion is scraped light, washed with a solution of aretan or ceresan wet and then coated with prowax. During summer it should be protected from sun's heat by white washing.

labour plenty, it would be worthwhile if estate owners undertake the collection of seed during the season. Seed collection might be encouraged on small holdings as the sale of seed would be an additional income to the small holder. This would also provide data on the availability of seed and the cost of collection for trials on large holdings.

Pretreatment of Seed and Oil Recovery.

The fresh seed containing high moisture has to be dried in sun or in kiln type dryers to bring moisture to 15 percent. The seed has to be cracked in rolls and the cracked seed screened to separate hulls and kernels. A two stage crushing of kernels in expellers is reported to produce a cake of 6-7 percent oil from kernels of 42 percent oil content?

ver plants is minimised. If the cuttings the cover plants, grasses and other eeds, are placed round the base of the oung rubber plant to form a mulch, the rowth of weeds grasses and the cover plants under the layer of mulch will be suppressed and this practice may therefore be helpful to minimise the weeding cost, to a certain extent.

Mulching and Fertilizer Applications

In the case of rubber plants, mulch d properly it is a common observation to find prolific development of tiny feeding roots of the plant, just below the decaying mulch. This intense root activity is of two years old budgrafts within the closely associated with better environ-

With the object of providing data on the characteristics and composition of Indian rubber seed as a raw material for crushing and its oil for edible and industrial uses, the present work was under-

Experimental

Six samples of rubber seed (Hevea brasiliensis) fresh from harvest were procured from the Secretary, Rubber Board in August 1960. They were analysed for seed characteristics (index, size and hull kernel contents, and seed composition moisture, oil, protein, crude fibre and ash contents). The results are given in Table 1. The A. O. C. S. Official and Tentative Methods were adopted in the analysis of kernels. The comparative values earlier reported in literature are ment in soil conditions, it is reasonable to find some response in the growth of rubber plants in the early years. According to Dijkman (1951) mulching the clean areas around the rubber with a layer of plant material preferably of cut, leguminous refuse has been found beneficial in open plantings. It is reported that a marked stimulating effect on the growth of rubber has been shown by mulching in Mid and East Java on porous soils. (1) Experiments carried out in Malaya also showed that mulching with cuttings of Mikania Scandens produced a better rate of growth in the case first six months after the commencement ment under the mulch; for instance of the treatment; the magnitude of this

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8 P.	Average (9)	1	2					
		5.4	2.7	31.3	0.69	41.7	58.3	42.0
	Kanthimathi (8)	5.3	2.2	30.0	70.0	42.0	58.0	45.8 20.4 8.7
	e Attoor (7)	5.2	2.7	32.0	0.89	41.0	59.0	39.6 24.0 7.2
	Sample Palazhi Attoor (6)	5.5	2.7	32.0	0.89	45.4	54.6	38.0
ubber Seed	pply of the Kottayam II (5)	5.4	2.8	31.0	0.69	41.0	59.0	45.8 20.4 2 7.2 3.3
ELABLE 1	Source of Supply of the Sample of Omanapuram Kottayam I Palazhi A (3) (4) (5) (6)	5.3	2.5	32.0	0.89	40.0	0.09	39.8 23.3 6.1 4.5
EMPosition of	S Omanapuram (3)	5.7	11	29.2	70.8	40.9	1.65	42.9 20.2 6.8 4.6

on the side facing the stock an extended dry patch broader below and tapering to a point above (shaped like a spear head) develops. This may have serious consequences. The bark is discoloured or is lost and the exposed wood is grey to black and overgrown by Diplodia and other fungi. If left untreated the plants dry up or are broken at this place. In some estates about 10 per cent of the

The brown bark region from the ground level up to the upper limit must be white-washed as a protection against sun's heat. In the first year shading of the vulnerable part may be necessary. The plants could be saved if the affected portion is scraped light, washed with a solution of arctan or ceresan wet and then coated with prowax. During summer it should be protected from sun's heat by white washing.

the mulch on raindrops which will allow better percolation of rain water.

Mulching and Weed Control

Weed control is another major problem in our plantations. Unless the be very poor. Usually in a new clearing a leguminous creeping cover is put down at the earliest possible occasion and during the period of establishment of this cover and throughout the period of its maintenance it is necessary to carry out periodic weeding rounds to remove the creeping legumes, grasses and other weeds from the immediate vicinity of the rubber plants, so that the competition om these weeds, grasses and legume ver plants is minimised. If the cuttings the cover plants, grasses and other eeds, are placed round the base of the oung rubber plant to form a mulch, the rowth of weeds grasses and the cover plants under the layer of mulch will be suppressed and this practice may therefore be helpful to minimise the weeding cost, to a certain extent.

Mulching and Fertilizer Applications

In the case of rubber plants, mulch: I properly it is a common observation to find prolific development of tiny feeding roots of the plant, just below the decaying mulch. This intense root activity is closely associated with better environment under the mulch; for instance

increased soil moisture contections content of the favourable temperature range a nutrient availability. It is a sou cultural practice to apply fertility cars of Reseating reatest root activity is observed. To Miam fore in the case of rubber plants if muting is carried out to any extent, fertility R. R. L. of Miam be advantageously spread on his Div. soil before placing the mulch on it. Is doing so, the probable wastage of plannonference food from the fertilizers applied could No. 62. be reduced considerably.

Mulching and Growth of Rubber Plants

It has already been said that the practice of mulching will result in the improvement of the soil conditions around the rubber plants in an open planting. As a consequence of the improvement in soil conditions, it is reasonable to find some response in the growth of rubber plants in the early years. According to Dijkman (1951) mulching the clean areas around the rubber with a layer of plant material preferably of cut leguminous refuse has been found beneficial in open plantings. It is reported that a marked stimulating effect on the growth of rubber has been shown by mulching in Mid and East Java on porous soils. (1) Experiments carried out in Malaya also showed that mulching with cuttings of Mikania Scandens produced a better rate of growth in the case of two years old budgrafts within the first six months after the commencement of the treatment; the magnitude of this

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his short period was of 12%. ag will help to give the rubber a good start especially in areas are subject to drought or on ion, experiments comparing several es of cover plants as mulching mateals, have also shown conclusively that aulching in the first few years of a rubber plantatation is beneficial (4) It is also reported in Ceylon that in an estate where the rubber plants were mulched with Guatemala grass mulch twice a year and fertilizer also applied over the mulched strips twice a year and the applied fertilizer covered up with a fresh layer of mulching material, rubber of 20 inches at 3 feet from the ground at the early age of 4½ years from planting and there is little doubt therefore that the rate of girthing in this case has been increased by mulching. (5) Practical lopment are the main factors limiting early growth of rubber plants and mulching the rubber plants which will result in soil moisture conservation and increased root development in the early years, has beneficial effects on the early tree growth. The practice of mulching rubber plants in the early years was tried at the Board's experiment station at Puthupally and found to have beneficial effects on

the growth of rubber plants during the initial periods.

Mulching Material and time of Mulching

Under the conditions obtaining on rubber estates in India the main drawback is the lack of sufficient mulching material close at hand for the initial mulching operations and for replenishing the mulch layer at suitable intervals. However, in most of our estates Pueraria phaseoloides if established and maintained properly from the very beginning it is possible to get enough mulching materials as cut refuse of this cover plant for the first few years after planting as this cover plant will grow sufficiently vigorous to withstand slashing at the eo of the two monsoon periods under canu. estate conditions. The loppings of tund cover plants and the cuttings of grassiteand other weeds obtained at the time on's weeding will provide sufficient materiahe for mulching rubber plants during thee initial periods in most estates.

As the main object of mulching is to check evaporation of moisture during the periods of drought from the soil around young rubber plants, it is advisable that mulching should be done during period for weather. However, owing telecumulative benefits of mulching praciti matters little in the long run who mulching is done during the portial dry weather itself.

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econdary leaf fall

Caused by

Glomerella cingulata (Stonem.) S. & V.S.
(Gloeosporium alborubrum Petoh)

Secondary leaf fall' is the name given a disease of rubber causing a minor af shedding as opposed to the severe abnormal leaf fall' caused by Phytogisthora palmivora. This type of leaf fall has been reported from Ceylon, Java, Malaya and Indochina. Immature leaves of young bud-grafts as well as those of mature trees are affected. Some

districts in the moaths of April, May, September and October. The disease could be noticed after the receipt of the first showers and before the onset of the south-west monsoon or during the break between the south-west and north-east monsoons when new flushes are formed. However, it is of much less importance compared to the leaf fall caused by

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clones are reported to be more susceptible than others. Sometimes complete defoliation of young shoots may take place. In Malaya the shed leaves are reported to show Oilium heveae and vellow mites in addition to Gloeosporium. From India this disease has not been reported previously though the causalfungus has been recorded (Butler & Bisby, 1960). This does not mean however that it was not prevalent. As abnormal leaf fall is common in this country the other type might have been overlooked. In recent years, however secondary leaf fall has been observed in a number of estates in Quilon, Trichur and Kozhikode

Phytophthora palmivora. The affected cleaves are often free from Oidium or 's mites.

Some clones are affected to a greater extent than others. In Indochina the clones BD 5 and PB 25 are known to be susceptible while PB 86 is stated to be resistant while in Malaya, the clones Tjir 1, Pil B 84, BD 5, AVROS 50 and PB 86 are known to be affected. The cloner Tjir 1 and PB 86 and the clonal seec lings of Tjir 1 are known to be suscept, ble in S. India. Other seedlings are all susceptible. Certain environmital conditions contribute to the extet of

PENTER, J. B. & s minute circular brown lesions, in diameter are formed. In stages these spots resemble caused by Helminthosporium But later they develop a thick

AMAKRISHN ADHAKRIS HARPLI



One leaflet showing raised lesions

brown margin and are raised above the surface as conical projections. The central tissues may turn white and exhibit star shaped tears. Young leaflets may carry numerous spots and become crinkled. These are shed quickly. Others are misshapen with ragged and torn margins. Dark green mature leaflets are not infected. Under moist conditions the accrvuli (spore bearing bodies) of

the fungus develop on the spots and may be light or deep pink in colour. Lesions may be formed on the young green stem also. Sometimes die-back sets in also the stem dries up. Before the commer ment of the heavy rains towards the of May, the same organism could be infecting the green pods causing roof the fruits. The pericarp become green and is covered by mnuminute accrvuli varying fir deep pink in colour. Su fraheasily and may be shed or main dend to the stalks.

Pathogen

The fungus causing the diseas X, identified by Petoh as Gloeosi alborubrum. Later investigator lic of the opinion that it is synony It with other species of Gloeosporium'e Colletotrichum and that these repraonly the imperfect stages of Glome cingulata (Carpenter and Stevent 1954). The only difference Colletotrichum and Gloeosporium the development of setae in the acer of the former. This character is quite undependable. Some isolates of G. alborubrum also produce setae. Though the formation of the perfect stage of this isolate has not been observed it is better to follow the nomenclature suggested. We have however to accept that G. cingulata is made up of more than one strain capable of infecting rubber causing different symptoms. Besides Hevea other hosts have been recorded for this



severity of the disease. The chief among them are the soil factors. High incidence is observed on plants growing in gravelly and infertile soils. The disease is considered to be a sign of weakened condition of the plants caused by lack of nutrition.

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The disease affects the tender and immature leaves. The leaves formed in the new flushes of mature trees after the receipt of rains are involved. Immature leaves of young buddings and seedlings are also affected. The symptoms

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ne nyphae permeate the tissues of the affected part. Intra epidermal or sub-epidermal stromata are formed. From the outer surface of the stroma closely packed cylindrical conidiophores develop and help to rupture the epidermal layer. On these conidiophores hyaline, oblong, one-celled conidia measuring 10-20 × 3-5 microns are produced. Though individual conidia are hyaline, in mass they are of various shades of pink colour. Acervuli are formed on the lesions on green twigs and fruits. High humidity is prerequisite for the formation of the acervuli.

ilus and conidia of G alborubrum

gus grows readily on agar he surface of the growth is with numerous pinkish acervuli, aimes colouring the whole surface he agar slant deep pink. Variations of the been observed in the nature of

e twth, formation of sectors, intensity obsporulation and formation of setae. nd

Control

vated the disease.

The damage caused by the varies in extent. Young plants develop die back and the growth a sely affected. This is more so in buc plants. On mature trees the leaf fa not so severe. As stated above nature of the soil factors determine intensity of leaf fall. In well manus holdings this leaf fall is rare. In drainage has in some instance

In the earlier years sulphur o the foliage was recommended a trol measure. But now it is knosulphur does not have any ir effect on this pathogen. Other cides like fermate, zineb and I mixture are known to have give factory control. In our country; mixture is sprayed on the fc April for the control of abnor. fall. The same treatment will kee secondary leaf fall also. But the flushes formed after the rains (i. spraying) have to be protected. T incidence of this disease in India r partially due to the spraying carrie against Phytophthora leaf fall. incidentally checks secondary le also. In addition to spraying, acquantities of manure have also applied.

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Report of the first year of trials in increasing yield from existing plantations of rubber

T. S. RAMAKRISHNAN, M. A., F. A. Sc. 6. N. RADHAKRISHNA PILLAY, B. Sc. (Hons)

Rubber Research Institute of India, Kottayam.

The gap between production and consumption of rubber in India is widening. This necessitates increasing imports of rubber from other countries at the expense of foreign exchange. To obviate this all efforts have to be directed towards increasing the production of rubber in the country. The long term project is to replace low yielding trees with high yielding new clones or clonal seedlings or bring more new area under high yielding clones. These, methods have their limitations. At any rate it will take some years to get results.

Another line of approach is to increase production from existing plantations by adopting measures which will prevent losses caused by diseases or improve the fertility status of the soil or augment the flow of latex. More than one disease affects the rubber plants resulting in the reduction of foliage, destruction of branches and damage to the tapping panel. The cumulative effects of these diseases are to reduce the yield of latex significantly, amounting to over 50%. If timely preventive or protective treatments are given the losses caused by these diseases can be eliminated and production increased.

The soils in rubber estates in S. India are not of adequate fertility. Consequently the growth of the trees is poor in many holdings and yield of latex subnormal. Application of fertilizers and establishment of cover crops of Pueraria phaseoloides improve the health of the trees and increase the yield of latex, excepting in holdings where the trees are very old and beyond their economic span of life. Fertilizer trials carried out in this country on mature rubber have revealed that the yield of latex is improved by the application of NPK mixtures. It has also been established that cover crops could be maintained un mature rubber and that these help 1.2 conserving soil moisture, keeping down the soil temperature, preventing soil erosion and adding humus and nitrogen to the soil.

Application of yield stimulants based on 2, 4, 5-T or 2, 4-D is becoming a routine practice in Mulaya and Indonesia for enhancing the yield of latex. This method is adopted only on trees over 18 years of age. The applications are repeated periodically once in 6 months; even after continuous use for 7 years no adverse effects have been reported.



Manuring

In India there is an impression that this method is to be adopted only on trees which are to be cut in 2 or 3 years and that on other trees it is harmful. This has not been gained from actual experience but is mere speculation.

In order to demonstrate the increase in yield obtained by the adoption of these methods, trials were laid out in three holdings in Kanyakumari district and one in Cannanore district in growers' holdings. The trees were marked out in blocks each block consist ing of one task (250 trees). In each holding, one block was left as control Of the rest some received protection, fertilizers and stimulant while others were protected and manured only. All the operations were carried out under our supervision. Materials for the protection of the trees, stimulants and panel protectants were supplied free to the grower. Fertilizers were supplied by the Fertilizer Association of India, twenty five percent of the cost being

borne by the grower and the rest shared equally between the Rubber Board and the Fertilizer Association. The labour charges were met by the growers. The yield records were submitted weekly by the growers and were periodically checked by the Rubber Instructor concerned. The results obtained in different holdings are given below separately.

In Kanyakumari district, powdery mildew (Oidium heveae) is the most important disease and therefore sulphur dusting was adopted as a protective measure. In Cannanore district however, abnormal leaf fall (Phytophthora palmivora) is more important and so the the trees were sprayed with oil-based copper oxychloride before the monsoon.



Application of yield stimulant

Kanyakumari district

Plot I :-

The experimental area consists of 5 blocks of 250 trees each over 20 years of age. Most of these are seedlings. In this area sulphur-tale mixture (70:30) was dusted. Five rounds of dusting, using 10 lb. of powder per acre per round were made. Dusting operations started between 4 and 5 AM and were stopped by 10 AM. Mistral II AB power duster was used. No defoliation occurred. Yield stimulant was first applied (2, 4, 5—T) on 28:3, 1962 to a breadth of three inches of bark below the tapping cut after scraping the surface lightly. A second application (2, 4—D) was made

in October over a breadth of one inchonly. The tapping cut and panel were brushed with aretan solution and later covered with prowax or mixture of prowax and rubberkote during rainy months. Block No. 1 received protection, fertilizers and stimulant. Blocks No. 2 to 4 were dusted and fertilizer applied. The fifth block was kept as control. Four pounds of NPK mixture (8-12-10) were applied per tree in 2 doses of 2 lb. each, once in April and again in early October. The fertilizer was applied in a square patch of 5 ft. square between 4 trees. Dustings were between 4-2-62 and 17-3-62.

The yield data are shown below:-

TABLE I

Yield of dry rubber in lb per 250 trees

			Blocks		
Month	1	2	3	4	5
1962 March	89.5	82	80	65	58
April	235	103.5	114	81	79.5
May	199	102	112	84	82
June	274	154	175	117	117
July	96	64	78	52	53
August	164	119	142	100	107
September	206	131	166	101	104
October	167	88	143	74	76
November	316	161	253	120	128
December	286	149	189	121	134
1963 January	150	81	96	68	77
Total	2182.5	1234.5	1548	983	1015.5

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Application of yield stimulant

Kanyakumari district

Plot I :-

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September	206	131	166	101	104					
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November	316	161	253	120	128					
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1963 January	150	81	96	68	77					
Total	2182.5	1234.5	1548	983	1015.5					

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The plot receiving all the treatments has given the highest yield. Of the three plots receiving dusting and fertilizers only, two have registered higher yields while one is on a par with the control.

Plot 2:- in Kulasekharam

The trees were between twenty and twenty five years of age and consisted of seedlings and Tjir 1 budded trees. The treatments consisted of:

Blocks 1 & 2 — Sulphur-talc mixture dusting, fertilizer

application and yield stimulant.

Blocks 3 to 6 — Sulphur-tale dusting and fertilizer application

Block 7 — Control.

Five rounds of dusting were given in February and March. Fertilizer application—2 lb. NPK (8—12—10) mixture per tree in April and again in October; stimulant 2,4,5—T for three inches in March and 2,4—D, one inch in October.

TABLE II

Yield of dry rubber per 250 trees

	Blocks							
Month	1	2	3	4	5	6	7	
1962 March	86.5	71.5	67.5	57.5	62.5	41.5	38	
April	346	362	211	176	168	100	124	
May	217	217	150	137	138	122	123	
June	427	418	294	249	231	215	205	
July	170	202	168	138	118	114	115	
August	307	322	259	242	212	233	178	
September	244	243	217	203	192	181	177	
October	187	168	129	109	135	165	116	
November	381	327	284	222	226	271	232	
December	404	405	364	327	303	364	293	
1963 January	322	278	257	219	230	285	201	
Total	3091.5	2983.5	2400.5	2079.5	2019.5	2091.5	1802	

The total increase in yield in the stimulated blocks is very high. Even protection and fertilizers have registered high increases compared with the control.

Plot 3 :-

This is also in Kanyakumari district but about 11—12 miles away from plot 2. The trees are mostly buddings of Tjir 1

with a high percentage of BD 5 in blocks treatments while blocks 3 to 6 had been 1 and 2. In this holding also the treat-dusted and fertilized. Block 7 was the ments were on the same lines as in Plot 2, control, The first two blocks had all the three

The yield data are given below :-

TABLE III Dry weight of rubber from 250 trees

Month	1	2	3	Blocks 4	5	6	7
1962 March	45.4	45.9	36 2	42.4	34.7	21	
April	173	156	94	107		31	30
May	134	127	97	104	90	86	87
June	207	211			96	87	87
July	210.5	231	194.75		204.75	191	190
			194.75	239.75	199.25	188.75	197.25
August	95	99	94	106.75	92.25	84.75	79.5
September	160.25	166.5	158	190.00	170.25	161.00	127.25
October	109.5	111.75	110.75	113.75	114.00	107.25	90.50
November	127	135.75	128.5	147.25	128.75	121.00	120,25
December	171 50	185.75	168.25	194.50	174.25	167,00	163.75
1963 January	139.25	138.75	139.50	167.50	139.75	137.25	137.00
Total	1572.40	1608.40	1415.70	1632.90	1443.95	1362.00	1309.50

Average yield from the three plots

Average yield per block of 250 trees in lb.

	Dusted fertilized&stimulated	Dusted and fertilized	Control
Plot-1	2182.5	1255.2	1015,5
2	3037.5	2147.5	1802
3	1590.4	1464.14	1309.5

In all the three plots the combined treatments have given very high yields. In the third plot the yield from the stimulated blocks is not up to expecta-

tion. This could be explained by the fact that a high percentage of the trees in Blocks 1 and 2 was of the clone BD 5. In other estates also it has been

OCTOBER-DEC. 1962]

The plot receiving all the treatments has given the highest yield. Of the three plots receiving dusting and fertilizers only, two have registered higher yields while one is on a par with the control.

Plot 2:- in Kulasekharam

The trees were between twenty and twenty five years of age and consisted of seedlings and Tjir 1 budded trees. The treatments consisted of:

Blocks 1 & 2 — Sulphur-tale mixture dusting, fertilizer

application and yield stimulant.

Blocks 3 to 6 — Sulphur-tale dusting and fertilizer application

Block 7 — Control

Five rounds of dusting were given in February and March. Fertilizer application—2 lb. NPK (8—12—10) mixture per tree in April and again in October; stimulant 2,4,5—T for three inches in March and 2,4—D, one inch in October.

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Total	3091.5	2983.5	2400.5	2079.5	2019.5	2091.5	1802

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July	210.5	231	194.75	239.75	199.25	188.75	197.2
August	95	99	94	106.75	92.25	84.75	79.5
September	160.25	166.5	158	190.00	170.25	161.00	127.2
October	109.5	111.75	110.75	113.75	114.00	107.25	90.50
November	127	135.75	128.5	147.25	128.75	121.00	120.25
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2	3037.5	2147.5	1802
3	1590.4	1464.14	1309.5

tion. This could be explained by the In all the three plots the combined fact that a high percentage of the treatments have given very high yields. trees in Blocks 1 and 2 was of the clone In the third plot the yield from the BD 5. In other estates also it has been stimulated blocks is not up to expectaobserved that this clone gives a poor response to yield stimulants. But in the plots 1 and 2 which had either Tjir 1 buddings or seedlings better results have been obtained. Compared to the untreated controls the yield from protected and manured plots is much higher. The response to manuring will be evident only after an year in mature trees. Hence the benefit accrued has to be attributed mainly to the control measures adopted.

The cost of the treatments of five rounds of dusting, manuring and stimulant application together for the whole year for 250 trees is about Rs. 280/- or Rs. 11 per tree. The cost of dusting may be reduced in some years if the incidence of the disease is low. The average increase in yield in all the plots together over the control per block in those receiving all the treatments is very high and indicate how the cost of treatment is far outweighed by the increased income. Further the health of the trees is also improved. No adverse effects of the stimulant have been noticed so far.

The average increase in yield per 250 trees in the blocks receiving all the treatments over the control is 1167 lb. in Plot 1, 1235.5 lb. in plot 2 and 280.9 lb. in plot 3. The lower figure in plot 3, as



Low volume spraying

already stated is caused by the apresence of more than 50% BD 5 trees in the stimulated blocks and some labour trouble. Calculating the cost of 1 lb of rubber at Rs. 1. 50 per lb the increase in yield has been sufficient to pay for the treatments and to leave a comfortable margin of profit. The trees take one year to respond to manuring and therefore it is too early to assess the benefit of manuring. They had good foliage. Dieback was absent and the health of the trees improved providing long term benefit.

Cannanore district

Plot No. 4:

This was in Cannanore district near Taliparamba. The plantation was over 25 years old, and consisted of unselected seedlings in a neglected condition without manuring, protection or cultural operations. Six blocks of 250 trees each were included in the treatments and all of them were sprayed with oil based copper oxychloride with the micron sprayer and fertilized with 4 lb. of rubber

mixture (8-12-10) in two doses of 2 lb. cach in April and October. Stimulant (2, 4, 5-T) was applied to 3° of bark below tapping cut in April in blocks 1 and 2. Since tapping was stopped during the rainy months the treated bark was not fully utilised by October. Hence a second application was not made. One block of 250 trees was kept as control On account of the spraying, leaf retention was 75.8 per cent in the sprayed plots and 32 per cent in the control.

TABLE V

The yield of dry rubber in lb. per block of 250 trees

Month							
	1	2	3	Blocks 4	5	6	7
April	80.5	80.5	35.25	35.25	35.25	35,25	54.25
May	78.25	69.5	41.75	44.25	48.25	44.5	43,75
June	43.0	40.75	22.75	22.50	20.75	20.0	20.0
July)							20.0
August	No tapping						
September	38.5	39.5	35.5	17.5	21.75	26.0	28.0
October	71.0	64.0	63.0	59.0	56.0	63.0	57.0
November	93.75	92.75	75.75	66.5	66.75	71.5	62.0
December	61.75	59.75	52.75	56.0	52.5	50.25	40.5
Total	466.75	446.75	326.75	301.0	301.25	310.5	305.5

This is a neglected plantation and has not had any cultural treatments before. Here also the highest yield has been from the blocks receiving all the three treatments. Since the plantation was uncared for, the response has not been as high as in other plots in the first year.

These trials have indicated that some precautions have to be observed while using the stimulants. The stimulated bark swells, cracks develop and becomes soft. It is liable to be affected by bark rot during rainy season if protective measures are not adopted. It is



Dusting Sulphur-tale mixture

advisable to mix some mercurial fungicide along Nie't the stimulant. We found aretan to be lb. Y satisfactory. Further, panel protect with aretan and application of prowax rubberkote are also

necessary during the rainy months. Under the conditions prevalent in Kerala it is better to apply the stimulant to 1½ inches of bark in March and 1½ inches in October. This will obviate tapping

of the stimulated bark during rains. All clones and seedlings do not respond equally to the stimulant. Some clones like BD 5, Tjir 16 and AVROS 50 exhibit very little increase when the stimulants are used. In some trees the flow continues for a much longer period and a second collection may be necessary. During the first year of trial there was no increase of the incidence of brown bast in the stimulated plots. We have used both 2, 4, 5-T and 2, 4-D formulations with success. But we would always insist on the use of the fungicides to protect the panel and the bark when stimulant is used.

The results have clearly indicated the advantages of combining all the three treatments. The production can be significantly increased from the mediumaged existing plantations at a low cost and this will partly meet the increased demand for rubber.

We would like to express our gratitude to M/s I. C. I. (India) P. Ltd. who supplied the stimulants and to the Fertilizer Association of India for bearing part of the cost of fertilizers and providing fertilizers near the experimental sites.

We are indebted to those Rubber Instructors who helped us during the operations and obtained the yield data.

SOIL CONSERVATION

Soil and moisture are two of the basic factors on determining, by their quality the productivity of agriculture. On the nature and characteristics of the soil in its upper layer depend the quantity, quality and frequency of the crops. When valuable top soil is lost, the fertility of the land goes down. The loss results from the washing away of the upper layer by floods and by injudicious methods of the soil husbandry. This loss can be made good by checking the erosion of the soil and by such farming methods as would restore and conserve fertility of the soil. Soil conservation thus means protecting land from the process of depletion in its fertility and saving it from deterioration in quality. It is an important part of the wider issue of conservation of natural resources.

Conservation of soil is not the problem of only individuals in their respective holdings. It is also the problem of the whole country. The entire land in the country has to be properly maintained and put to the best use for the benefit of the society. Ignorantly, many cultivators exploit the land for immediate gains and render it weaker in productivity. The poorer the cultivator, the greater is likely to be his desire for indiscriminate use of the land.

-YOJANA -December 9, 1962.



Question :-

In an area to be replanted, although digging the land after the removal of the old trees may result in good aeration of the soil, it is said that there will be loss of Nitrogen from the soil. Is it correct? If not what are the advantages of digging?

Answer :-

Digging the land after removal of the old rubber trees will improve the permeability of the soil to rain water and air. It will also make the soil surface devoid of all vegetation. In the soil thus exposed to the direct impact of heavy rains and sunlight and in which the aeration is good the microbiological activity will be great and as a result the decaying of the humus and organic matter content in the soil will be hastened. The rapid decay of humus and organic matter content of the soil causes large releases of plant foods. This super-abundance of plant food may cause an early forced growth of the rubber plants. But the loss of humus and organic matter in the soil will result in poor water and nutrient retaining capacity of the soil. Soil with poor water and nutrient retaining capacity are always susceptible to drought and crosion. During the monsoon period there will be consider-

able loss of Nitrogen and other plant nutrients from such soils. It follows. therefore that even at the expense of a somewhat slower initial growth of the rubber stand, digging may not be ordinarily necessary in areas to be replanted, But in areas which are having hard crust formation on or near the surface of the soil, digging up may be beneficial as it will reduce surface run off by allowing percolation of the rain water. In areas where noxious weeds like Lalang, Eupatorium etc. grow abundantly, digging at the time of planting may be of advantage for avoiding competition of these weeds with the planted rubber and leguminous cover plants.

Question

I would like to spray the 18 months old, rubber plants in my plantation with Bordeaux mixture. Would you please inform me how the mixture is prepared and what quantity of it is required to spray an acre?

Answer

Various proportions of the ingredients are being employed in the preparation of Bordeaux mixture for combating different diseases. Even on rubber, planters use different formulations. These are 3-3-40,

4.4-50 and 5-5-50. (indicating the quantities of copper sulphate and lime in pounds and water in gallons respectively.) In years when the incidence of the disease is light the weaker mixtures may prove satisfactory, but the 5-5-50 mixture is the most efficient one under all conditions. The solution of copper sulphate and lime are mixed in different ways. But when the copper sulphate solution is poured into the lime solution, the resulting gelatinous precipitate remains in suspension for a longer period. Hence this is considered to be the most satisfactory method of mixing.

In order to prepare 50 gallons of the mixture, 5 pounds of copper sulphate are dissolved in 25 gallons of water kept in a copper, brass or wooden container To help in the quick preparation of the solution the chemical is to be finely powdered before adding to the water, or bag and suspended overnight in the water, from a rod placed across the mouth of the vessel, so that by the morning the solution would be ready for use. In another vessel 5 pounds of fresh quick lime are placed and warm water is sprinkled over it in order to slake it When the slaking is complete more water is added to make it up to 25 gallons. The

lime solution is to be filtered if grit or other hard lumps are present. The copper sulphate solution is then poured into lime solution, vigorously stirring the mixture during the process. The resulting mixture which consists of a ligh blue gelatinous precipitate suspended in water is the Bordeaux mixture.

The following precautions have to be observed in order to maintain the quality of the mixture and prevent its deterioration. (1) Only good quality copper sulphate and lime are to be used. Fresh burnt quick lime is recommended for use. (2) The vessels used in the preparation and transport of the mixture should be made of copper, brass, wood or earthenware. Iron and zinc vessels are not to be used. (3) The keeping quality of the mixture is limited and hence it must be utilised on the day of preparation and should not be kept for use on the next day. (4) The mixture should be sprayed on the plants with the aid of brass or copper sprayers and not with those made of iron or zinc. (5) Fine misty spray is preferable to coarse spray or jet.

About 50 gallons of the mixture may be required to spray an acre of rubber, of the age you specified.

NEWS AND NOTES

1. New Offices of the Rubber Board

The offices of the Rubber Board and the Rubber Research Institute of India began functioning at the new premises as from 10th December, 1962. The new buildings have been constructed at a cost of about Rs. 12 lakhs at the Board's Experiment Station near Puthupally, over five miles from Kottayam. The extent of the Experiment Station is 82.00 acres, of which 15.42 acres have been set apart for the office buildings and for the construction of staff quarters. The acreage position of the Experiment Station is as follows:—

Old Mature Rubber Replanting and newplanting	4.69 acres
—1956	18.00 ,,
New planting—1957	9.83 ,,
New planting—1958	7.69 ,,
Replanting and newplanting	
—1959	10.39 ,,
Replanting and newplanting	
-1960	2.72 ,,
Replanting-1961	1.73 "
Nurseries	9.97 "
Rock	151
Reserves and Building sites	15.42 ,,
Total	82.00 acres

Photographs of the new office buildings and laboratories and a plan of the Experiment Station are published elsewhere in this issue.

2. Membership of 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), read with sub-rule (4) of rule 3 of the Rubber Rules 1955, the Central Government have nominated Shri K. K. Vasu Panicker, Congress House. Trivandrum, as a member of the Rubber Board with effect from the 11th January, 1963 and up to 5th November 1964, to represent the interests of labour in the vacancy caused by the death of Dr. T. T. Chacko, member of the Board.

3. Board and Committee Meetings

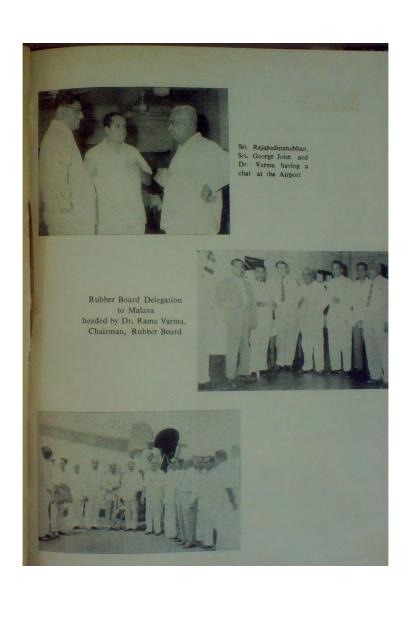
The 43rd meeting of the Rubber Board was held on 15th November, 1962 in the Council Hall at the new office of the Rubber Board and the Rubber Research Institute of India, Puthupally, Kottayam.

A meeting of the Exec utive Committee was held on 13th November 1962 at the office of the Rubb er Board, Kottayam.

The Sub-committee of the Board constituted for the purpose of consideration of the Board's comments on the 148th Report of the Estimates Committee of Parliament met at the Board's office on Monday, the 3rd December 1962.

4. Board's Delegation to Malaya

The Rubber Board's delegation to Malaya consisting of Dr. Rama Varma, Chairman, Dr. V. R. Narayanan Nair,

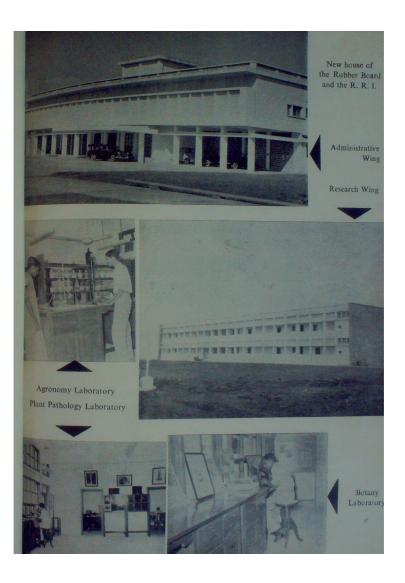


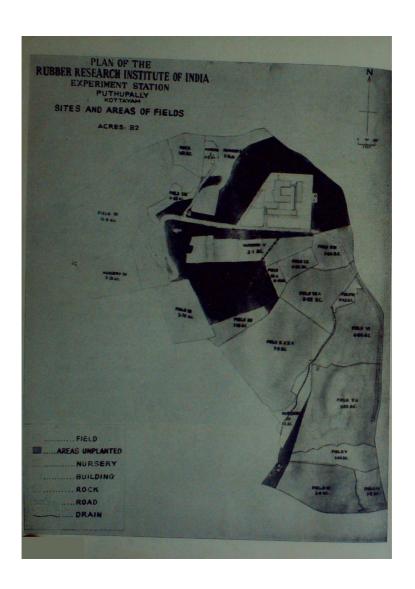


"SRAMDAN"

Transport of Files and Furniture from old office to new office, being done by the office staff in aid of National Defence.







v Joins

Shri Chacko Kallivayalil and Shri Sri A. Abdul Sadique-K. J. Kurian, which had gone to Malaya on the 6th October 1962 returned to India on the 22nd October 1962. While in Malaya the delegation visited the Rubber Research Institute of Malaya and a number of rubber estates and held discussions with the officers of the RRIM. prominent planters and the Government of the Federation of Malaya. The delegation will be submitting a report on its visit to Malaya together with its recommendations for the improvement of the rubber plantation industry in India.

5. Appointments

The following new staff appointments have been made:

duty on :

Sri S. S. Swaminathan-

- " R. Gangadharan Unni-Statistical Assistant 1-11-1962
- " P. K. Narayanan-Editorcum-Information Officer 21-11-1962
- V. Haridasan-Economic Assistant 1-10-1962
- " V. K. G. Nair-Librarian 1- 1-1963
- T. N. Madhavan Nampoothiri—Comptist 18-12-1962

Telephone Operator

5-12-1962

P. S. Kuttappan-Field Assistant

10-12-1962

- K. Soman-Field Assistant "
- M. Natarajan-
- John-
- T. K. Somanatha Pillai-Electrician-cum Mechanic 6-12-1962
- " P. V. Skaria-Field Assistant

6. New Secretary Joins

Shri T. V. Joseph, erstwhile Accounts Officer, Rubber Board has been appointed Secretary, Rubber Board, consequent of the posting of Shri S. K. Moorthy as Special Officer for Cess Assessment. Shri C. R. Subramanian has been appointed Accounts Officer.

Technical Conference

The Technical officers at the Headquarters of the Rubber Board, and R. R. I., regularly confer on the first Tuesday of every month with a view to discussing the various advances made in the field of research and other Technical problems related to the rubber plantation.



Registration of Rubber Estates

Unregistered rubber estates and holdings must be registered with the Rubber Board before March 31st, 1963, after obtaining necessary licence. Possession of unregistered estates is punishable under the Rubber Act, 1947. Only registered rubber areas will be eligible for benefits from the Rubber Board-Those who have already applied for registration need not apply again. Necessary application forms can be had from the Board's head office at Kottayam or from its sub-offices at Kottayam, Trivandrum and Calicut.

Maintenance Loan for Immature Rubber Areas

Government of India have approved the Rubber Board's proposal to issue an interest free maintenance Ioan to immature rubber holdings registered with the Rubber Board and having areas ranging from 1 acre to 15 acres. The proposed Ioan is at the rate of Rs. 475/per acre. This will be issued in six annual instalments with Rs. 100/per acre. This will be issued in the subsequent five instalments. This Ioan will be given only from the second year

of planting and it will be stopped as soon as tapping commences. The repayment of the loan need be effected only from the tenth year of planting.

The terms and conditions for the issue of this loan are being framed and it is expected that the planters can start availing of this benefit shortly.

Aid to Smoke Houses

The majority of small rubber growers, being not affluent enough to put up smoke houses of their own, are at a disadvantage to produce quality rubber sheets. Their production is too small to require a smoke house of an economic size. Rubber Board therefore proposes to aid both financially and technically such growers through co-operative societies in the construction of ideal smoke houses.

The scheme envisages the grant of subsidy up to 50% of the actual cost of construction and equipment of smoke houses subject to a maximum of Rs. 5,000/-. Subsidy shall be disbursed in instalments as the construction progresses.

The societies shall construct the smoke house according to the specifications

approved by the Board. The Board will very gladly offer technical advice at all stages of construction. Further particulars can be had from the Head and Sub-offices of the Board.

Plant Protection Equipments

During the last year plant protection equipments were distributed on loan basis through 18 co-operatives by the Rubber Board as a trial and the results were found satisfactory. This year applications from 54 societies have so far been received. In response to this, necessary arrangements have been made for distribution of the plant protection equipments this year also on loan basis through the co-operatives who have applied.

Unlicensed Dealing

Unlicensed dealing in rubber is punishable under the Rubber Act, 1947. The rubber producers also should make it a point to transact business only with licensed rubber-dealers. For the information of those related with the rubber industry the list of licensed rubber dealers have been kept in all the offices of the Rubber Board.

Loan for Newplanting

The Rubber Board has invited applications for granting loans for newplanting of rubber to registered small holders of rubber in 1963 also. The loan will be interest free and will be limited to Rs. 750/- per acre for newplanting to raise the existing small holdings to 5 acres.

and above and upto 15 acres in a contiguous plot. Loan will be sanctioned only against sufficient security worth Rs. 1000/- per acre and will be distributed in six annual instalments. The first and second instalments will be Rs. 300/- and Rs. 150/- respectively and the subsequent four instalments Rs. 75/- each. The loan will be payable in six annual instalments of Rs. 125/- each, commencing from the tenth year after planting. The loan assistance is limited to 2,500 acres in any one year.

Application forms and further details of the scheme can be had free of cost from the Secretary, Rubber Board or the Board's sub-offices at Trivandrum, Kottayam and Kozhikode or from the Rubber Instructors stationed at various places.

Applications in the prescribed form supported by the following documents should reach the Secretary, on or before 31st March, 1963.

- 1. A plotted and certified survey plan (in duplicate) of the area intended to be newplanted in 1963.
- 2. Non-encumbrance certificate (in duplicate) for the last 24 years in respect of the property offered as security.
- Latest land tax receipt (in duplicate) in respect of the property offered as security.

In the request for application forms the register number of the existing holding should invariably be mentioned.

Planting Materials

The Board has decided that planting licences will not be issued in future to those planters who use low yielding planting materials for rubber cultivation. From 1963 onwards only high yielding planting materials such as clonal seediings or budded plants must be used both for new planting and replanting. In the case of field buddings, unapproved planting materials may be initially used for stock plants, but the same shall be budded with approved material or replaced with budded stumps of seedlings of approved material, within a period of three years from the date of initial planting. On failure to comply with the above conditions, the registration of the estate is liable to be refused or cancelled if already registered, besides attaching other penalties under the Rubber Act and Rubber Rules.

'NATURAL RUBBER' DEFINED

"Rubber is a material which is capable of recovering from large deformations quickly and forcibly, and can be, or already is, modified to a state in which it is essentially insoluble (but can swell) in boiling solvents, such as benzene, methyl, ethyl ketone and ethanol toluene azerotrope."

"A rubber in its modified state, free of diluents, retracts within one minute, to less than 1.5 times its original length, after being stretched at room temperature (20°-27c°) to twice its original length and held for one minute before release."

[Definition proposed by the ASTM Committee on Nomenclature and Definitions, headed by Mr. W. H. Watson of Polymer Corporation Ltd., Canada for approval and adoption by the ASTM administrative Committee on Standards.

- 'Rubber News', Vol. II, No. 1]

Back Issues

Back issues of the Rubber Board Bulletin (English and Malayalam editions) from July-September 1961 onwards are available, at a cost of 50 np. per issue.

Please write for your requirements to the Secretary Rubber Board, Rubber Board P. O., Kottayam, Kerala State The cost has to be remitted in advance. No transaction by V. P. Post



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 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 are also continued.
- March
 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.
- 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 waxrextreseal is done. If needed the beds for sowing seeds can be prepared. Cover crop seeds are sown or cuttings planted.



TABLE I

Recorded Planted Acreage under Rubber at the End of Each Year

Year	Area in acres
1950	170,506
1951	171,191
1952	172,786
1953	173,643
1954	176,647
1955	207,239
1956	234,351
1957	261,998
1958	286,567
1959	305,452
1960	321,002
1961	348,121

TABLE II

Total Planted Acreage at the End of 1961 and Planting Materials Used
(Area in acres)

Planting materials	New planted area	Replanted area	Total acreage
Ordinary Budded Clonal	209,895 35,535	4,159 17,140	214,054 52,675
Tota	70,766	31,925	81,392 348,121

TABLE III

Classification of Holdings and Estates According to Size at the End of 1961

					No. of units	Area in acres
Small Holdings (50	acres &	below)				
5 Acres and below					54,581	104,757
Above 5 acres and	upto an	d includ	ding 10 a	cres	5,124	38,401
Above 10	"		50	,,	3,162	66,601
		To	tal		62,867	209,759
Estates (above 50 a	cres)					
Above 50 acres an	d upto &	includ	ling 100 a	ecres	294	21,173
,, 100	"		500	,,	223	45,928
,, 500	"		1000	,,	32	21,966
,, 1000	**		1500	,,	18	22,056
,, 1500	**		2000	"	6	10,105
Above 2000 acres					. 7	17,134
	То	tal			580	138,362
GRA	ND TOTA	AL.			63,447	348,121

TABLE IV

Statewise Distribution of the Planted Area at the End of 1961

(Area in acres)

	STATES		HOLDINGS cres & below)	(/	ESTATES Above 50 acres)		TOTAL
No.	No. of units	Area	No. of units	Area	No. of units	- Area	
1	Kerala	62,302	204,909	530	123,345	62,832	328,254
	Madras	548	4,536	39	10,878	587	15,414
	Mysore	17	314	10	3,717	27	4,031
	Andamans			1	422	1	422
Charles .	Total	62,867	209,759	580 -	138,362	63,447	348,121

ОСТОВЕ R-DEC. 1962]

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

The second second					
States	1957	1958	1959	1960	1961
Kerala	21,840	22,513	21,603	22,680	24,490
Madras	1,877	1,752	1,704	2,030	2,076
Mysore	405	437	437	447	400
Andamans	25	15	28	35	26
Total	24,147	24,717	23,772	25,192	26,992
Total	24,147	24,717	23,772	25,192	

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber since 1957

(In Metric Tonnes)

		Import				Consumption			
Year	Production	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total		
1957	24,147	9,832	3,591	13,423	32,273	3,080	35,353		
1958	24,717	12,068	3,579	15,647	35,312	3,304	38,616		
1959	23,772	14,718	4,748	19,466	39,282	4.410	43,692		
1960	25,192	22,949	8,466	31,415	45,941	6,561	52,502		
1961	26,992	21,693	8,992	30,685	48,319	9,600	57,919		

TABLE VII

Consumption of Reclaimed Rubber
(In Metric Tonnes)

Yea	Г	Quantity	97.1
1957	7	3,898	
1958		4,116	
1959		4,526	
1960		5,327	
1961		5,929	

TABLE VIII

Stock of Natural and Synthetic Rubber at the End of Each Month 1957-1961

Months	1957	1958	1959	1960	1961
January	9,127	11,829	12,716	11,842	15,427
February	8,437	10,742	11,189	11,389	14,835
March	7,479	10 157	11,442	10,959	12,582
April	7,693	10.161	11,330	10,048	12,507
May	8,213	10,613	10,448	10,210	12,323
June	6,874	10,235	9,456	10,485	11,194
July	6,478	10,120	9,819	10,086	10,716
August	6,950	10,084	10,142	10,400	11,133
September	9,004	9,683	10,122	10,894	11,755
October	10,597	10,795	11,178	12,506	13,754
November	11,763	12,549	12,033	13,216	14,437
December	11,473	12,953	12,271	16,227	16,172

Production of Natural rubber in 1962 was 31,357 Metric Tonnes, out of which Kerala produced 28,298 Metric tonnes, Madras 2568 M. tonnes, Mysore 451 M. tonnes and Andamans 40 M. tonnes. During 1962 Consumption of Natural rubber was 51,776 M. tonnes, Synthetic rubber 10,409 M. tonnes and reclaimed rubber 6577M. tonnes. Stock of Natural and Synthetic rubber as at the end of 1962 was 19,434 M. tonnes.

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[Published in the Gazette of India, Extraordinary, Part II-Section 3- Sub-section (ii)-New Delhi, Saturday, April 28, 1962/Vaisakha 8, 1884.]

MINISTRY OF COMMERCE AND INDUSTRY

Notification

Rubber Control

New Delhi, the 28th April 1962.

S. O. 1274. — In exercise of the powers conferred by sub-section (1) of section 13 of the Rubber Act, 1947 (24 of 1947) and in supersession of the Government of India, Ministry of Commerce and Industry Notification S. O. 663 dated the 24th March, 1961, the Central Government hereby fixes with effect from the 28th April, 1962 of all classes of business the following maximum and minimum prices, exclusive of sales tax, for the various grades and qualities of rubber and latex of different concentrations excluding the cost of container as mentioned below, namely:—

Grade of		F. O. B. Co.	chin for 50 kilograms
rubber	Quality of rub	ber Maximum p Rs.	orice Minimum price Rs.
(1)	(2)	(3)	(4)
Group 1	R. M. A. IX	162.60	161,50
	R. M. A. 1	162.60	161.50
Group 2	R. M. A. 2	160.95	159.85
	R. M. A. 3	159.30	158.20
	Cuttings No. 1	151.03	149.93
Group 3	R. M. A. 4	155.44	154.34
	R. M. A. 5	151.03	149.93
	Cuttings No. 2	144.42	143.32
Group 4	Precoagulated Crepe	168.67	167.57
	Pale Latex Crepe IX	166.46	165.36
	Pale Latex Crepe 1	164.26	163.16
	Pale Latex Crepe 2	163.16	162.06
Group 5	Pale Latex Crepe 3 FAQ	162.06	160.96
Group 3	E. B. C. Super IX	157.64	156.54
	Estate Brown Crepe IX Estate Brown Crepe 2X	153.23	152.13
	Smoked Blanket	149,93	148.83
	Remilled Crepe 2	153.23	152.13
Group 6	Estate Brown Crepe 3X	144.97	143.87
Group o	Remilled Crepe 3	141.11	140.01
	Remilled Crepe 4	138.91	137.81
Group 7	Flat Bark	132.84	131.71
	ex up to 35% concentrates	123.47	122 37
Normai iau	ex up to 35% concentrates	Rs. 162.60 plus a	Rs. 161.50 plus a
		premium of Rs. 19.29	premium of Rs. 19.29
		per 50 Kilograms of D. R. C.	per 50 Kilograms of
Latex conce	entrates of 36% to 50%		D. R. C.
	(both inclusive)	Rs. 162.60 plus a	Rs. 161.50 plus a
	(com micro)	premium of Rs. 36.38	premium of Rs. 36.38
		per 50 Kilograms of D. R. C.	per 50 Kilograms of
Latex conc	entrates of 51% to 60%	Rs. 162 60 plus a	D. R. C.
	(both inclusive)	premium of Rs 47.40	Rs. 161.50 plus a
		per 5) Kilograms of	
		D. R. C.	per 50 Kilograms of D. R. C.
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- 4. Publisher's Name Nationality
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5. Editor's Name

Nationality

Address

- -Kottayam, Kerala State
- -P. K. Narayanan
- -Editor-Cum-Information Officer, Rubber Board, Kottayam
- -P. K. Narayanan
- -Editor-Cum-Information Officer, Rubber Board, Kottayam

-P. K. Narayanan

- -Editor-Cum-Information Officer, Rubber Board, Kottayam

6. Names and addresses of the individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital.

The newspaper is owned by the Rubber Board, Kottayam, a statutory body constituted under the Rubber Act, 1947.

l, P. K. Narayanan, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date. 18-3-1963,

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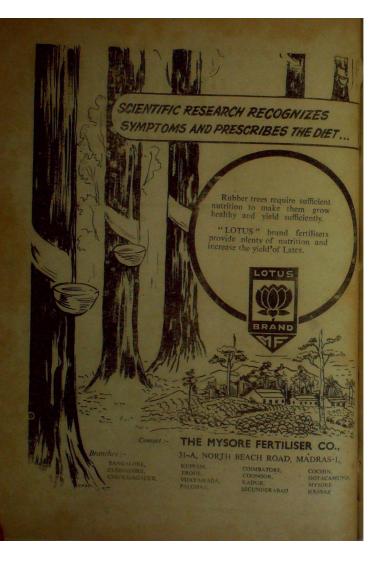
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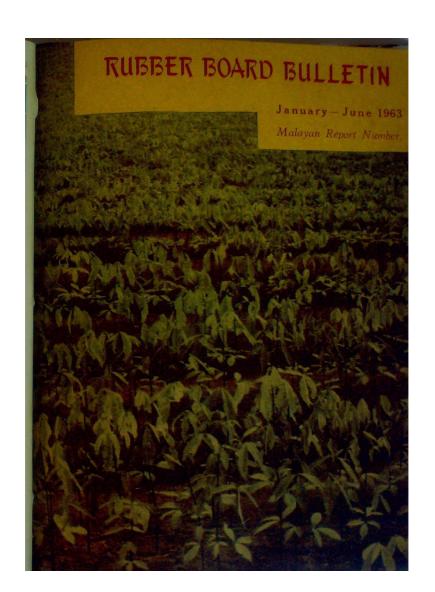
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IANUARY-JUNE 1963

rubber board bulletin Nos. 3 & 4

To Our Subscribers

Very much to our regret, the publication of the Rubber Board Bulletia for the period January-March 1963 has been delayed due to circumstances beyond our control.

We are trying hard to bring the publication of the *Bulletin* up-to-date. In this attempt we have been forced to combine the January-March 1963 and April-June 1963 issues. We hope that in future we would be able to publish the *Bulletin* according to schedule.

We are glad to have been able to publish in this issue of the Bulletin the Report of the Rubber Board's Delegation to Malaya.

Subscriptions to Volume Six of the Rubber Board Bulletin expires with this issue. Subscribers may kindly renew their subscription on receipt of this copy and continue their patronage. While sending subscriptions, subscribers may indicate the edition (English) Malayalam) and the subscription number.

Editor

137 rubber statistics

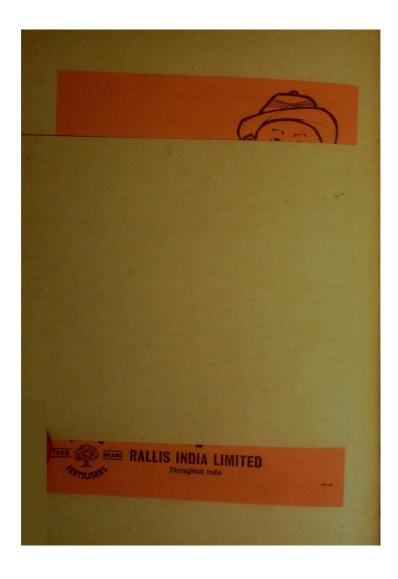
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Planting Material

The selection of the planting material is of supreme importance in newplanting or replanting rubber. The objective being to maximise production any amount of care bestowed on choosing the proper planting material suitable to the location of the estate will not be too much and will pay dividends. Now is the time for the rubber grower to decide on the planting material to be used for planting in the coming season

Both seedlings and budded plants are used. By this time most of the planters are aware that there is no purpose in using unselected seeds for raising plantations. Even in the choice of clonal seeds the place of origin has to be carefully looked into. The presence of a few unselected seedlings in the seed plots can vitiate the quality and performance of the progeny. There appears to be a preference for Java seeds among several rubber growers. This word 'java' has no particular significance and does not guarantee better performance. The performance depends on the inherent characters of the parents. One should not be carried away by hearsay propaganda but should devote some time and thought to obtain clonal seeds from reliable and established sources. Clonal seedlings cannot be distinguished from unselected seedlings by mere appearance.

Budwood of several clones are available in the country. The characteristics of different clones vary. Some are suitable for hilly areas. Others do weil in low lying situations. There are clones which are not damaged seriously by wind. Still others break easily. Some require fertile soil. Others may tolerate moderately fertile conditions.

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Budwood of several clones are available in the country. The characteristics of different clones vary. Some are suitable for hilly areas. Others do well in low lying situations. There are clones which are not damaged seriously by wind. Still others break easily. Some require fertile soil Others may tolerate moderately fertile conditions. Some are highly susceptible to diseases. Others

are tolerant or resistant. The choice of the clones should be guided by their suitability to the area to be planted. Mere reports of high yields in Malaya or Java or in other parts of our own country should not be taken for granted. Climatic and soil conditions affect the growth and yield of rubber tremendously. A surer guide will be the performance of the clones in the neighbouring estates where similar climatic and soil conditions prevail. Any new clone alleged to be superior should be first tested in a small area and then extended if satisfactory. It may be argued that this is time-consuming and does not give immediate results. But there is no short cut to this method. Rubber trees stay on the land for over 40 years. So one should not plant in a hurry and then repent.

The controversy whether clonal seedlings or buddings are to be used has been going on for a long time. Much might be said on both sides, Clonal seedlings are easier and economic to establish, come into tapping earlier and are hardier but exhibit variation. The yield may sometimes be equal to that of some buddings. Brown bast may be more in 100% intensity tapping. Buddings cost more to establish, and take more time to come into tapping and require careful tapping. But they exhibit uniformity and often yield more

Taking all things into consideration, buddings of proved clones are the best for areas where the soil and climatic conditions are satisfactory for uninterrupted development. The clonal seedlings may do well in surroundings which are not so good. The choice can be made according to the locality.

OBITUARY

We record with deep sorrow the sad and premature demise of Sri M. P. Cherian, a member of the Board, at Calicut on 26th May 1963, at the age of fifty-one. He was nominated to the Rubber Board by the Union Government on 6th November 1961 for three years,

He was a very eminent luminary of Kerala and was a big planter and industrialist. He had evinced very keen interest in promoting rubber industry. There is hardly any field of activity untouched by him.



He was loved by all for his humanitarian, generous, benevolent and philanthropic nature. He has left a void difficult to fill. In his death we have lost a stalwart to rubber plantation industry, a patriot to the nation, a public worker to the people of Kerala and a "friend in need" to many. He is survived by his wife, a daughter and a son.

We share with his family in their bereavement and pray eternal rest to

are tolerant or resistant. The choice of the clones should be guided by their suitability to the area to be planted. Mere reports of high yields in Malaya or Java or in other parts of our own country should not be taken for granted. Climatic and soil conditions affect the growth and yield of rubber tremendously. A surer guide will be the performance of the clones in the neighbouring estates where similar climatic and soil conditions prevail. Any new clone alleged to be superior should be first tested in a small area and then extended if satisfactory. It may be argued that this is time-consuming and does not give immediate results. But there is no short cut to this method. Rubber trees stay on the land for over 40 years. So one should not plant in a hurry and then repent.

The controversy whether cloual seedlings or buddings are to be used has been going on for a long time. Much might be said on both sides, Clonal seedlings are easier and economic to establish, come into tapping earlier and are hardier but exhibit variation. The yield may sometimes be equal to that of some buddings. Brown bast may be more in 100% intensity tapping. Buddings cost more to establish, and take more time to come into tapping and require careful tapping. But they exhibit uniformity and often yield more

Taking all things into consideration, buddings of proved clones are the best for areas where the soil and climatic conditions are satisfactory for uninterrupted development. The clonal seedlings may do well in surroundings which are not so good. The choice can be made according to the locality.

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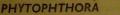
We share with his family in their bereavement and pray eternal rest to his noble soul.



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Speech delivered at 44th Meeting

Dr. Rama Varma reviews Board's developmental activities

Friends.

I have great pleasure in welcoming you to the 44th meeting of the Board. The Report of the Delegation which went to Malaya has been given to you. I would like to make a few general observations before we take it up for discussion.

After we met last, the Rubber Rules have been amended to ensure that only high vielding material will be used for future planting. According to the new Rules, licences will be issued to plant only with approved planting material. In this connection I am glad to inform you that the planters from whose estates seeds are generally collected have removed or pollarded seedlings and other rogue trees from the collection areas. The collection areas have been demarcated and boundaries fixed. I would like to take this opportunity to express my thanks to those planters who readily agreed to our suggestion to remove the seedling trees from the collection areas. The Board has prepared maps of such areas which will be made available to planters who require it. The Board will continue to collect seeds from approved areas for distribution to smallholders and others who require them. This year it has also been possible to get the maximum foreign exchange released to import seeds from Malaya. And we have received some of the latest RRIM clones. This year, the Board's nursery at Karikkattoor is expected to meet the replanting requirements of smallholders.

I am glad to report to you that the supply of sprayers through co-operatives which we started last year has become very popular and this year about 52 societies have taken advantage of that facility. I expect them to spray at least 10,000 acres this year. The Board's scheme to assist the cooperative societies to set up smake-houses and to provide processing ficilities has been approved by Government and the first smoke-house set up under the scheme at Cheruvally has started working. The formal inauguration of it will take place by the end of the month. Twenty such s noke-houses are expected to be established during the current year. The Board's scheme to grant loans for the maintenance of immature areas planted with high yielding material has also been agreed to by Government and the rules for granting the loan as recommended by the Planting Committee have been included in today's agenda for your approval. As soon as those rules are finalised, it would be possible to assist small-growers to maintain immature areas properly. That may help to keep the trees healthy and reduce the immaturity period at least by one year.

The Board's advisory service has been re-organised. It should be possible hereafter to give advice on the various aspects of rubber cultivation to those who need it. We are also organising a series of seminars in different centres of rubber production for the benefit of growers. The first, in the series, was held two days ago at Vakathanam.

The progress of replanting has been disappointing. Two reasons attributed to it are: (1) the delay in the payment of subsidy and (2) uncertainty about the continuance of the scheme. In preparing the replanting scheme the delay in the paythat is why it was decided to add a rehabilitation allowance of Rs 9/- per 100 lbs. to the fair price of rubber, and to give the balance in the form of direct subsidy. I am not mentioning this to justify the delay. I know that the rehabilitation allowance would not be of sufficient help to the smallholders. Delay is bad and it should be avoided. By better planning it should be possible to complete the payments within three to four months of the completion of work. Steps are being taken to that effect

To remove the uncertainties about the continuance of the replanting schene, the Board requested all the estates of 50 acres and above to submit their replanting programme for the next three years. Only 82 estates have sent their programmes to the Board. This makes it difficult to prepare any plan for a long period and implement it successfully. In Malaya replanting has become a regular estate practice and it is being done at the rate of 3 per cent of the planted area every year. Unless some such measure is taken here a situation may arise in which only a few enterprising estates would complete their replantings, while others would continue to remain as high cost units. It would be difficult to protect the latter class without keeping prices high and wages low. That would create serious economic and social problems and would defeat the purpose of

One of the basic problems facing the industry today is the pressure of population on land. In 1952 holdings below 51 acres were only 13,766 and the average size of a holding 4:06 acres in 1961 the number of holdings has increased to 62,867 and the total area to 2,09,759 acres, the average size of a holding being 3:34 acres. The number of holdings below 5 acres and below has increased from 10,903 to 54,581 and the area from 20,028 acres to 1,04,757 acres. The importance of this class of smallholders is steadily increasing and the Board will have to re-orientate its policy to be of real assistance to them.

44th Rubber Board Meeting

The FORTY FOURTH MEETING of the Rubber Board was held at 10, 30 A. M. on Tuesday, the 9th April, 1963, at the Board's Office at Puthupally, Kottayam.

The following members were present :-

- 1. Dr. Rama Varma (Chairman)
- 2. Sri T. Jayadev
- 3. Dr. M. S. Nair
- 4. Dr. V. R. Narayanan Nair
- 5. Sri V. J. Kurian
- 6. , George John
- 7. " A. T. Mathyoo
- 8. " K. M. Philip
- 9. , K. Karunakaran
- 10. Smt. Rosamma Punnoose
- 11. Sri Joseph Jacob
- 12. " Michael A. Kallivayalil
- 13. , K. V. Thomas
- 14. " K. Srinivasan
- 15. "Mathew Maniyangadan, M. P. Welcoming the members, the Chairman delivered the presidential address which is reproduced elsewhere.

Important Decisions

- 1. Sri K, V, Thomas was re-elected Vice-Chairman of the Board for another term of
- 2. Sri K. Venkitakrishnan, General Manager, Rubber plantations, Government of Madras, was co-opted as member of the Planting Committee for the balance period for which the present Planting Committee will continue to function.
- 3. Sri K. K. Vasu Panicker was elected member of the Labour Welfare Committee in place of the late Dr. T. T. Chacko.

- 4. The Board approved the exhaustive report submitted by the Malayan Delegation with appreciation of the Board for the very good and instructive work of the delegates.
- 5. The Board decided that the question of amending the subsidy rules to enable the Board to effect recovery of the subsidy paid in respect of replanted areas acquired by Government for any reason be referred back to the Planting Committee for further consideration and final recommendations.
- 6. The rules for issuing loans for the maintenance of immature rubber areas were approved.
- 7. The new planting loan rules were decided to be amended in such a manner as to enable new planted holdings which lie within a radius of five miles of the registered holding and coming within the same ownership to become eligible for the grant of loans under the scheme, as recommended by the Planting Committee.
- 8. The scheme for organising Co-operative Rubber Marketing for the benefit of small growers, prepared by Dr. V. R. Narayanan Nair and Sri V. J. Kurian (Board members) was approved.
- Decided to ratify the assessment of the Import/Export Committee that the overall shortage of rubber during 1963-64 may be estimated as 32,000 tonnes.
- The Chairman's proposal to constitute a labour research wing attached to the Board was unanimously approved.

The meeting concluded at 2 P. M.

Black stripe, Black thread or Bark rot

caused by

Phytophthora palmivora Butl.

(Phytophthora faberi Maubl.

P. meadii McRae)

P. heveae Thompson.

T. S. RAMAKRISHNAN M. A., F. A. SC.
P. N. RADHAKRISHNA PILLAY B. SC. (Hons.)
Rubber Research Institute of India, Kottayam

This is a disease affecting the tapping panel. It is widespread and has been recorded from most of the countries where rubber is cultivated, though the intensity of infection may vary from place to place. It was first noticed in Ceylon in 1909 and in Burma in 1912. Soon after, the same disease was observed in S. India, Java and Malaya. Later the incidence of the same malady has been recorded from other countries in Asia, Africa and America.

Symptoms

This disease is prevalent during the rainy season. Linear vertical depressions appear above the tapping cut. If the bark in the affected areas is removed, the underlying tissues appear as black narrow lines extending vertically up and down. The discolouration may pass deeper into the wood also in some cases. More often the disease is more superficial with slight penetration into the wood. But the decay may proceed into the regenerating bark above and below the cut involving the untapped portion also. Later the affected tissue may drop off leaving small or big open wounds in the

panel. Regeneration of bark is not uniform and tapping of the regenerated bark will be difficult. Outside the tapping panel the bark elsewhere may also be infected through wounds.

In S. India black stripe was very severe in the earlier years ie. 1916 to 1920, in some of the plantations in Trichur district. In recent years the disease is prevalent in many of the plantations during the monsoon months and immediately after but is not reported to be so alarming in the larger estates as in Ceylon. This is interesting in view of the fact that abnormal leaf-fall, pod rot, shoot rot and canker caused by the same pathogen responsible for black stripe are often severe throughout Kerala. The inoculum is available in abundance on rubber itself as well as on other hosts. One of the reasons appears to be the practice of cessation of tapping for five to seven weeks adopted by many of the planters during the rainy season. Furthermore the use of panel protectants by larger estates keeps the disease under control. In small holdings where the panel is not protected bark rot is

Pathogen

Phytophthora palmivora is the main causal organism in S. India. The fungus is found all over Kerala on rubber and other hosts. The entrance into the nanel is effected through the freshly tapped surface and if the weather conditions are favourable, the spread is rapid. Old regenerated bark is not infected. Once having infected the tapped surface the fungus spreads upwards and downwards and even into the wood. The bark rots at the cut surface and assumes a dark colour. Depressions are formed. The infected wood appears as black, long, narrow stripes Extension of rotting of the untapped bark below the cut and the tissues underneath it. may occur. The latex flow is reduced or even stops if rotting is extensive. A foul odour is associated with this,

In Ceylon the disease was first attributed to *P. faberi* (causing canker and pod-rot of *Cacaa*). But now all are agreed that this is synonymous with *P. palmivora*. In Malaya, another species *P. heveae* is also known to cause black stripe. Further work will show whether this is really a different species or a strain of *P. palmivora*.

High humidity (over 90%) and actual rain water falling on the panel during the tainy season are very favourable for the multiplication of the fungus and onset of infection. If tapping is continued under these conditions, the fungus is able to infect the freshly cut surface. Dense bushy ground cover and thick canopy of foliage and close planting help to raise the atmospheric humidity inside the plantation. This is very favourable for infection especially

when the tapping is at the lower levels of the stem. Conditions which provide better ventilation and quick drying of the panel during the rainy season are not favourable for the disease. At the present day polythene covers are fixed to the stem to provide protection from rain falling on the tapping panel and the collecting cup. This enables tapping to be continued during the rainy season without loss of the number of tapping days. In a number of plantations this has led to an increase in the incidence of bark tot. A humid atmosphere is maintained round the panel inside the polythene skirt and this is helpful for the growth of Phytophthora. It is believed that in medium rainfall areas the disease is absent. But it has been observed that even under these conditions, the disease occurs on trees at the bottom of deep valleys or in plantations with high density of planting.

Panel infection, being through wounds, is likely to occur on many seedling trees and clones. Climatic conditions form the limiting factor. High incidence has been observed on Tjir I, PB 86 and PR 107. A closer study may reveal many other susceptible clones.

Control

In order to combat the disease it is advisable to stop tapping during the heavy rainy months. Where tapping is continued during the wet season the tapping out and a distance of two inches above and below the cut should be protected with a water miscible fungicide. Many substances have been recommended for this purpose. In earlier years, brunolinum plantarum (10%), Agrisol (10—20%), kilgerm (5—10%)

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and Izal (3-5%) were used in Malaya. In India tar preparations were in use in the beginning but later Izal became popular. At present this substance is not imported and is not available in the market. This has been replaced in recent years by organomercurial preparations, aretan and ceresan wet. These have been tested in several plantations and have been found to be very efficient. Aretan is mixed with water in the proportion of 1 oz. in 21 gallons of water and ceresan 1 oz. in 1 gallon of water. These two fungicides do not leave any mark on the treated area. In order to detect whether the treatment has been carried out, small quantities of china clay or lime or dyes like fuchsin are added to the solutions. To prevent the wash of these fungicides during rains a water-proof coating is applied over the fungicide after it has dried, Burmah paste (manufactured by M/s. Burmah Shell) or prowax, waxrex trescal or rubberkote (marketed by M/s. Esso) may be used. The first named substance is not in the market new. These substances are helpful in the

rapid healing of the wound also. In Ceylon, Antimucin (mercury based fungicide) is being recommended now (I oz. in 1 gallon of water). Captan (orthocide) was found to be the most satisfactory fungicide in America when used as a 2% solution.

These fungicides are applied by means of a brush or more efficiently by a small hand sprayer. The application is made on the day succeeding the tapping or on the day of tapping before removing the scrap. This has to be repeated twice or more often during a week depending on the severity of the disease. When the infection is heavy it is advisable to stop tapping for some time and apply the fungicide repeatedly. In some instances a dozen applications may be required to bring the disease under control. When tapping is stopped in February one application of the fungicide and waterproofing may be given. If the panel is exposed to sun at this time lime may be applied over the waterproofing to prevent sunscorch. Mercury based fungicides are peisonous and must be handled with care.

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preparation of land for Planting Rubber

V. K. BHASKARAN NAIR, M. Sc. Rubber Research Institute of India

The Rubber growing areas of India are limited to the south-western region of the country extending from the Kanyakumari district of the Madras State in the South to the Coorg district of the Mysore State in the North. Most of the plantations in these regions are situated on low hills or hillocks of varying sizes and heights. Flat lands lend themselves easy for working but the extent of such areas suitable for planting rubber is limited in this country. Hilly lands are however suitable for growing good rubber provided adequate measures are taken to conserve the soil and the altitude does not exceed 1000 ft.

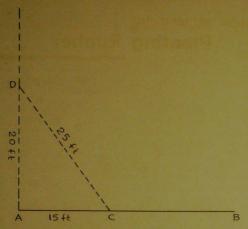
The operations for new planting consist of felling and clearing, contour terracing on slopes, laying of roads and pathways, provision of drainage facilities etc. Lining, marking and pitting follow.

In jungle clearing, larger trees of economic value are removed first, followed by felling the smaller trees and slashing the begin sufficiently early to avoid any delay at the time of planting. In South India, June is the best time for planting and so all preparations for planting should be adjusted to finish before that month. A light burn after felling as soon as sufficient drying has

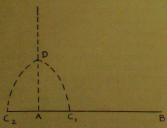
occurred may be done to ensure the destructrees. But excessive clearing and burning may cause loss of humus in the soil and expose the land to increased damage from erosion before a plant cover is established. Replanting the old areas has to be thought of when yield falls low and maintenance then be slaughter-tapped or yield stimulant applied to obtain the maximum yield. Lining and pitting for replanting may be started. if possible, between the old trees and felling could be done just before planting. Poisoning old stand prior to replanting is practised in other countries.

On flat or slightly undulating areas square or rectangular planting can be adopted. In the case of rectangular planting the lines should be taken east-west to get the maximum sunlight. The equipments required for lining in this case are a compass, two ropes and a number of marking pegs. A compound or simple galvanised wire may be a satisfactory lining rope. One of the ropes can be used for the base line and the other for the guide lines. The ropes should be well stretched before use. Planting distances should be marked on the ropes with coloured rags. The longest straight boundary

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AB is the base line. Points are marked on a tap: measure at 15 ft., 25 ft. and 20 ft. (or other intervals in the proportion 3:5:4). The 15 ft. length is laid out from the end along the base line as AC above. Point D is then fixed by drawing the tape measure taut with the correct lengths used as AD, CD above. The required right angle is DAB.



AB is the base line. Using a convenient length of cord points C_1 and C_2 are marked out at equal distances from A, on AB and this extension. Using any length of cord approximately double the length AC_1 , one end is fixed at C_2 and C_3 in turn, and arcs are marked out on the ground at the extent of the cord. Point D at the intersection of the arcs gives the required right angle DAB. Courtesy. R. R. I. M.

of any area makes a convenient base line. Planting points are pegged out along this using the lining rope. At each end right angles are laid out and points marked out at the correct distances by using the appropriate rope. The fourth side should be measured with the lining rope to check the correctness of the right angles at the base line. The rope is then worked back, line by line, parallel to the base line and towards it until all points are pegged. Irregularities in the shape of the field can be rectified by suitable extension from the main rectangle. If rocks or stumps prevent pegs from being put in their proper places, it is usual to move them up and down rather than to the side for the sake of appearance. Quincunx planting can be effected either by

diagonal lining where the guide lines are put in at an angle of 60 or 120 degrees to the base line or by marking an extra half planting distance beyond the last tree point on the rope and in the alternate rows this marker is brought against the guide peg and small pegs are placed in the normal way against the coloured rags on the rope. The guide pegs in alternate rows do not then mark planting points.

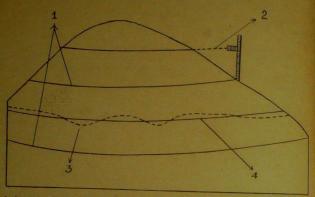
Contour lining

Contour lining is done in undulating and hilly lands by marking out the planting points in level lines across the slopes. A line of average slope is selected dividing the land conveniently. Guide pegs are driven in along this line to mark the contour intervals which would be determined according to the requirement. Then starting at the top

the contour lines are pegged out right and cate the planting points using a road tracer. For smaller areas a triangular wooden frame with the points of its legs at the required planting distance may be considered. The correct level is indicated either by a spirit level or a plumb line. The levelling triangle is placed with one leg against the guide peg and when the instrument is correctly levelled the ground. Subsequent points are marked using the preceding point as the guide. Where the gradient increases, contours would converge and where the slope is less steep they would open out. When the change is so marked that the horizontal intervals become less than half the standard one, contour should be stopped. On the other hand if the interspace becomes too great, a



Contour terracing



Approximately parallel contours with general "guide" contour.
 2. Elevation distance with right angle pole.
 3. Original central level contour with road tracer.
 4. Original contour straightened out as central "guide."

Courtesy-Rubber Research Institute of Ceylon

· blind 'contour line should be introduced extra. The need can be judged by the eye but levelling should be done by instrument. This situation can be avoided by adopting a compromise between contour and straight line planting. A continuous dead levelcontour is pegged at a suitable area depending on the lie of the land. This contour line should be straightened out; later parallel continuous planting lines are marked above and below this guide contour line. When the terrain is not difficult the central guide contour line can be marked through the whole clearing. On steep land the stipulated distance between the contours should not be marked out along the surface of the slope; instead, the surface interval equivalent to the desired horizontal interval should be calculated and pegs put along

this line. On flat and gently undulating areas distance marked along the surface would be sufficient. This method ensures evenly spaced continuous contour planting rows.

Terracing

On hilly areas the cutting of planting terraces is advisable to aid soil conservation. Continuous terraces along contour planting rows are initially expensive but are well worth the expenditure in the long run as these form the best method of protection wherever the risks of soil erosion are apparent. However, for reasons of economy planting on hill sides may sometimes be done on square platform about 4 ft. square. These should be placed along the contours. These platforms could be joined together

later to make complete terraces or with and adopting a herring bone system of drains narrow ledges of about 2 ft. width to facilitate movement of the workers and supervisory staff from tree to tree.

To make a terrace the soil is cut from about one foot in front of the line of the planting row back into the hill side to give a width of 3 to 5 ft. with a drop of 9" to 11" to the back of the terrace. The angle of slope to the back of the terrace depends much on the type of the soil. For example a steeper slope is necessary in light soil than in clay or gravelly soil. The soil cut out is used to extend the front of the terrace and provide it with a small bund on the outer edge of the surface which should be beaten down to prevent crumbling in heavy rain. This may be further strengthened by timber slewed on the contour and if necessary with added provision of hard-wood stakes driven into the ground. Stops of uncut earth should be left out at intervals along the terrace line to check lateral flow of excess rain water along the terrace.

Proper provision of drainage facilities is important especially on low lying lands. There may be a system of natural waterways available in the area which when cleared and desnagged would give excellent drainage. There may also be large depressions or swamps with no natural outlet where proper drainage may prove difficult and expensive. Such areas may be better left untouched. If drains are to be cut the depth should be maintained throughout the entire length. Sloping sides are less collapsible than vertical sides. Silting can be reduced by allowing the minimum number of drain junctions

with the side drains joining the main drain at less than a right angle and the former

Silt pits and 'Edakayvalas'

ing land to prevent soil erosion. Pits are dug continuous or at intervals along the The soil from the pits should be thrown above to make earth bunds. The bunds hold up the surface run off water and dissipates it over the area above them; the water then percolates through the soil thereby improving aeration. In localities where long lasting torrential rains often occur during the rainy period the water collecting against the bunds built above the silt pits cause too muc's wear and pressure. In such areas the bunds may be built below the

Soil conservation needs are partially satisfied by the construction of level contour stone terraces (Edakayyalas). The stone terraces check the movement of surface run off water. The eroded soil would be deposited on the upper sides of the terraces while water would filter through the terraces. The distances between terraces should be the 'Edakayyalas' and silt pits, but the maintenance of a good ground cover would minimise these needs greatly.

Planting distances

The planting distances are generally selected in such a way as to provide more or

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less 180 pits per acre in the case of buddings seedlings. Some of the common distances and 200 or more pits in the case of clonal adopted to give such a stand per acre are:

Spacing of more than 30 ft, between rows and less than 8 ft, between plants in the row are not generally favoured now. When the rows are widely apart it is termed as hedge planting.

Holing

Planting holes provide the young plants with good soil conditions for establishment and quick growth. There may be difference of opinion about the size and shape of the pits depending largely on the soil conditions and nature of planting materials used. However, it should be borne in mind that the shape and size of the pits should be made in such a way as to satisfy the primary needs of the young plant for establishment at the initial stage. Pits are usually dug to the size 3' × 3' × 3'. But 2½' × 2½' × 2½' may be sufficient. Alterations from this standard size may be made depending on the type of planting materials used and the nature of soil available. For example a stumped budding would need a larger and deeper hole while germinated seeds or basket plants need comparatively smaller holes. Similarly when the soil is hard the pit has to

be widened. For purpose of economy, in the better types of soil pits are sometimes dug wider at the top and tapering to the bottom or the depth reduced to about 2 ft. with central 'alavango' hole 6 or more inches in depth for the tap root (R. R. I. C., 1963).

Holing can commence as soon as the work of clearing is sufficiently advanced and it is important that filling should be completed sometime before planting to give the soil sufficient time to settle. When digging the hole the top soil should be placed on one side and remainder of the soil on the other side. Filling should be done with good top soil as far as possible. Sufficient surface soil has to be collected away from the hole for this purpose, all stones and roots removed and this soil should be used for filling the pits. Where manure is to be

applied it should be thoroughly mixed in the The hole should be filled to about two top eight inches of the soil in the hole. inches above ground level.

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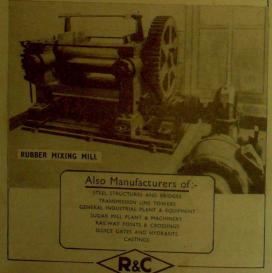


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Mouldy rot

caused by

Ceratocystis fimbriata. Ell. & Halst.

(Ceratostomella fimbriata (E. & H.) Elliot

Sphaeronema fimbriatum (E. & H.) Sacc.)

T. S. RAMAKRISHNAN, M. A., F. A. SC. P. N. RADHAKRISHNA PILLAY, B. SC. (Hons.) Rubber Research Institute of India Kottayam

Mocldy rot affected panel

This is a disease of the tapping panel and is prevalent in almost all countries where Herea is cultivated, to a lesser or greater degree, depending on the climatic conditions. It occurs only during the rainy season. The

fungus causing the disease has not been recorded from Ceylon and India so far. In the year 1961 however the fungus was observed on seedling rubber trees during July-August, in Palai. Damage resembling

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what is caused by mouldy rot has been observed in several plantations in S. India though the causal organism was recorded only on two occasions. In some countries it is the most serious disease of the tapping panel,

Symptoms

The first signs of infection are the formation of depressed spots about half to one inch above the tapping cut in the newly tapped area. These join up to form an irregular sunken band running parallel to the cut often broken here and there by in colour. In continuous wet and cool weather a grey fungal growth spreads over the sunken area. The wood may be discoloured and exposed and the wounds give an appearance of bad tapping. Within a few weeks the disease may spread to the regenerating bark, killing the tissues and forming extensive depressed wounds. Bark renewal is affected and this may make future tapping of the regenerated bark impossible. The disease does not usually extend below the tapping cut. During dry seasons the scale off. Callus is formed round the edges of the depressions and gives rise to uneven

Path ogen

The fungus causing the disease was originally called *Sphaeronema fimbriarum* which was later changed into *Ceratostomella fimbriata*. A further change has been effected and it is now known as *Ceratocystis fimbriata*. This belongs to the Ascomycetes group.

The mould like growth consists of smoke coloured septate hyphæ about 3-5 microns

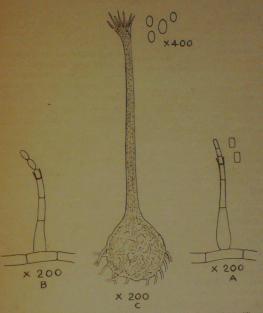
in width. They invade the cells of the bark, the xylem and may penetrate into cells of the medullary rays.

Two kinds of conidia are produced. One type is hyaline, rectangular and formed in chains coming from inside the conidiophore (endoconidia). They are formed in abundance on the external mycelium. Wide variations in size may be noticed—15-35×5-8 microps

The second type is olive brown in colour, thick walled, elliptical and also borne in chains originating from inside conidiophores. They measure $12-24 \times 12-14$ microns.

Besides these two, a perithecial stage is also produced. The perithecia occur in groups and are black with a basal bulbous portion and a long neck fimbriated at the tip. The basal portion is 50-100 microns in diameter and the neck 300-400 microns in length. The asci are short lived. They break down quickly and the free ascospores which collect in the perithecium are extruded through the neck. They are elliptical, one celled, hyaline and measure $4-9\times3-5$ microns.

The perithecia are not always found. The fungus grows rapidly on agar media, Though we obtained perithecia on incubated bark, they did not develop in agar cultures except in the first culture. But conidia are formed in abundance. Other workers have also found that perithecia are not formed in agar cultures by the pathogenic strains of the fungus. The conidia germinate readily producing germ tubes. The optimum temperature for growth lies between 21 and 26°C. At 35°C the fungus is inactivated.



B Coloured conidia

C Perithecium

A Hyaline conidia

Inoculations with pure cultures of the fungus produced typical symptoms in newly tapped panel in 48 hours. High atmospheric humidity is essential. Thick canopy and dense undergrowths favour the spread of the disease if tapping is continued during the rainy season. The fungus is able to infect only newly tapped panel. Any factor helping to maintain high humidity in the neighbourhood of the panel helps the spread of infection. In S. India tapping is

suspended in many of the estates during the rainy season. This is helpful in minimising the incidence of mouldy rot. Dry and clear weather arrests mouldy rot.

Seedling trees and many clones are susceptible. The disease is common on PB 86, PR 107, Tjir 1 and Pil B 84.

The disease is spread by wind borne spores, insects visiting the panel and by the tappers. The tapping knife and the hands

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of the tapper may carry the spores from an is applied over it on the tapped portion.

Stoppage of tapping during the rainy season especially in areas where the disease occurs will prevent the spread of the disease. Prophylactic treatment of the panel involving the use of fungicides will keep down infection. During the season when the disease is prevalent the newly tapped panel must be brushed or sprayed with a protectant at intervals depending on the incidence of mouldy rot. Many substances are recommended for this purpose. Izal (3-5%) solution, Antimucin (1 oz. in 1 gallon of water), Fylomac 90 (0.28%) and Brunolinum Plantarum (5-10%) have been used with success in other countries. The solutions of the fungicides are sprayed or brushed on the newly cut surface and on the bark below the cut to a width of 3-4 inches. After this has dried, a waterproof substance prowax, waxrextreseal, rubberkote etc.

However these fungicides are not available in India. In their stead organomercurial fungicides like arctan (1 oz. in 21 gallons of water) or ceresan wet (1 oz. in 1 gallon) can be used with equal effect. Here again waterproofing must be applied over the fungicide so that it may not be washed away

The tappers must be instructed to look out for mouldy rot during the rainy season and report to the Superintendent so that regular treatment may be commenced. The treatments may have to be repeated at intervals of 4-6 days depending on the intensity. In severe outbreaks it may be necessary to stop tapping and carry out repeated sprayings on the panel till the mould is kept down. Tapping healthy trees immediately after tapping a diseased one should be discouraged as this will spread infection. The fungicide may be applied

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Mac Millan & Co. Ltd., London, xv + 480.



December

ESTATE CALENDAR

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. Trea ment against pink disease is done. Seed collection is continued. Panel protection is given in areas where tapping is

done. Rubber seeds are sown.

This is the time for weeding and manuring. Sowing of seeds can be September 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. October 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 o sun. Lime washing and mulching is continued if found necessary. Ca' przoniun

seeds are collected during this month.

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Horse hair Fungus

(Marasmius equicrinus Mull)

T. S. RAMAKRISHNAN M. A., F. A. SC. P. N. RADHAKRISHNA PILLAY B. SC. (Hons.) Rubber Research Institute of India Kottayam

This fungus has been recorded from Ceylon, S. India, Malaya and other countries, associated with rubber, tea and many other cultivated and wild plants. Long branched, black hair-like tangled threads are found attached to the bark at the base of the trees. It may sometimes pass on from stem to branch or even to leaf. Sometimes small mushroom-ike fructifications develop on these,

The fungus is called *Marasmius equicinus*. Though the appearance is alarming it is not strictly parasitic but lives on the dead bark and the dead leaves on the ground. More often the fallen rotting pods may be covered with a tangle of such threads.

As it is not parasitic no control measures are warranted.

NEWS AND NOTES

101st Fertilizer Festival, Kottayam

In commemoration of the completion of hundred village fertilizer festival: organised in various villages in Kottayam distric, the folst festival was celebrated at the Mammen Mappillai Hall, Kottayam, on 9th March 1963

The Fertilizer Festivals were a new venture in popularising modern farming practices and many official and non-official organisations such as N. E. S. Blocks, Agricultural co-operative socie ies, Bharat Sevak Samaj, F. A. C. T., Kerala Agricultural Department and Rubber Board co-operated in this venture. It is estimated that more than six thousand farmers in Kottayam district actively participated in these festivals.



Group discussion

The programme for the 101st Festival included a seminar, an exhibition and a public meeting. At the relating to agriculture and the need to increase production to meet the national

emergency were discussed. Prominent experts in the field of agriculture led the discussions

The exhibition which was educative and informative, was organised under the joint auspices of the FACT, the Agriculture Department and the Rubber Board.

In the evening there was a public meeting at which H. E. the Governor of Kerala, Shri V. V. Giri, presided.



Stri Giri at Board's staff

There was a very interesting cultural programme after the public meeting.

A souvenir was also brought out in connection with the Festival to commemorate the completion of the 100 Fertilizer Festivals, the release of which was done by Shri M. K. K. Nair, Managing Director, FACT

Rubber Growers' Seminar

The Rubber Board has drawn up a plan to organise seminars of rubber growers and

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Dr. Rama Varma speaking at the function

exhibitions in important rubber growing centres to educate rubber growers on scientific methods of cultivation. The first of



Dr. Varma being received

these seminars and exhibitions took place at Vakathanam, a village near Kottayam, on 7th April 1963. The Vakathanam Service Co-operative Bank actively participated in organising the seminar which was inaugurated by Dr. Rama Varma, Chairman, Rubber Board. The technical officers of the Board led the discussions in which a number of rubber growers took part. An exhibition put up by the Rubber Board at the site detailing scientific and modern methods of cultivation, attracted a good number of visitors.

Nomination to the Rubber Board

Shri K. C. Sankaranarayanan, Secretary to the Government, Agriculture Department, Kerala State, Trivandrum, has been appointed a member of the Rubber Board by the Central Government in place of

JANUARY-JUNE 1963]

Shri M. Janardhanan Nair, Director of Agriculture, Kerala State with effect from the 28th March, 1963 up to the 5th November, 1964 or until such time as he holds the office of Secretary, Agriculture Department, Kerala State, whichever is earlier, to represent the Government of Kerala in the Board.

Amendment to Rubber Rules

The following notification has been published in the Gazette of India, Part II, Section 3 (i), dated 4th May, 1963:—

Rubber Control

New Delhi, the 24th April, 1963

G. S. R. 774—In exercise of the powers conferred by section 25 of the Rubber Act, 1947 (24 of 1947), the Central Government hereby makes the following rules further to amend the Rubber Rules, 1955, namely:—

- These Rules may be called the Rubber (Amendment) Rules, 1963.
- 2. In rule 30A of the Rubber Rules, 1955
 - (i) in sub-rule (1),-
 - (a) in clause (e) after the word "material" the following words shall be inserted, namely:—
 - "or for maintaining immature areas planted with high yielding planting material;"
 - (b) after clause (c), the following clause shall be inserted, namely:—
 - "(f) lumpsum grant to small growers in one or more instalments to meet wholly or partly the cost of erection of smoke houses-cum-processing sheds

- either directly or through Co-operative Societies."
- (ii) after sub-rule (2), the following subrule shall be inserted, namely:—
- "(2A) The Board may also incur expenditure from the Pool Fund for purposes of lending sprayers or dusters to small growers directly or through Cooperative societies irrespective of the planting material used, on payment of rent or free of rent."

Rubber Board Staff Association Annual Meeting

The 4th annual meeting of the Rubber Board Staff Association was held at the Council Hall, Rubber Research Institute of India, Rubber Board, on 19–5–1963. In view of the National Emergency it was decided by the members not to have any celebrations this year as usually conducted on previous years.

The President of the Association speaking on the occasion said that such meetings should provide an opportunity for reviewing the past activities and for thinking of ways and means to remedy the draw backs if any. Speaking about the achievements of the Association the President emphasised the need for a strong Association and reminded the members that any complacency on the part of the members would be suicidal. He exhorted the members to maintain the general efficiency of the office and to help implement successfully the development schemes of the Board.

The Secretary narrating briefly the history of the Association said that it had now be-

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come a force to be reckoned with. This position could be achieved because of the purity of the means it pursued and the goals it aimed at. He said that they were fortunate in having a Chairman like Dr. Rama Varma who had been very considerate of the well being of the staff all along. He wished that Dr. Rama Varma might continue as the Chairman of the Board for many more years.

A resolution to appeal to the President of India not to accord assent to the amendment of Article 311 of the Constitution and another to request the Government of India to increase the rate of D. A. in accordance with the recommendations of the 2nd Pay Commission in view of the increase in the cost of living, were unanimously adopted.

The following members were elected office bearers of the Association for the year 1963-64.

Sri P. Mukundan Menon-President;

Sri K. N. G. Menon-Vice President -

Sri R. V. Panicker-Secretary:

Sri K. J. Ninan-Joint Secretary;

Sri K. V. Korah-Treasurer;

and Messrs. S. Sankaranarayanan, K. Vijayagopal, M. K. Subramania Iyer, M. O. Joseph, V. Govindarajan, K. K. Ramakrishnan, members of the Exe. Committee.

Appointments

Dr. N. H. Sivaramakrishnan has joined the staff of the Rubber Research Institute of India, Rubber Board, Kottayam as Deputy Director (Chemistry—Rubber Technology) on 1st June. 1963. After his M. Sc. (Chemistry) from Banares Hindu University, Dr. Sivaramakrishnan joined the Indian Institute of Science, Bangalore and carried out research on various aspects of rubber. He was awarded the Ph. D degree of the University of Bombay in 1953 for his thesis on "Spreading properties of rubber and rubber derivatives."

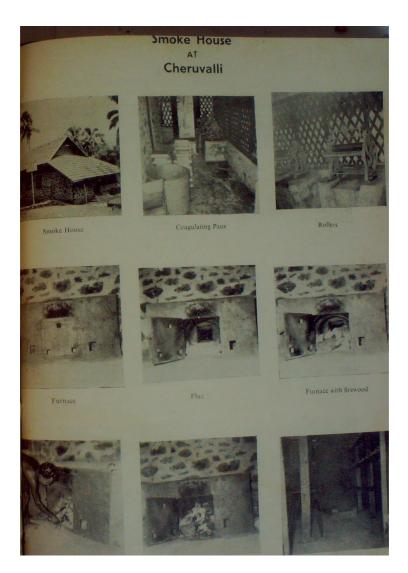
Dr. Sivaramakrishnan was engaged in research and teaching for the post-graduate students of the Dept. of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore till 1959. Then he joined the Indian Rubber Manufacturers Research Association, Bombay as a Senior Scientific Officer and carried out research at the National Chemical Laboratory, Poona-He has published a number of research papers in important journals in India and abroad.

Shri K. C. Ananth has joined the staff of the Rubber Research Institute of India. Rubber Board as Deputy Director (Agronomy). Shri Ananth graduated from the Banares Hindu University in 1952 and obtained his M. Sc. (Agriculture) in 1954 from the same university. He took his Diploma in Agricultural Extension from the Allahabad University.

Shri Ananth joined the Central Tobacco Research Institute. Rajamundry, in 1954 and worked in the Agronomy Division for about two years

He joined the Coffee Board, (Research Department) as Liaison Officer and after two years was appointed as Agronomist which post he held up to 1961. Latter he joined the Consolidated Coffee Estates (1943) Ltd. and worked there for two years as Scientific Officer.

JANUARY—JUNE 1963



Exhibition, Seminar AND Public Meeting

at Cheruvalli held in connection with the Inauguration of Smoke House



Shri Rajapadmanabhan opening the exhibition



" Use only high yielding planting materials" - K. M. Joseph



The group assembled



Dr. Varma cutting a tage to mark the opening of the Smoke House





Smoke House at Cheruvalli_Opened

The Rubber Processing Factory at Cheruvally, constructed by the Cheruvally Rubber Karshaka Co-operative Society, under the Rubber Board's "Aid to Smoke-houses Scheme", availing a grant of Rs. 5,000, was formally inaugurated by Dr. Rama Varma, Chairman, Rubber Board, at a colourful function at Cheruvally on 16th June 1963. Shri K. T. Thomas, M. L. A.,

Declaring open the smoke-house, Dr. Varma explained the various development programmes the Board has envisaged with a view to helping the smallholders. He spoke about the necessity of organising cooperative societies of smallgrowers and also stressed that unless the personnel engaged in running such societies work with a spirit of selfless service, the very movement would be at stake.

Earlier, in the morning, Shri K. T. Thomas M. L. A., hoisted the flag, and Shri A. K. Rajapadmanabhan, Dy. Rubber Production Commissioner, Rubber Board, declared open the small exhibition put up by the Rubber Board. Exhaustive study vation were conducted by the Board's technical experts. (See Photographs on left)

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Planting Notes

Tapping in Replanted Holdings

The Board's Replanting Subsidy Rules

Tapping shall not be commenced in any for clonal seedlings from the ground level and the Board's inspecting officers shall have

Permit holders whose rubber trees in the cerned and get the areas inspected and certified. Trees should be marked for tap-

Before applying for permission to commence tapping in the replanted areas it is that at least 70% of the trees in their re-

How to ascertain this quickly and easily? trees, by its centre. Hold the stick vertically close to the tree with its free end at the base in case of seedling trees and at the bud I but on older plants it may commence on

union in the case of budded trees. Then encircle the wire round the tree. If the ends of the wire just meet or do not meet, the tree has exceeded the required girth and if the ends of the wire overlap, the tree is not yet

Pink Disease

Rubber growers should be on the look out for early symptoms of pink disease on young rubber during the months of June to October. Plants of two to 20 years age are It spreads in wet weather and is very

Symptoms

In the initial stages latex exudes from the affected part. This is followed by fine white thread-like mycelial growths which soon envelop the affected portion. These grow very fast on the surface for a distance of 2-3 feet under favourable conditions. Sometimes this develops a pink colour. may fall off exposing the wood. Copious flow surface. As a result of destruction of bark many of the dormant buds on the stem

is the appearance upon the surface of a salmon-pink incrustration produced by the fungus. On the young plant the disease is seen on the main stem at varying heights; the main stem especially at the forks where the branches arise or on the branches themselves. The stem of plants below three years is quickly infected and the bark all round the infected part may be destroyed resulting in a ringing effect as a result of which the upper portions wilt and dry up. Dried leaves do not fall off but remain attached to the dead shoots. This occurs mainly in the months of September and

on forks and stem with 1% Bordeaux mixture. Brush Bordeaux paste for a distance of two feet in the region of forks. Paint a mixture of one part copper sulphate, two parts of lime and three parts of pure

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Notes

T. S. RAMAKRISHNAN, M. A., F. A. SC. P. N. RADHAKRISHNA PILLAY, B. SC. (Hons.) Rubber Research Institute of India, Kottayam

Zinc Deficiency

Symptoms of deficiency of zinc are exhibited by rubber seedlings in nurseries and young plants in the field in different parts of Kottayam, Trichur and Kozhikode districts. The leaflets are narrow, strap shaped and crinkled with wavy margins. The growth of the plant is retarded and it remains stunted. This deficiency can be made up by applying small quantities (about 5 lb. to an acre) of zinc sulphate to the soil at the base of the plants. Foliar applications give quicker response. A mixture made up of zinc sulphate and lime solutions can be sprayed on the foliage. One pound of zinc sulphate is dissolved in 10 gallons of water. is slaked and water added to make up 10 gallons and then filtered. The former is poured into the latter and stirred well. The resulting formulation is sprayed on the

To economise, two pounds of zine sulphate can be dissolved in water and added to 100 gallons of Bordeaux mixture, when the plants are being sprayed for the control of leaf spot or shoot rot diseases. This will result in saving on labour.

This treatment was given in a five acre

nursery where hundreds of plants were showing the symptom. In the course of four months, the new foliage formed was found to be quite normal though some of the old leaves had the symptom. This method can be adopted for controlling deficiency of zinc in young plants.

Slugs and Snails

In the Rubber Board Bulletin, Vol. VI, No. 1, July-September, 1962, we had recommended meta baits for the control of slugs and snails in rubber plantations. Metal-dehyde is not readily available in the market. Alternative measures had to be tried.

Advantage was taken of heavy infestation of slugs on about 5 to 10 acres of two year old plants in a plantation in Trichur district. The terminal buds were damaged in a large number of plants. The slugs were hiding under the weeds and cover plants during day time and came out only at night. Handpicking was not practicable.

In order to prevent further infestation of the stem, eight inches of the stem above the soil was painted all round with Dieldrex 18 E.C.(1 in 400). In addition the young shoots were dusted with 10% gammexane. This treatment had very good effect and the slugs disappeared from the scene in no time.



DISTRIBUTION OF PLANTING MATERIALS

The Board will be distributing selected, high yielding planting materials during the planting season of 1963 also. The materials will be distributed according to the following schedule:—

Budwood	April-May
Clonal seedling stumps and budded stumps	June-July
Clonal seeds	July-August

The details regarding the materials and their distribution are given below:—

Budwood

Only budwood of 20 clones of RRIM 500 and 600 series are available for distribution this year. These will be supplied under agreement to rubber growers having 5 acres or more of registered rubber estate, for experimental planting only. Only 5 yards of each clone will be given to any one applicant.

The cost of budwood is Rs. 5.00 per yard. Delivery will be from Board's office at Puthuppally, Kottayam.

Clonal seedling stumps

One year old selected Tjir 1 clonal seedling stumps raised in the Board's Karrikkattoor Nursery near Erumeli will be distributed to rubber growers at the cost price of 22 nP. per seedling stump. The distribution

will be made from the nursery and from the Board's sub-offices at Kottayam, Kozhikode and Trivandrum.

Budded stumps

It is proposed to distribute budded stumps of clones Tjir 1, PB 86, Gl 1, PR 107, LCB 1320 and AVROS 255. The cost per stump of all clones will be 39 nP.

As the availability of budded stumps will be limited, the maximum number that can be supplied to anyone applicant is provisionally fixed at 2000 in aggregate.

Clonal seeds

Tjir 1 clonal seeds collected under the Board's supervision from collection areas specially selected for the purpose will be supplied to small growers and large growers according to availability. The cost will be Rs. 35.00 per thousand. The Board does not propose to undertake distribution of seeds to commercial nurseries this year.

Smallholders will be given seeds at the subsidised rate of Rs. 30.00 per thousand. The distribution at concessional rate will, however, be limited to 2000 seeds to one applicant.

Germinated seeds, if available, will be supplied at an additional cost of Rs. 5.00 per thousand or fraction thereof.

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How to apply

Applications for budwood of RRIM clones may be submitted in plain paper giving name and address of the applicant; name, register number and acreage of the estate and requirement of budwood in yards of each clone. Applications for seedlings, budded stumps and seeds should be submitted in forms prescribed for each. Copies of the forms can be had from the Secretary, Rubber Board, from the Board's sub-offices or from Rubber Instructors' offices on request.

TJIR 1 CLONAL SEED COLLECTION AREAS APPROVED FOR 1963

The Rubber Rules have been amended to ensure that only approved high-yielding planting materials will be used for replanting or newplanting in future. Accordingly, planting licences are now being issued by the Board strictly under the condition that only approved material will be used for the proposed plantings.

In the case of clonal seeds to be used for planting as such (without budding) the

Board at present recommends only Tjir I mother seeds collected from areas approved by it. A list of the areas approved by the Board for the year 1963 along with detailed sketch maps has been prepared and made ready to be supplied to planters free of cost on request. The list is to be revised every year. The areas selected and approved have been closely examined by the Board and adequate steps have been taken to ensure that contamination of the areas by cross pollination from unselected seedling rubber has been eliminated or reduced to the minimum.

The approved areas will be marked out prominently by the estates during the seed fall season by painting 4 inch wide yellow circular bands at a height of 5 feet from the ground on trees at regular intervals along the boundaries of the collection areas. Intending purchasers of seeds should take note of the fact that Tjir 1 seeds collected from unapproved areas will not differ in appearance from those of approved areas. They would therefore, do well in satisfying themselves that the seeds obtained by them are collected from the approved areas.

BLUE RIBBON

We consider it a special privilege to place on record our deep appreciation for the brilliant success of Sri M. S. Gopinathan who secured the solitary First Class in Chemistry and a high Second Class in Malayalam in the B. Sc. Degree Examination held in March 1963. Sri Gopinathan belongs to Quilon and is the son of Sri K. Sankaran, an employee of a Rubber Estate in Kanyakumari. Sri Gopinathan has been a recipient of the educational stipend offered by the Rubber Board "to sons and daughters of labourers working in registered rubber estates." His distinguished educational career had brought him several other merit scholarships also.

We wish him every success.

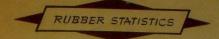


TABLE I

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

TABLE II

Planted Acreage Under Different Planting Materials as at the End of 1962–1963

(Area in acres)

Planting	-	Newplanted	Replanted	Total
materials		area	area	area
Ordinary		211,888	4,184	216,072
Budded		37,679	17,555	55,235
Clonal		77,798	12,037	87,835
	Total	327,365	33,777	361,142

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TABLE III

Classification of Holdings and Estates According to Size as at the End of 1962-1953
(Area in acres)

	Groups			No. of units	Area
١.	Small Hold	lings (50 acres &	below)		
	5 Acres an			57,524	110,998
			d including 10 acres	5,428	40,041
	Above 10:	acres		3,410	69,698
			Total	66,362	220,737
B.	Estates (al	ove 50 acres)			
	Above 50	and upto & in	neluding 100 acres	305	22,113
	,, 100	"	500 ,,	232	46,842
	,, 500		1000 ,,	32	22,081
	,, 1000	. "	1500 ,,	18	22,056
	,, 1500	"	2000 ,,	6	10,179
	,, 2000			7	17,134
		Tota	al	600	140,405
		GRAND TOTAL		66,962	361,142

TABLE IV Statewise Distribution of Area at the End of 1962-1963 (Area in acres)

	STATES		HOLDINGS acres & bélow)	(.	ESTATES Above 50 acres)		FOTAL
		No. of units	Area	No. of units	Area	No. of units	Area
i.	Kerala	65,658	215,085	- 548	125,211	66,206	340,296
2.	Madras	683	5,305	41	10,945	724	16,250
3.	Mysore	21	347	10	3,827	31	4,174
4.	Andamans			1	422	1	422
	Total	66,362	220,737	600	140,405	66,962	361,142

JANUARY-JUNE 1963]

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

States	1958-59	1959-60	1960-61	1961-62	1962-63
Kerala	22,062	21,890	23,175	24,954	29,057
Madras	1,665	1,814	2,040	2,060	2,695
Mysore	425	437	452	402	447
Andamans	17	32	30	30	40
Total	24,169	24,173	25,697	27,446	32,239

TABLE VI

Production, Import and Consumption of Natural and Synthetic Rubber
(In Metric Tonnes)

-	Production		Import		Con	sumption	
Year	of Natural Rubber	Natural Rubber	Synthetic Rubber	Total	Natural Rubber	Synthetic Rubber	Total
		10 500	4,229	16.767	35,767	3,443	39,210
1958-59	24,169	12,538		21,005	40,491	4.934	45,425
1959-60	24,173	15,287	5,718			7,306	55,454
1960-61		23,125	8,097	31,222	48,148		58,504
		22,528	10,121	32,649	48,410	10,094	-
1961-62	27,446			33,352	53,553	10,583	64,136
1962-63	32,239	23,360	9,992	33,332	35,530		

TABLE VII

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

V	Acquired	Consumed
Year 1958–59 1959–60 1960–61	3,973 4,997 5,123	4,022 4,949 5,443 5,942
1961-62 1962-63	6,119 6,790	6,772

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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
April	8,723	10,035	8,571	9,696	11,003
May	9,106	9,067	8,186	9,716	10,937
June	8,756	8,138	8,128	8,462	12,193
July	8,710	8,545	8,067	8,256	12,475
August	8,619	8,968	8,489	9,235	12,218
September	8,322	8,995	9,157	9,744	12;723
October	9,523	9,810	10,265	11,291	13,917
November	11,007	10,467	10,742	12.120	15.059
December	11,587	10,793	12,993	13,359	16,334
January	11,715	10,496	13,036	12,990	15,940
February	10,438	9,533	11,185	11,511	13,879
March	10,233	9,201	9,875	11,439	13,485

In the service of Kerala

Punalur

Syndicate Bank, a house that leads in branch banking, a pioneer in the small savings, and an expanding institution with vast resources has served Kerala since the earliest times. Its first branch in Kerala was opened as early as just 6 years after its incorporation. 26 out of its 176 Branches are in Kerala State and its net work of branches in Kerala extends over the whole State from the northernmost Kumbla to the southernmost at Trivandrum.

Branches in Kerala State Kanhangad

Dauagara	Buttayam	Quiton
Badiadka	Kozhikode	Taliparamba
Cannanore	Kumbla	Tellicherry
Changanacherry	Nileshwar	Thodupuzha
Cochin	Palghat	Trichur
Ernakulam	Pandalam	Trivandrum
Kasaragod	Ponkunna m	Trivandrum Local
Kayamkulam	Pavyanur	

THE SYNDICATE SEEKS TO SERVE YOU

Out of the 13 banks taken over by the Syndicate 2 were from Kerala and its second All Women's Branch is at Trivandrum.

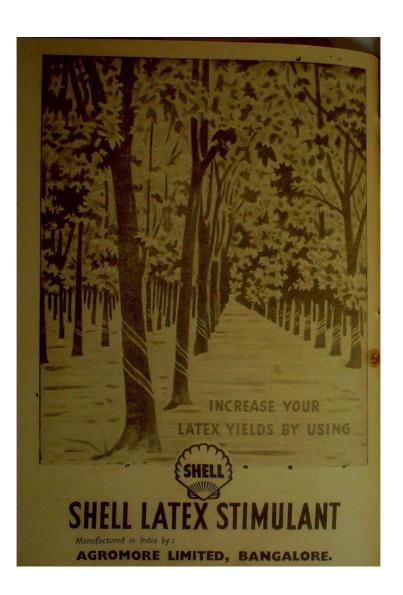
THE CANARA INDUSTRIAL & BANKING SYNDICATE LTD.

Alleppey

NATURAL RUBBER PRICES

The current controlled maximum and minimum prices exclusive of sales tax, for various grades and qualities of rubber and latex of different concentrations excluding the cost of container.

Gra	de of		F. O. B. Cochin	for 50 kilograms
rul	bber	Quality of rubber	Maximum price Rs.	Minimum price Rs.
(1	1)	(2)	(3)	(4)
Gro	oup 1	R. M. A. IX R. M. A. 1	162.60 162.60	161.50 161.50
Gro	oup 2	R. M. A. 2 R. M. A. 3 Cuttings No. 1	160.95 159.30 151.03	159.85 158.20 149.93
Gre	oup 3	R. M. A. 4 R. M. A. 5 Cuttings No. 2	155.44 151.03 144.42	154.34 149.93 143.32
Gr	oup 4	Precoagulated Crepe Pale Latex Crepe 1 Pale Latex Crepe 2 Pale Latex Crepe 3 FAQ	168.67 166.46 164.26 163.16 162.06	167.57 165.36 163.16 162.06 160.96
Gr	roup 5	E. B. C. Super IX Estate Brown Crepe IX Estate Brown Crepe 2X Smoked Blanket	157.64 153.23 149.93 153.23 144.97	156.54 152.13 148.83 152.13 143.87
Gı	roup 6	Remilled Crepe 2 Estate Brown Crepe 3X Remilled Crepe 3 Remilled Crepe 4	141.11 138.91 132.84 123.47	140.01 137.81 131.71 122.37
	roup 7 ormal lat	Flat Bark tex up to 35% concentrates	Rs. 162.60 plus a premium of Rs. 19.29 per 50 Kilograms of D. R. C	Rs. 161.50 plus a premium of Rs. 19.29 per 50 Kilograms of D. R. C.
L	atex conc	centrates of 36% to 50% (both inclusive)	Rs 162.60 plus a premium of Rs. 36.38 per 50 Kilograms of D. R. C.	Rs. 161.50 plus a premium of Rs. 36.38 per 50 Kilograms of D. R. C.
L	atex con	centrates of 51% to 60% (both inclusive)	Rs. 162 60 plus a premium of Rs 47.40 per 5) Kilograms of D. R. C.	Rs. 161.50 plus a premium of Rs. 47.40 per 50 Kilograms of D. R. C.



RUBBER BOARD

INDIA

REPORT
OF
THE DELEGATION TO MALAYA

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PART I

1. Constitution of the Delegation

The Rubber Board decided at its meeting held on 28th June 1962 to send a Delegation to Malaya and later to Ceylon to study the various aspects of the Rubber Plantation Industry and the organisational set up for the development of the industry in those countries. The following constituted the Delegation to Malaya:

- 1. Dr. Rama Varma, Chairman of the Board and leader of the Delegation,
- 2. Dr. V. R. Narayanan Nair, Member of the Board representing small growers,
- representing other 3. Shri Chacko A. Kallivayalil,
- 4. Shri K. J. Kurian

The specific points for study were :-

- 1. to study the latest planting methods in Malaya;
- 2. to explore the possibilities of getting good planting material on a commercial
- 3. to study the working of the Replanting Scheme in Malaya;
- 4. the steps taken to solve the problems of small holders of rubber;
- 5. co-operative movements in the rubber plantation industry;
- to establish close liaison with the Malayan Rubber Research Institute and also to explore the possibilities of sending Board's officers to Malaya for training; and
- 7. to explore the possibilities of importing rubber from Malaya on Rupee

A detailed brief was prepared for the use of the Delegation. It was discussed at a meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 1962. The Chairman had also meeting of the Executive Committee on 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962. The Chairman had also meeting of the Executive Committee on 28th September 1962.

2. Programme in Malaya

We left Cochin on 5th October, 1962. We spent 10 days in Malaya and 2 days in Singapore. Our programme in Malaya is given in Appendix I. We returned to Cochin on 22nd October,

3. General back-ground

- 3. 1 Geography. The Federation of Malaya lies between latitudes 1° and 7° North and longitudes 100° and 105° East. It is bordered by Thailand on the North, Malaya on the South, by the Indonesian island of Sumatra across the Strait across the Strait of approximately 50,690 sq. miles, about the same as Madras and nearly three times that of Kerala. Tour-fifths of the area lie under primeval jungle, mountains and swamp. The settled and cultivated areas lie along the two coastal strips. On the western side of the peninsula, it is a practically unbroken succession of mangrove-swamps and mud-flast. On the East coast there are long stretches of sand and surf bordered by a littoral vegetation. Further inland on both coasts, lies the agricultural belt where rubber is grown. Malaya enjoys copious rainfall, high humidity and uniform temperature. The total yearly rainfall is usually about 80 to 100 inches. The rain is partly controlled by the direction from which the winds blow—those being the South-West and North-East monsoons. Even in between monsoons, Malaya gets occasional showers. There is no monsoons. Even in between monsoons, Malaya gets occasional showers. There is no
- 3. 2. People. The population of Malaya is about seven million. Unlike most other South-East Asian countries, it is not too large for the available land and natural resources. However, the present rate of growth is estimated to exceed three per cent, a rate which would lead to a doubling of the population in 25 years. The population is racially and culturally a mixed one. Nearly 50 per cent are Malays, 37 per cent of Chinese origin, 10 per cent of Indian origin, and the rest of Ceylonese, European or Eurasian
- 3. 3. Government. Malaya was a British colony for a long time. It became independent in 1957. There are nine States in Malaya each under a Sultan. They constitute into a Federation. The Federation has an elected Parliament and Cabinet system of Government responsible to the Legislature. Each State has its own Legislature, and Cabinet Government. Federation of Malaya is a member of the British Commonwealth.
- 3. 4. 1. Economy. Malaya presents a prosperous appearance. * Its per capita income was Rs. 1081 in 1957 as compared with India's Rs. 279, Pakistan's Rs. 240, Ceylon's Rs. 527 and Japan's Rs. 1198. It is estimated that agriculture accounts for 49 per cent of the value of gross domestic production and 60 per cent of the total economically active population. Rubber is the most important agricultural crop. Of the total cultivated area of about 5,5 million acres, not less than 3.5 million acres are under rubber. The rubber area is even estimated at 4 million acres. About two million people or 30 per cent of the total population are directly dependent on rubber. In 1961, the revenue from export duty on rubber was 100 million dollars. Next in importance is rice. Other major crops are coconuts and palm oil. The minor crops include a wide variety of fruits, vegetables and spices. Fishing and forestry also play an important role.
- 3, 4, 2. Next in importance to agriculture is the production of tin. Malaya is the largest producer of tin in the world, accounting for about 33 per cent of the total output. It accounts for about 20 per cent of Malaya's total exports. It is next to rubber as a contributor to the value of total exports and the value of gross domestic income. Malaya has not made much advance in the establishment of secondary industries.

Federation has an

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4. Rubber in Malaya

- 4.1. Rubber was planted on an experimental scale in Malaya in the late 1880's. Commercial planting was started in 1900. In the first decade one million acres were brought under rubber. Today the estimated area under rubber is about 4 million acres. For statistical as well as for administrative purposes, rubber area is divided into two categories, namely, Estates and Smallholdings. An estate is defined as lands, contiguous or non-contiguous, aggregating not less than 100 acres in area planted with rubber or on which planting of rubber is permitted and under a single legal ownership. Areas below 100 acres are treated as smallholdings. In India, only 50 acres and below are treated as smallholdings.
- 4, 2. On 31st December, 1961 there were 2,218 estates in Malaya with a total area of 2,285,259 acres. It included 88,045 acres under other crops. The area planted with rubber was 1,937,432 acres of which 1,376,950 acres were mature. The average size of a rubber estate was 873 acres. Europeans have a predominant share in the estates. Twelve European managing agencies control 333 companies with a total acreage of 1,138,590. One single agency controls 66 companies with a total acreage of 226,074, In India, estates of above 100 acres are only 286 and their average size is 410 acres. There are only seven estates in India the acreage of which is more than 2,000.
- 4, 3. Information on smallholdings is meagre. The total area under smallholdings in Malaya is estimated at about 2 million acres. About 87 per cent of the holdings is less than 10 acres in size. The agricultural census indicated that only 47 per cent of the holdings were in single units; 40 per cent consisted of two or three discrete parcels and remaining 13 per cent, four, five or in a few cases more parcels, 67 per cent of areas individually less than 3 acres are mixed farms or farms specialising in another of areas individually less than 3 acres are mixed farms or farms specialising in another cop where rubber is a secondary crop. In India about 70 per cent of the smallholdings are below 10 acres and 50 per cent below 5 acres. Here also mixed farming is not rare among smallholdings.
- 4, 4. Of the total planted area of 1,937,432 acres under estates in Malaya, 1,227,620 acres or 63.37 per cent are planted with high yielding planting material. In India of the 138,362 acres under estates of above 50 acres, 66,267 acres or 49.6 per cent are planted with high yielding planting material. In the case of smallholdings out of an estimated 2 million acres, 450,026 or about 25 per cent are brought under an estimated 2 million acres, 450,026 or about 25 per cent are brought under high yielding between 1953 and 1961. In India, out of 209,759 acres under smallholdings below 50 acres, 67,800 acres or 33.3 per cent are under high yielding.
- 4. 5. In Malaya the production of estates has increased from 328,800 tons in 1951 to 429,500 tons in 1961 and the average yield from 460 lbs. per acre to 719 lbs. per acre.

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3. 4. 3. The Federal Government is fully aware of the nature of its economy and the problems before it. In its first Five Year Plan (1956-60) the highest priority had the problems before it. In its lirst Five Year Plan (1956-60) the highest priority had been given to the rubber industry, both estates and smallholdings—so that by replanting and other measures the country's greatest single industry and source of revenue could better meet the challenge of synthetic rubber. Equal importance had been given to general agriculture and mining industries. Second priority was for education and health services. Next came housing. In the field of industry, Government policy was to create the infrastructure of basic facilities and services and to encourage private enterprise (both local and foreign) by means of policies conducive to investment and expansion. It is admined that the total gross investment, during the First Plan, which ampeausable to the claimed that the total gross investment during the First Plan, which amounted to almost \$3000 million or 12 per cent of national income generated a rate of growth slightly greater than that of population. The second Five Year Plan aims at consolidating and expanding the programmes undertaken under the First Five Year Plan.

4. Rubber in Malaya

- 4.1. Rubber was planted on an experimental scale in Malaya in the late 1880's. Commercial planting was started in 1900. In the first decade one million acres were brought under rubber. Today the estimated area under rubber is about 4 million acres. For statistical as well as for administrative purposes, rubber area is divided into two categories, namely, Estates and Smallholdings. An estate is defined as lands, contiguous or non-contiguous, aggregating not less than 100 acres in area planted with rubber or on which planting of rubber is permitted and under a single legal ownership. Areas below 100 acres are treated as smallholdings. In India, only 50 acres and below retreated acressingly acressing the small blookings. below are treated as smallholdings.
- On 31st December, 1961 there were 2,218 estates in Malaya with a total area of 2.285,259 acres. It included 88,045 acres under other crops. The area planted with rubber was 1,937,432 acres of which 1,376,950 acres were mature. The average size of a rubber estate was 873 acres. Europeans have a predominant share in the estates. Twelve European managing agencies control 333 companies with a total acreage of 1,138,569. One single agency controls 65 companies with a total acreage of 226,074. In India, estates of above 100 acres are only 286 and their average size is 410 acres. There are only seven estates in India the acreage of which is more than 2,030.
- 4. 3. Information on smallholdings is meagre. The total area under smallholdings in Malaya is estimated at about 2 million acres. About 87 per cent of the holdings is less than 10 acres in size. The agricultural census indicated that only 47 per cent of the holdings were in single units; 40 per cent consisted of two or three discrete parcels and remaining 13 per cent, four, five or in a few cases more parcels. 67 per cent parcels and remaining 13 per cent, four, five or in a few cases more parcels. 67 per cent of areas individually less than 3 acres are mixed farms or farms specialising in another crop where rubber is a secondary crop. In India about 70 per cent of the smallholdings are below 10 acres and 50 per cent below 5 acres. Here also mixed farming is not rare among smallholdings.
- 4. 4. Of the total planted area of 1,937,432 acres under estates in Malaya, 1,227,620 acres or 63.37 per cent are planted with high yielding planting material. In India of the 138,362 acres under estates of above 50 acres, 66,267 acres or 49.6 per cent are planted with high yielding planting material. In the case of smallholdings out of are planted with high yielding planting material. In the case of smallholdings out of an estimated 2 million acres, 450,026 or about 25 per cent are brought under an estimated 2 million acres, 450,026 or about 25 per cent are under smallholdings below 50 acres, 67,800 acres or 33.3 per cent are under high yielding.
- 4, 5. In Malaya the production of estates has increased from 328,800 tons in 1951 to 429,500 tons in 1961 and the average yield from 460 lbs. per acre to 719 lbs. per acre.

4. 6. Malaya is the largest single producer of natural rubber. Almost the entire production of Malaya is exported. Its export increased from 691,600 tons in 1951 to 790,600 tons in 1961. During this period there had been considerable change in the direction of trade. Exports to dollar countries declined from 35 per cent in 1951 to 16 per cent in 1961 and to sterling countries from 35 per cent to 21 per cent, while it increased from 18 per cent to 25 per cent to to countries in the O. E. E. C. and from 12 per cent to 38 per cent to the rest of the world. Exports to United Kingdom declined from 24.7 per cent in 1953 to 14.6 per cent in 1961, to the United States from 21.4 per cent to 12.1 per cent and to the U. S. S. R. with hardly any exports till 1956, it increased from 1.3 per cent in that year to 12.5 per cent in 1961. If Malaya has to look to foreign markets for the export of its rubber. India is fortunate in having an expanding domestic market for its product. To meet the domestic demand India's imports of rubber have increased from 6,921 tons in 1951 (6,921 tons natural and nil tons synthetic) to 30,200 tons in 1961 (21,350 tons natural and 8,380 tons synthetic). As Malaya is dependent on foreign markets for the sale of its rubber, it has no control over the prices. The prices fluctuated widely according to changes in the world demand for natural rubber. The following statement shows the Cochin and Singapore prices since 1951.

Year	Cochin (per 100 lbs.)	Singapore (per 100 lbs.		
	Rs.	Rs.		
1951	120.37	263.75		
1952	129.67	149.44		
1953	138.00	104.91		
1954	138.00	104.69		
1955	149.44	177.58		
1956	155.75	150.52		
1957	155.75	138.06		
1958	155.75	124.83		
1959	155.75	157.98		
1960	155.75	168.12		
1961	151.06*	129.95		
1962 (10 months)	148.17**	121.03		

4.7. When compared with Malaya, India is only a minor producer of rubber. Geographic and climatic conditions are not similar. The yield per acre is lower and the cost of production higher in India than in Malaya. India's advantage lies in the expanding domestic market, while Malaya has to sell its large production of rubber in foreign markets in competition with synthetic rubber as well as natural rubber from other countries.

ber.

^{*} Excluding cess

^{**} Excluding cess and sales tax

PART II

RESEARCH AND DEVELOPMENT

5. Malaya has the climatic advantage to grow rubber. But it has attained a pre-eminent position in the field of natural rubber because of the importance it gave to research. Though the names of Sir Joseph Hooker, Director of Kew Gardens and Sir Henry Wickham are generally mentioned as those responsible for introducing rubber to the South-East Asian countries, it was the researches of the late H. N. Ridley in the ninetees on the extraction of latex which made large scale planting of rubber economical. It was he who showed that latex could be extracted without killing the tree. From 1900, the Department of Agriculture of the Federated Malaya States started taking an active interest in rubber research. In 1909, the Rubber Growers' Association of Malaya appointed a Chemist to do research on the curing of rubber. In 1920, it was decided to etart a separate institute for rubber research. It took final shape only in 1925. The Rubber Research Institute of Malaya started functioning from September, 1926.

6. The Malayan Rubber Fund Board

- 6.1. By the Malayan Rubber Fund (Research and Development) Ordinance, 1958, Malayan Rubber Fund Board was constituted. Its main functions are:—
 - (a) to promote research into the production, consumption and uses of natural
 - (b) co-ordinate activities within and outside the Federation relating to research, development, publicity and other matters affecting the natural rubber industry, and
 - (c) obtain information on synthetic rubber and other like products and materials and stimulate the use of natural rubber either in competition therewith or as complementary thereto.
- 6.2. The Board is an autonomous body. Controller of Rubber Research is the Chief Executive. He is appointed by the Minister on the recommendation of a committee consisting of two nominees of the Minister and two nominees of the Rubber Producers' conveil. Council. He is given a unique position and status commensurate with the responsibilities attached to the post. The Board is obliged to keep the Minister informed of all matters relating to its activities. The Minister may issue directives to the Board as to the policy relating to its activities. The Minister may issue directives to the Board as to the policy to be pursued by the Board. If the Board objects to any such directive, the Board may submit its objections and the reasons therefor in writing to the Minister, who shall submit its objections and the reasons therefor in writing to the Minister, who shall cause the same, together with his directive, to be laid before the House of Representatives.
- 6.3. The Malayan Rubber Fund Board controls the Rubber Research Institute of Malaya (RRIM), the Natural Rubber Producers' Research Association (NRPRA), and the Natural Rubber Bureau (NRB). It gets its revenue from a cess on exports at the rate of 0.75 cents per lb. collected as a customs duty.

7. The Rubber Research Institute of Malaya

7.1. The Rubber Research Institute of Malaya undertakes research on all aspects of the Rubber tree, harvesting of the crop and the conversion of crop to marketable forms.

The work of each division is closely co-ordinated. There are separate divisions for Statistics and Information. There are three advisory services. The Smallholders' Advisory Service is responsible to educate the large smallholding community on improved methods of cultivation, harvesting, processing and marketing. An Estate Advisory Service provides froutine advice to all estates. The Chemical Division has a separate advisory service manual service to estates on the processing of rubber and also a technical service to manual service to manual services. The Institute is located at Kuala Lumpur. It has an Experiment Station of about 3000 acres at Sungei Buloh, 16 miles from Kuala Lumpur. The approved estimates and actual expenditure of the RRIM for 1961 were:—

	Approved estimates	Actual expenditure
Headquarters & laboratories	7,807,920	\$
Experiment Station	1,269,843	6,342,420 1,035,913

- 7.2. The researches in progress at RRIM can be divided into two broad categories, biological and chemical. The biological divisions consisting of soils, botany and pathology are conducting researches on breeding and selection, propagation and planting methods, soils and manuring, cover plants, weed control, tapping and yield stimulation, physiology of latex production and flow, pests and diseases and drying of trees. The achievements of the Institute in these fields are commendable. By selective breeding, it has been able to produce clones which could give a yield of 1,500 to 2,000 bs. per acre, more than three times the yield from unselected seedlings. There are now clones on trial, which, if successful, may give a yield of 3,500 lbs. and more. Results of the researches in the biological divisions, which are of importance to us have been dealt with in the Planting Section of the Report.
- 7.3. The Chemical Division deals primarily with latex and the preparation of the many products obtained from it, including smoked sheet, crepe, special and modified rubbers and latex concentrates. Microbiological studies of latex and latex concentrates are being pursued with particular reference to means of bacterial contamination. Other important works done in this section are studies of latex particles and their behaviour on coagulation, of the rubber hydrocarbon with particular reference to its greater reactivity when newly obtained from the tree and of variations in latex and rubber which arise from seasonal and environmental effects, manurial and collecting treatments and the type of planting materials used.
- 7.4. Chemical engineering studies include: the drying of coagulum which is being examined in a specially constructed tunnel drier with the object of accumulating basic data for use in devising more efficient drying methods; the methods of large scale preparation which are being developed for new products from natural rubber, such as superior processing rubber, copolymer grafts and purified rubber; and factory problems such as that of effluent disposal.

8. Advisory Services

- 8.1. The Chemical Advisory Service. The Chemical division has its own advisory service. Advice is given on subjects which range from the problems arising in collecting latex to the layout of factories for processing it into sheet, crepe or concentrate.
- 8,2.1. The Smallholders' Advisory Service The RRIM has two other advisory services to carry the results of research to the planter. The Smallholders' Advisory Service is the most important of them. It provides technical information and advice on rubber growing and processing to smallholders. The work is carried through Rubber Instructors and Assistant Rubber Instructors. Their work is supervised by Senior Officers. The

qualification prescribed for a Rubber Instructor is a degree in Agriculture. The Assistant Rubber Instructors are given three months' initial training at the RRIM Experiment Station. Refresher Courses are also arranged for them. They keep in constant touch with smallholders and give them advice and help on all aspects of rubber cultivation.

- 8, 2. 2. Group Processing Centres. The establishment of Group Processing Centres is one of the achievements of the Smallholders' Advisory Service. A Group Processing Centre provides simple equipment, and often a smokehouse, for use by smallholders who process their own latex at the centre and after smoking, sell it either individually or who process the tenter and are arranged co-operative marketing societies are often formed. The Group Processing Centres are becoming popular. Fiftysix new ones were added in 1961. There were 117 centres at the end of 1961 and 2,198 tons of rubber were processed.
- 8. 2. 3. Training Schools. The Smallholders' Advisory Service also runs two training schools. There are three types of training courses; standard courses providing one month residential courses, practical courses, and extension courses. The Smallholders' Advisory Service makes use of mobile demonstration and film units, agricultural shows and sheet making competitions to educate the small grower in the improved methods of cultivation and processing of rubber. Illustrated lectures and discussion groups are also organised for the benefit of the smallholder.
- 8. 3. The Estate Advisory Service. The Estate Advisory Service division confines its activities to estates above 100 acres. Besides routine visits to estates by its officers, it arranged Planters' Conference, lecture course for Estate Assistants, and group discussions. Its services are mostly availed of by owners of medium size estates.

9. Natural Rubber Producers' Research Association

The Natural Rubber Producers' Research Association was founded in 1938 and it has its laboratories in England. Its researches are financed by the Malayan Rubber Fund Board. The NRPRA 'delves deeply into the fundamental principles underlying the main processing and performance phenomena so as to broaden the scientific framework on which new technological advances can be built'. In close co-operation with the RRIM it is studying the fundamental question of how latex is formed.

10. Natural Rubber Bureau

The Natural Rubber Bureau, third of the major organisations financed by the Malayan Rubber Fund Board aims to stimulate demand for natural rubber by extending technical service to the manufacturing industry in the use of natural rubber. It is to meet all the sophisticated devices of modern sales promotion of its competitors. In addition to Rubber Developments and the Natural Rubber News, it has published over 450 titles. Consultants of the Bureau regularly visit manufacturers to give necessary advice. It has its offices in U. S. A., U. K., Malaya, Australia, South Africa and New Zealand.

- 11. In India much greater attention has to be devoted to research and advisory services. The Rubber Board should immediately start training schools for smallholders and plantation workers. The courses of study and the methods of instruction adopted in Mulaya and control of the courses. in Malaya are good examples to follow.
- 12. The RRIM does not maintain any official relationship with similar institu-tions in other countries except with the NRPRA in England which is also financed from the same source. The results of its researches are always available through its publications,

It should not be difficult to establish person to person correspondence between those working in the same field there and in India. We are confident from the discussions we had with the Acting Director and the heads of divisions that we can expect reasonable assistance from them and that they would matters.

13. For some time to come, we may have to depend on RRIM for high yielding planting material. We may also benefit considerably from their researches on plant physiology. But on soils and plant diseases we shall have to depend on our own researches as the problems here and there are mostly different. On the Chemical side there is no need to duplicate the work that is being done there. Our immediate objectives should be to set up an advisory service with necessary laboratory facilities to assist the planter in the processing and preservation of latex. It would also be useful to have liaison with the Natural Rubber Bureau which is establishing close contacts with the manufacturers in the country.

14 Replanting

Malaya has done remarkably well in replanting over one million acres under unselected seedlings with high yielding planting material within ten years. The Rubber Industry (Replanting) Fund Ordinance of 1952 was the first official move to encourage replanting on a planned basis. Under the Ordinance, the Rubber Industry Replanting Board was constituted. There was a provision in the Ordinance to levy a cess on exports, the revenue from which was to go to the Board to assist replanting. The Ordinance also laid down that there should be separate schemes of replanting for estrues and smallholders and the funds should be allocated to both in the ratio of their respective production to the total production. The administrations of Fund A for estates and Fund B for smallholders were entrusted to two separate bodies. The original scheme for replanting was reviewed in 1954 by the Mission of Enquiry appointed by Government. On its recommendation, a sum of \$280 million was allocated for the banefit of the rubber planting industry. That amount was allocated to Fund A and Fund B on the basis of their past production.

The Fund A got 163 million dollars and Fund B, 112 million dollars.

14.1.1. Replanting of Estates. According to the new plan, the estates were required to replant 21 per cent of the total planted area in eight years (1955-61) though the rate of 3% replanting per year was accepted as a useful general guide. The financial assistance which they got for it were in two forms. First the 4.5 cents * per lb. collected as cess was returned to them every quarter on the satisfactory submission of their production for the period. Strietly, it was treated as the company's mone, and was liable to normal rates of tax. Besides that, they got a cash subsidy of 400 dollars per acre replanted or new planted within the 21 per cent limit for seven years. The subsidy was paid in five instalments at the following rates:

1st year \$. 150
2nd year , 100
3rd year , 50
4th year , 50
5th year , 50

50

Within the 21 per cent limit, the subsidy was allowed also for replanting rubber with the following crops:

Pepper Pineapple Ramie

- 14. 1. 2. There were reasons for allowing newplantings and replantings with approved crops within the 21 per cent limit. First, it enabled the company to select better areas for replanting, if the old areas were not good enough to replant. Secondly, by allowing replanting with other crops, too much dependence on rubber could be reduced. But the choice was left to the planter. Under this scheme in six years' time 362,168 acres were replanted which came to 84 per cent of the area that was eligible for subsidy. It is clear from this that the planters took full advantage of the subsidy to replant the eligible area under the scheme. The area replanted with other crops was only 6,474 acres during this period. The total area of estates replanted from 1952 up to 31st December, 1961, was 611,500 acres. This included the area replanted without subsidy also. The total area of estates replanted without subsidy also. The total area of estates replanted without subsidy also. estates planted with high yielding planting material on 31st December, 1961, was 1,230,495 acres or 63 percent of the total area.
- 14. 2. 1. Replanting of Smallholders. The replanting scheme for smallholders was started in 1952. The original scheme before it started working was merged with a second scheme. It envisaged replanting of 5,00,000 acres before 31st December, 1959, with specified targets for each year from 1953. This would have covered one third of the smallholders area under rubber. Under Scheme No. 2. grants were given at the rate of 400 dollars per acre. This was raised to 500 dollars per acre with retrospective effect from 1st January. 1953. From 5th April, 1956, the Rubber Industry Replanting Scheme came into force. 1953. From 5th April, 1956, the Rubber Industry Replanting Scheme came into force appearance. The smallholder was not paid directly the replanting cess of 4.5 cents per lb. as in the case of estates. He was given only a higher rate of grant for the area replanted.
- 14.2.2. The Scheme No. 2 for the Administration of Fund "B" and the Government Replanting Scheme for smallholders, introduced in 1956, were revoked with effect from the first day of January, 1960, and Scheme No. 3 was brought into effect from that date. The objects of Scheme No. 3 are:—
 - (a) to undertake and continue the commitments of Scheme No. 2 under Fund "B" published as Legal Notification No. 633 of 1952 and the Government Replanting published as Legal Notification No. 633 of 1952 and the Government Replanting Scheme of Smallholders, published as Legal Notification No. 119 of 1956.
 - (b) to provide for continued assistance to replanting and newplanting by small-
 - grants shall be made to smallholders in respect of approved applications for replanting and newplanting of rubber at the rate of \$, 600 per acre.

The subsidy is paid in five instalments.

1st grant 3rd grant In respect of entitlements a smallholder owning 1 to 10 acres can replant the entire area owned; above 10 to 15 acres, upto a maximum of 10 acres, above 15 to 30 acres, one third of the area owned plus five acres; and above 30 acres only one third of the area in seven years' time. Under Scheme No. 3, an applicant can newplant, while retaining his old rubber, which may be still highly productive on condition that he would replant the old rubber within seven years of the date, the new area is planted.

- 14.2.3. Attempts have been made to introduce group replanting and newplanting. Work is entrusted to experienced contractors on behalf of the smallholders. It is too early to say how that arrangement would work out to the benefit of the smallholder.
- 14.2. 4. Catch cropping is practised on replanted holdings, when there is a market for such crops. The rules for it are:

Bananas and Pineopples: Must not be planted or allowed to grow within 8 feet of the rubber tree rows.

Tapioca, sweet potatoes, yams yam beans and derris: Must not be planted within 4 feet of the rubber tree rows. Such plants, must be removed not later than 18 months after the planting of the rubber trees.

Vegetables including Groundmus: Must not be planted within 4 feet of the rubber tree rows.

Fruit trees: Must not be planted within 15 feet of rubber tree rows. Only if the rubber tree rows are at least 30 feet apart, the planting of fruit trees will be allowed.

Note: Failure to observe the above conditions will result in deferment of payment of grants.

- 14.3. There is also a scheme for the supply of planting material to smallholders. It is referred to as the Pool of Planting Material. Under this scheme, the Director of Agriculture is responsible for the production of clonal stumps and budwoods required by the smallholders for replanting and new planting. Three seed gardens are being established for this purpose in the North, Central and South Malaya. In 1961, a total of 4,623,021 clonal stumps, 704,310 germinated clonal seeds and 166,855 budded stumps were distributed to smallholders participating in Scheme No. 3. A total of 496,509 yards of budwoods were also distributed. The Replanting Board for Smallholders also undertakes the supply and distribution of fertilisers to smallholders. The quantity of fertilisers distributed in 1961 was 30,528 tons. There are also arrangements for the supply of cover crop seeds, and other services, the costs of which were adjusted in the grant payable to the small-budders.
- 14.4. The total area replanted under various schemes upto 31st December, 1961, was 460,333 acres, of which 437,191 acres were rubber and 23,142 acres other approved crops. Still another 1.5 million acres of smallholdings require replanting during the next few vertex.
- 15.1. The striking features of the Replanting Schemes in Malaya as distinct from the scheme in India are:—

First, for administrative purposes they have kept the replanting plans of the estates and smallholders separately. In the case of estates, the Scheme gives sufficient latitude for the planters to replant according to their best judgments. In the case of smallholders not only financial assistance is given but also supply of planting materials, manures and other services are ensured.

- 15.2. Secondly, the area to be replanted by each estate during a period of time is determined in advance. In the case of estates, it is 3 per cent of their total area to be replanted in a year or 21 per cent within a period of 7 years. In the case of smallholders, the total area to be replanted was fixed at 33\frac{1}{2}\$ per cent within 7 years, and limits were also laid for individual holdings. In India only yearly targets for the industry as a whole has been fixed. It is for consideration whether the Malayan system of fixing the replanting target for each estate can be introduced in India also. In the case of replanting of small-tolers the Board should take the responsibility to supply abantage applicable. holders, the Board should take the responsibility to supply planting materials, manure and other essential services required.
- the estates are allowed to replant, newplant or replant with other specified crops within the ceiling. In India the question of replanting rubber with other crops does not arise, as our idea is to extend the area under rubber. It is, however, for consideration whether areas now under rubber which are not suitable for replanting can be allowed to be replaced
- 15.4. Fourthly and most important is that the replanting cost is allowed as an item of revenue expenditure for tax purposes. This question of taxation is dealt with in
- 15.5. In India, the rate of replanting subsidy is Rs. 1000/- per acre both to the estates as well as to the smallholders. Besides, the control price includes a rehabilitation allowance of Rs. 9/- per 100 lbs.

16. New Planting

16.1. Estates are not undertaking large scale new plantings. Their acreage of rubber has remained static at about 2 million since 1931. Evidently new plantings of estates, if any, were only sufficient to replace areas abandoned or replanted with other crops. In the absence of any reliable information it is difficult to know the trend of new plantings by multiple and the contraction of the contraction of the settlement of small. plantings by smallholders. As the State is now actively assisting the settlement of small-leders, it is unlikely that any large scale new plantings would take place outside those schemes. There are two block planting schemes for smallholders. One is administered by State Land Development Board and the other by the Federal Land Development Auchority.

17. Block Planting Schemes*

- 17.1. Block schemes administered by State Land Development Boards have provided for the new planting of 63,000 acres. They are to be in blocks of 250 acres and entrusted to contractors. Later it is divided into individual holdings of 6 acres each. The responsibility for the maintenance of the holdings rests with settlers. Normally a grant of 400 dollars per acre is given for the development of the blocks.
- The Scheme of the Federal Land Development Authority is more ambitious. It finances and manages large block developments, of 4,000 acres each. Each holding in the block is to consist of 10.25 acres, each comprising 6, 7, 8 acres of rubber and 2, 3 or 4 other crops together with a separate 0.25 acre house site in a central residential area. Social and other services are supplied by Government.
- 17.3. There are now 31 FLDA projects. The total area to be covered is 133,250 acres, of which 81,000 acres will be under rubber. The area is cleared and planted by

Rubber Smallholdings in the Federation of Malaya by J. M. F. Greenwood, Rubber Research Institute of Malaya.

contractors. Normally 1,000 acres of rubber are planted in first year and the whole area will be planted in two or three years' time. An FLDA manager is responsible for the successful operation of the scheme in each centre. The settlers are to undertake the maintenance of their holdings under the supervision of the FLDA manager. One striking feature is that all FLDA schemes establish high yielding budgrafted rubber. It is estimated that the cost per acre including management charges, may work out to 2090 dollars or approximately Rs.3,000. The development cost is considered as a loan to the settlers to be repaid in regular monthly instalments after the crops are in production. A block development scheme of this type can have the advantages of large scale plantings, without concentration of wealth in a few hands.

A similar scheme can be tried in India also, particularly for the development of new areas in places like Andaman and Nicobar Islands.

18. The National Land Finance Co-operative Society

18.1. Recently a new situation arose in Malaya. Some of the European firms wanted to dispose of their property. Some financiers bought those estates and sold them at high prices after dividing them into smaller plots. Such fragmentations became a social as well as an economic problem. It hit the worker badly. He lost his job and was compelled to seek work elsewhere. A solution to it has been tried through the National Land Finance Co-operative Society. The objects of the society are:—

- (a) to encourage, promote and facilitate the operation of co-operative estate societies and co-operative land development societies, and
- (b) to promote co-operation, thrift, self-help and mutual aid.

18.2. Though the society was registered only two years ago, today it has a membership of 25,568 and they have subscribed to 38,063 shares of 100 dollars each. Members are permitted to pay up the share value in 10 equal instalments of 10 dollars each. It is the intention of the organisers that the members of the society would steadily increase their holdings in the society by a monthly saving of 10 dollars. Though there is no restriction of membership to any class of people, workers are the main shareholders. The society is empowered to take loans, deposits and donations. We were told that the taking over of the first estate, Ladang Buthit Sidin, in 1961 was facilitated by a loan from a leading British Commercial Bank. A second estate was taken over in April, 1962. The estates taken over by the society are run on similar lines as any other big estates.

PART III

PLANTING METHODS

19. Planting Material*

- 19. 1. The yield of rubber per acre can vary between 300 to 3000 lbs. according to the planting material used. The selection of planting material is, therefore, of the atmost importance. Two things have to be remembered in the selection of planting material. First, rubber being a perennial crop, is requires a minimum 25 years of close observation and study before any clone could be recommended for planting on a large scale. Some of the clones which looked promising in the initial stages have proved disappointing later. Typical examples are PB 5/63 and RRIM 501 and 526. Only proved clones are safe for large scale planting. Secondly a clone which is good under certain soil and climatic conditions need not prove to be satisfactory under a new environment. 19. 1. The yield of rubber per acre can vary between 300 to 3000 lbs, according environment.
- 19. 2. In Malaya, RRIM regularly reviews the performances of different planting materials and makes recommendations for the guidance of the planters. For that purpose, it divides the planting material into three classes;

Class I refers to planting material suitable for large scale planting. Even in this class, most of the clones are recommended with certain qualifications, as there is at present no fully tested clone which combines first class yield with all round favourable secondary characteristics. The materials included in this class are:—

Clones: Gl 1, PB 86, PR 107, RRIM 513 and Tjir 1,

Clonal seedlings: Prang Besar Isolated Garden seed from plots F and G; Chemara Isolation garden seed E; Tjir I mother seed from registered collection areas and seeds from registered polyclone areas planted with proven seed parents.

Class II is made up of planting material which is considered promising, but testing not completed. In general, the yield of this class is higher than that of material in Class I. As there is an element of risk involved in planting this material, not more than one third of total planting (including replanting) programme of an estate (or group of estates) over a number of years should be planted with material of Class II, while the use of over a number of years should be planted with material of Class II, while the use of over a number of years should be planted with material or exceed 10 per cent of the otal planting programme.† The materials included in this class are:—

GT 1, PB 5/51, RRIM 519 and RRIM 605. Two clones PB 5/63 and RRIM 526 which were included in the 1961 recommendations have been withdrawn since then, as they are found to be susceptible to *Gloeosportum*.

seedlings: Seed of Prang Besar Gough Garden I and II; seed gardens at Kajang Estate and Kuala Perak Estate; registered monoclone areas of clones recommended for large and moderate scale planting, but not fully

^{*} Source: Planters' Bulletin of RRIM - Fifty third & Fifty eighth issues.

Suppose that an estate has planted a four year replanting programme of 600 acres, then 200 acres (one third of the total replant) may be allotted to material of Class II, then 200 acres (one third of the total replant) as particular clone or but not more than 60 acres (10 per cent of total replant) to a particular clone or seedling collection.

proven as seed parents; seed collected from boundaries between plantings of good seed parents such as clones Tjir 1, AVROS 157, BR 2, PilB 84, RRIM 501, PR 107, GT 1, and LCB 1320.

Class III contains clones recommended for planting on an experimental scale. Class III is sub-divided into III-A and III-B. In Class III-A, not more than 25 acres are recommended for planting. The materials in this group have shown high yield capacity but have shown undesirable secondary characteristics on some trials.

Clones included in III-A are:

RRIM 600, 607, 623 and 628; C 426, 30 and 32; PB 5/76, 28:59 and 28/83; AVROS 1734, IRCl 7, NAB 15, WR 101. Class III-B for planting in small observation plots (one task) clones. This includes imported ones, the suitability of which under Malayan conditions has to be tested and proved, RRIM 632 and 638; RRIM 701 and 707, CH 148 and 153; PB 206, 213, 217; AVROS 427, 1191, 1447, 2037, IRCl 6, NAB 12 and 20; PR 228, 251, 252; RRIC 5, 7, 14, 45.

20. Planting Material Used

20. 1. The following two statements will show the use of seedlings and clones in Malaya's replanting programme in 1960.

TABLE 1.

Acreage of Clonal Seedlings Planted in 1959 & 1960

Clonal seedlings	European owned		Asian owned		Total	
	1959	1960	1959	1960	1959	1960
Tjir 1 seedlings	2957	1973	4830	6948	7787	8921
	32.1%	31.2%	54.9%	67.7%	43.3%	53.8%
Prang Besar Gough Garden Seedlings	4162	3168	1105	1259	5267	4427
	45.1%	50.2%	12.6%	12.3%	29.2%	26.7%
Other clonal Seedlings	2100	1173	2861	2053	4961	3226
	22.8%	18.6%	32.5%	20.0%	27.5%	19.5%
Total	9219	6314	8796	10260	18015	16574
	100%	100%	100%	100%	100%	100%

TABLE 2.

Acreage of Clones Established on Estates in 1959 & 1960

Clones			1959	1960	Total 1955/1960
Tjir 1			6,566	3917	33,077
Sab 24			587	57	3,365
Glen 1			853	1004	4,575
PB 86			6139	4361	57,070
PR 107			2,761	1,769	21,900
LCB 1320			2370	672	10,162
GT 1			3,973	6,830	15,196
RRIM 501			5,572	2,139	26,396
RRIM 513			3,292	5,084	15,308
RRIM 519			451	112	1,164
RRIM 526			667	264	2,373
RRIM 600			969	536	2,714
RRIM 603			2,479	915	8,717
RRIM 605			2,408	5,949	11,901
RRIM 607			792	725	2,058
			417	80	779
RRIM 610			246	256	4,158
RRIM 612			1.040	97	2,050
RRIM 614			5,508	12,367	21,825
RRIM 623			52	644	69
RRIM 628			947	531	5,05
RRIM Clones, mi	xed of h	Of fisted and	3,109	4,124	10,25
PB 5/51			3.287	7,408	13,36
PB 5/63			214	1,503	1,85
PB 28/59		se listed abo		411	2,75
Prang Besar Clone	es, mixed		1,179	1,440	4,33
Chemara Clones			3,683	2,287	40,27
Others and mixed			60,232	65,482	323,81

^{20.2.} The total area planted in estates with clonal seedlings during 1960 was less than 17,000 acres compared with 18,000 in 1959. It amounts to 18 per cent of the total area planted in 1960 against 22 per cent in the previous year. In the European owned estates the proportion of clonal seedlings was reduced from 18 per cent to 12 per cent in 1960. The use of Tjir I seedlings increased by 13 per cent (mainly at the expense of other 1960. The use of Tjir I seedlings increased by 13 per cent (mainly at the expense of other 1960. The use of Tjir I seedlings increased by 13 per cent (mainly at the expense of other 1960. The use of Tjir I seedlings increased by 13 per cent of the expense of other 1960. The use of Tjir I seedlings increased by 13 per cent of the expense of other 1960. The use of Tjir I seedlings was noticed.

20.3 The acreage budded during 1960 with the various clones are given in Table 2, together with the 1959 figures and the totals over the period 1955-60. It will be seen from it that the use of the older clones was further reduced. The most popular clone in 1960 was RRIM 623. It was recommended only for experimental planting. It is the view of the RRIM that the knowledge about this clone is not yet sufficient to warrant its use on a large scale.

21. Average Yield

- 21.1 Post war planting material consists broadly of two groups, the older clonal seedlings and older clones like Tjir 1 and PB 86 and modern material such as clones RRIM 500 and 600 series, PB 5.63 and PB 5/51. For the older clones and clonal seedlings, yield is estimated to increase from 450 lbs. per acre in the 1st year of tapping to 1200 lbs, per acre in the seventh year; from the tenth year owards, when renewed bark is reproduced wield may decrease to 1000 lbs. per acre. For modern material, yield is estimated to increase from 500 lbs. per acre in the first year of tapping to 1500 lbs. per acre in the seventh year of tapping. There are clones capable of yielding 2000 lbs. per acre and more, but they are not yet recommended for large scale planting.
- 21.2. In India, we have got most of the clones included in the three classes in Malaya. The three older proved clones Tjir 1, PB 86 and Gl 1 are popular in India. Our knowledge about the new clones is limited. It is reported that some of them are giving good yield in India. The Rubber Research Institute should immediately undertake a study of the performance of the various imported clones established in India and make its recommendations on the suitability of the new clones under Indian conditions. We believe that the planters would extend their full co-operation to the Institute for studies of this nature by making available correct information about the clones established in their estates.

22. Seed Collection Areas

- 22.1. In Malaya, seeds are collected only from sources approved by RRIM. In India, there is no system of approving seed collection areas. The choice is left to the planters and private nursery owners. A recent amendment to the Rubber Rules forbids planting with unselected seedlings. This is a step in the right direction. But in India, as there are no isolated seed gardens, the Board should take the responsibility for collection and distribution of seeds from areas approved for the purpose. We also recommend that the Madras Government should be persuaded to establish a seed garden in the Government plantations in Kanyakumari District. No other district in India will be suitable for establishing a seed garden. In this connection we would like to mention the efforts made by the Government in Malaya to establish seed gardens. We visited the Temerloh-Kg. Awah seed garden recently started by Government.
- 22.2. This Government owned garden is about 115 miles from Kuala Lumpur. It is 3000 acres in extent of which 2000 acres have been planted. Planting is polyclonal. Budded stumps of five varieties are planted in a row, which is repeated in rows of five. The planting distance is 30 ft. × 10 ft. and clones used are PB 5/51, RRI 501, RRI 623, Tjir and RRI 605. It is expected to produce high quality seeds in five to seven years. Three (PB 5/51, RRI 501 and RRI 623) and two clonal systems (GT 1 and RRI 501) are also tried. The whole plantation is envisaged as a commercial proposition and is designed to meet the requirements primarily of smallholders. Linked to the supply of clonal seed is the supply of budwood and budded stumps. The garden is only three years old, but the growth of plants and general maintenance appeared to be good. The idea is to have three gardens one each in the North. Central and South Malaya.

23. Import of Seeds

We examined the possibilities of importing seeds from Malaya. There is considerable demand for seeds there itself and as Government has taken the responsibility to supply able demand for seeds there itself and as Government has taken the responsibility to supply seeds to smallholders, we may get seeds only after meeting the local requirements. Secondly, there is good demand for Malayan seeds from other rubber growing countries also. Though the sources approved by RRIM can be known, it will be taking a risk in placing reliance on unknown parties. The two sources which can be relied upon are Prang Besar and Chemara. Both these estates are willing to export seeds to India. The costs of seeds in Malaya are given below:

Prang Besar Chemara E Garden Chemara F Garden 20 cts.

When imported into India Prang Besar seeds may cost more than Rs. 700-per 1000, Chemara E Garden seeds over Rs. 560/-per 1000, and Chemara F Garden over Rs. 670/- per 1000. We were informed that the seed fall in the Chemara E Garden is declining and that the performance of F Garden seeds, though expected to be better than the old ones, is yet to be watched. The availability of Chemara seeds is estimated at 4 lakhs. Prang Besar may be able to supply a little more.

24. Prang Besar Seed Collection Area

We visited the Prang Besar seed collection area. The estate provides the major source of imported seed supply to India, hitherto mostly Isolation Garden seed and more recently Gough Garden seed. The best seeds are now considered to be:

G. G. 2— S 15, S 86, RRI 614, Tjir 1, PR 107 and PB 5/51. G. G. 1— PB 5/51, PB 28, PB 59, S 78, PB 49, Tjir, PR 107 and PR 501.

Seeds are collected and packed in polythene bags and stored in a cool room. It is claimed that the seeds are capable of being stored without deterioration for a period of 3 months. We got the opportunity of watching collection, packing and storage process. The whole thing is done in a systematic manner and the chances of seeds deteriorating before despatch are very little. We discussed with the manager of the estate the complaints before despatch are very little. We discussed with the manager of the estate the complaints of planters in India about the low percentage of germination of imported seeds. To avoid such complaints, the only method he could suggest was to allow the import of germinated seeds. He also mentioned that he is exporting germinated seeds to Ceylon.

25. On the question of planting material we have the following recommendations

1. The performance of different clones under Indian conditions should be studied and the Board should give better guidance to the planter in the selection of

2. The desirability of establishing a higher percentage of buddings particularly in

3. The Board should take the responsibility of the collection and distribution of estates should be examined.

4. The Madras Government should be requested to establish a seed garden in the clonal seeds for planting seedlings.

Government plantations in the Kanyakumari District 5. The importation of germinated seeds from Prang Besar and Chemara Gardens should be taken up.

oom mendations

26. Vegetative Propagation

26.1. Cuttings. The advantages of growing Hevea clones propagated by budgrafting on seedling root-stocks are widely known and it is an accepted estat: practice. But a new development which requires watching is the possibilities of the production of rooted cuttings of the better clones. Root stocks influence the growth and yield of scions. Since seedling root stocks are variable in their genetic constitution exact assessment of scionic effects is not feasible. Rooted cuttings of the same clone will be of the same constitution and if they are used as root stocks their effect on scions can be correctly guaged. Further rooted cuttings and promising clones when planted in the field will be on their own roots and their performance can be studied to decide whether this method of propagation is better or not.

26.2. Green buddings. Budgrafting on seedling stocks is usually done when the stock is one year old or even two years old. The new technique under development is to bud seedlings of two to eight months old, using buds stripped from green terminal shoots. These green buddings are raised in polythene bags in nurseries and transplanted with shoot and root systems undisturbed. It is still in the experimental stage. The advantage claimed of it is that the immaturity period can be reduced.

27. Planting Distance

The ideal planting distance is one which allows for unhindered development of roots and foliage. Extreme inter-row planting distances, with consequent short distances between trees in rows, have a detrimental effect on the growth habit, bark and bark renewal. In the estates, we visited, we could not find a uniform policy followed in the matter of planting distance. It varied from estate to estate and from plantings to plantings. It would appear that the calculation of the economics of planting from time to time had played an important part in determining the planting distance. In India, we do not think it necessary to modify without proper study the standard planting distances given

1. For buddings.

In hilly areas
$$22' \times 11' = 180$$
 pits per acre $-do$ —

In flat areas: square system of planting "triangular" $16' \times 16' = 170$ —do—

seedlings.

In hilly areas $20' \times 10' = 218$ —do—

 $30' \times 7' = 207$ —do—

In flat areas $14' \times 14' = 222$ —do—
 $15' \times 15' = 193$ —do—

28. Manuring

The RRIM is doing various experiments on the nutritional requirements of the rubber tree with the object of determining methods of fertiliser and cover plant usage which will give optimum growth and yield. We were told that some of the European estates have independent facilities for research, and that they have their own methods of fertiliser usage to get the maximum efficiency. In India, the planters are fully conscious

of the need for a proper manuring programme. The fertiliser mixtures, now recommended are based on the experiences gained in other countries. Unless research is intensified in India, it will not be possible for the Board to advise the planter on the economic use of the

29. Period of Immaturity

In Malaya, the period of immaturity, from planting to opening for tapping is usually five to six years. In India, it is 7 to 8 years. Extreme variations in soil moisture, high dry season temperature and disease factors are some of the reasons attributed to the high dry season temperature and obsease factors are some of the reasons attributed to the longer period of immaturity in India. But under good conditions of maintenance, it has been possible to reduce the immaturity to six years. As the country requires larger quantities of rubber, lack of proper maintenance of immature areas should not be allowed to be a cause for the delay in opening the tree for tapping.

30. Tapping

With buddings, cuts are opened at 50 to 60 inches above the union when trees have attained the standard girth of 20°. Tapping is normally on the \$1/2, d2-100% system. With seedlings cuts are opened at 20 inches from ground level once trees have girthed to 22°. Tapping is on the third daily 67% intensity. The process of tapping is continuous throughout the year and bark consumption is in the region of 9 to 10 inches per annum. Malaya aims at 30 to 35 years of economic tapping which virtually entails tapping on virgin bark and bark of first renewal only. Stimulants are applied when the tree is 18 to 20 years old and high level tapping resorted to once virgin bark on the low level is exhausted.

Two types of knives are in use in Malaya, the 'Jebong' and the 'Gouge.' They are different from the knife commonly in use in India. Jebong may be preferable for high level tapping. We are not sure that the 'Gouge' will have any advantage over the

From what we have seen in Malaya, we believe that some changes are possible in our tapping practices. In view of its importance, we give in Appendix-2 the full text of the observations of the RRIM experts, who visited India in 1960, on our tapping practices. These are topics which should be first discussed at the level of estate superintendents and actual planters before any concrete recommendations could be made.

PART IV

31. Processing and Marketing

31. 1. Rubber is obtained from tree in the form of latex. The estate processes it into smoked sheet, pale latex crepe or brown estate crepe. It also sells altex at different degrees of concentration. As the entire Malayan production has to be exported, great care taken in the processing of latex into different forms in which it has to be sold. Not only the highest standards have been insisted upon for the traditional forms like sheets, crepe and concentrated latex, but attempts are also made to introduce new types to meet the needs of the consumer. Some of the new types are SP (superior processing) and PA 800 compounds and its advantages are most striking in extruded and calendered products, It is produced by mixing vulcanised and normal hevea latex, the blend being coagulated and worked up into sheet or crepe rubber by conventional plantation methods.

- 31. 2. Another development which may prove to be of great use for quality control, is the technical classification of rubber. Under this scheme, rubber is divided into three classes—Red Circle, Yellow Circle and Blue Circle—according to the results of strain tests carried out on representative samples. The strain test is done on every bale sample received, after vulcanising a portion of the rubber from the sample which has first been blended to make it homogeneous. All operations (blending, mixing of the ingredients, vulcanising and testing) have been standardised. The strain value is the percentage stretch of the vulcanised rubber under a fixed load. Red circle rubber stretches most and the Blue Circle least; Yellow Circle rubber has intermediate properties. The strain test can be done in one of two ways: there is a normal test which takes three days and a rapid test which takes only about 3 hours. The latter is usually used for packing house samples and any other cases where results are needed quickly. By taking samples regularly from eventually of any estate, it is possible to check that the properties of the rubber produced are maintained within definite limits. This system of quality control is applied to most Malayan estates.
- 32. The Malayan Government has passed laws to ensure that the quality of rubber exported from Malaya conform to international standards. Some of the important enactments relate to licensing of dealers and shipping and packing control. Recently a Rubber Exchange has been established to regulate all transactions in rubber.
- 33. In India, because of an assured internal market, very little attention has been given to improve quality, grading, packing and marketing. In these respects we are still in the pre-war stage. We have to learn a lot from Malaya in matters of factory lay-out, introduction and use of modern machinery and quality control. We recommend that the services of one of the chemical engineers from Malaya should be obtained to study the working of the plantation factories and to advise on the improvements required in the lay-out, modernisation of equipment etc. We also recommend that the Chemical Section of the Rubber Research Institute of India should be quickly staffed and equipped, to undertake advisory service on the chemical side.

34. Import of Rubber on Rupee-payment Basis

One of the specific points we were asked to examine was the possibilities of importing rubber on Rupee-payment basis. Malaya's total exports of rubber in 1961 was 1·17 million tons. Its rubber went to almost all the countries in the world. India's share in Malaya's total exports was only less than 2 per cent. Further there is an impression in Malaya that our policy is to be self-sufficient in rubber by undertaking the manufacture of synthetic rubber to fill the gap between the demand and domestic production of natural rubber. We tried to explain that the demand for rubber in India is increasing at a fast rate and India will have to continue to import rubber for some time. There is a lack of interest in Malaya to export rubber on Rupee-payment basis. When once they enter into such an agreement with one country, they will have to agree to similar arrangements with other countries also. They do not consider that it would be to their advantage. Even with East European countries, they insist payments in Sterling. From the discussions we had in Malaya, we do not think that there is any immediate possibility for importing rubber from Malaya on Rupee-payment.

PART V

35. Labour

35. 1. The rubber plantations employ the largest number of workers in Malaya. Though the trade union movement is only of post-war origin, this industry is fortunate in having a well organised Union under able leadership. One striking feature is that the Union is affiliated to no political party. We give below the organisational set up and working of the Union as reported by the Mission from the International Labour Office.

"With a strongly centralised organisation in Plantation House, Petaling Jaya, the N. U. P. W. employs over 140 full-time paid officials and has eight branches in different parts of the country. Except for the secretary, the administration of each branch is in the hands of elected members who form the branch committee. The secretary is assisted by a treasurer, an industrial relations officer and members of the field staff. Monthly meetings of estate secretaries are held in one of three or four centres covered by a branch. In addition, visits are paid to every estate at least once in three months. Maintenance of close personal contact with its members is considered vital for the union, both for its effectiveness in the industrial relations field and for financial and other reasons. To ensure that this is done, each branch office is equipped with a number of cars for quick communication with members who are dispersed over wide areas. Members are also encouraged to raise and settle their disputes at the local level, especially as "the good old days when out of fear and docitity the tendency of people to keep their problems for themselves is fast disappearing."

Membership fees are paid at the rate of one Malayan dollar per month, in return for which members are provided with a variety of services, including assistance in the educational field. Finance and the collection of funds present a big problem but, because of hesitations on both the employers' and the workers' side, collection of funds by a check-off system has not been introduced. Wage negotiations are conducted at the national level, but the N. U. P. W. attaches great importance to developing joint consultative machinery at the regional and local levels.

At headquarters, the N, U, P, W, has a number of departments, such as a Research Department which studies information on wages and the general economic situation and provides the necessary data for wage negotiation. There is a Public Relations Department which deals with publicity and information and is responsible for the production of a workly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the field staff, as well as a monthly magazine in English, plus bi-weekly monthly bulletin for the production of a monthly magazine in English, plus bi-weekly monthly magazine i

35. 2 We have given in Appendix-3 the wage structure of plantation labour. The average monthly earnings of different classes of workers as on 31st July, 1961, are given below:

	Average days worked	
	28	129
Foreman	25	86
Tappers	23	60
Weeders	27	105
Factory workers		

The conditions of service are regulated by various enactments and agreements between the Union and the Employers' Association. There is no system of annual profit sharing bonus. A survey conducted in 1960 showed the extent of amenities enjoyed by the

1. Free accor	nmodation	78	per cent	of labou	r force
2. Free water	supply for resident labour		per cent		TOTOC.
	ricity for resident labour	37	per cent		
4. Free medi	cal attention	86	per cent	of total	labour force
5. Free servi	ces		per cent		,,
6. Free treati	ment	50	per cent	.,,	.,
7. Eligible fo	r sick leave	89	per cent	**	

100 per cent of all women workers.

- 35. 3. As compared with Malaya, the wage rates in India are much lower. While the guaranteed factor in the wages of a tapper in Malaya was Rs. 4.37 a day, the minimum wage of a tapper in India is only Rs. 1.87. On a piece rate basis a Malayan tapper earned Rs. 5.37 in 1961 while an Indian worker's earning is about Rs. 2.26. But higher wages have been possible in Malaya largely due to the higher productivity. Not only the yield per acre is higher in Malaya, but also the workload per worker is higher than in India. For example, in Malaya the tapping task is 400 to 450 trees per worker. There are Chinese workers who even do 500 trees a day. In India the tapping task is 250 to 300 trees. Similar difference is discernible all along the line.
- 36. In India, shortage of experienced tappers is becoming a serious problem. During the next five years on an average 22,000 acres of new rubber a year will come into tapping. That would require about 10,000 additional tappers a year. But new areas tapping. That would require about 10,000 additional tappers a year. But new areas would require experienced tappers. Unless the tapping task is increased, in the older estates, experienced tappers for new areas will be difficult to get. A balanced distribution of experienced tappers between old and new areas is necessary both from the technical as well as from the economic point of view. The question of increasing the tappers task to the mutual advantage of the employer and labour has to be settled by negotiation by the parties concerned. But by increasing the tapping task alone, the shortage of tappers is not going to be met. The Rubber Board should start immediately tappers training schools in two or three centres.

37. Taxation

37. 1. Export duty and cesses. In Malaya export duty is levied on a sliding scale of prices. Collections under this head go to general revenues. Besides, there are three cesses. There is a cess of 0.75 cents per lb. for research. The collections under this head are given to the Malayan Rubber Fund Board for research. Another cess is for replanting at the rate of 4.5 cents per lb. The collections under this head are given to Fund A and Fund B, Fund A for estates and Fund B for smallholdings. It is paid to the two funds on the basis of their respective production. When the price of rubber goes above one dollar, an anti-inflationary cess is levied,

Export Duty & Cesses Currently

Price in cents per lb.	Schedule I duty cts per lb.	Anti-inflationary Cess cts in lb,	Schedule III Cess cts in lb	Schedule IV Cess cts in lb.	Total Export duty cts per lb.		
40	1.625		.75	4.5	6.875		
50	2.00		.75	4.5	7.25		
60	2.375		.75	4.5	7,625		
65	3.375		.75	4.5	8,625		
70	4.250		.75	4.5	9.50		
75	5.250		.75	4.5	10,50		
80	6.125		.75	4.5	11.375		
90	9.250		.75	4.5	14.50		
100	12.375		.75	4.5	17.625		
110	13.50	2.50	.75	4.5	21.25		
150	22.50	12.50	.75	4.5	40.25		

37.2. Income tax. The company tax is 40 per cent. The individual incomes are assessed on a sliding scale, the maximum of which is 45 per cent. In calculating income for assessment, the following allowances are given.

In respect of New planting or New extension:-

(1) 1st year 10% and similar allowance in each succeeding nine years. This has been amended to at the last budget meeting of the Parliament.

1st year 50% 2nd year 50% as from 1st January, 1963.

- (2) Full replanting cost is allowed.
- (3) Capital expenditure means:
 - (a) The construction of industrial buildings and structures.
 - (b) The clearing of land for planting.
 - (c) Plantings other than replantings but does not include expenditure on the provision of machinery or plant or on the acquisition of land or anything
- (4) Initial allowance equal to one-fifth of that expenditure on machinery or plant is allowed. Machinery or plant for the use of trade the allowance shall be calculated on the reducing value of the asset—which shall be the original cost of the asset reduced by the
 - (a) any initial allowance granted
 - (b) and by annual allowance made.
 - (e) capital expenditure on roads, bridges and drains reckon at \$ 17 per acre.
 - (d) replacement of road, bridges and drains is treated as capital expenditure.
- 37.3. State taxes. Besides a land tax of \$ 6 an acre, an education cess of 1 to 2 dollars is being levied by the individual States.

37.3.1. We may now examine the position in India. Here, there is a cess of 30 nP per kg. This is collected from the manufacturers who acquire rubber locally. The manufacturers are also obliged to pay to the Rubber Board the difference between the landed cost and the domestic price (controlled) when the former is lower than the latter. The cess of 30 nP per kg is for research, to give subsidy for replanting and for other developmental activities. The amount obtained from the difference between landed cost and the control price is credited to a separate fund known as Pool Fund. This is for the exclusive use for the rehabilitation of smallholders. Unlike in Malaya, the responsibility for collecting these two items of revenue is vested with the Board. This has created problems for the Board.

37.3.2. The other taxes are State levies. As 94 per cent of the area under rubber is in Kerala, we give below the taxes there.

(a) Land tax:

1. Basic tax ... Rate Rs. 2/- per acre.

2. Plantation tax ... Rate Rs. 8/- per acre.

3. Additional tax ... Rate Rs. 2/- per acre.

(b) The Kerala Buildings tax ... Only for new buildings and extensions exceeding a specified floorage space.

(c) Kerala General Sales tax ... Shifted from the producer to the last purchase in the State. Assessed at 2% on the purchase value and 5% surcharge thereon.

(d) Agricultural Income tax ...

The rate for companies is 25%. For individuals there is a sliding scale the maximum of which is also 25%. Over and above it, there is a super tax which is on a sliding scale. In the case of individuals, upto Rs. 25,000/- there is no super tax. On the next Rs. 15,000/- the super tax is 12 nP in the rupee and it increases to 34 nP in the rupee up to Rs. 1 lakh, beyond which the rate is 41 nP. In the case of companies the super tax is 12 nP in the rupee on the first Rs. 1 lakh and it rises to 37 nP in the rupee for income above Rs. 20,00,000/-. In the case of both individual and companies there is a surcharge of 5% both on income tax and super tax.

(e) Panchayat levies

(i) Land tax ... Rate 10% of the basic tax.

(ii) House tax ... 4 per cent of the net annual rental value.

(iii) Factory licence fee.

(iv) Profession tax.

(v) Storage Licence fee.

37. 3. 3. The Malayan tax structure would appear to be simple and more precise in application.

38. Planters' Conference

In India, today there is no proper forum to exchange views and discuss the practical aspects of planting. The utility of research will be diminished, if practical aspects are not

aken into account. Every planter will have his own experience of particular planting material, buddings, planting distance, manuring, treatment of diseases, tapping etc. His observations, however careful they may be, may not be sufficient to prove any particular hypothesis. They may require further study. It is, therefore, essential to pool the knowledge and experience of individual planters and review them periodically for mutual benefit. For that, we recommend annual conference of planters. There should be conferences at district as well as at all-india levels. The initiative for this should come from the Planters' Associations. Such conferences have been found to be very useful in Malaya. The Research and Development Section of the Rubber Board should actively participate in such conferences. participate in such conferences.

39. Future Prospects

In Malaya natural rubber is no longer mentioned as the unique material that it was a few years ago. The industry is fully alive to the developments in the synthetic field. But it is confident that both on cost and quality it will be able to stand on its own in competition with any new polymer. One of the reasons for this optimism is that the demand for elastomers continues to increase at a rate of 1,80,000 tons a year. It will probably be more than double the increase in natural rubber production during the next en years. Secondly the industry is confident of bringing down its price to 18 U. S. cents. The price of synthetic rubber is not expected to go below 20 U. S. cents. It is also claimed that if an averace yield of 1,500 lbs. per acre could be obtained, which is probable, the cost could further be brought down to 10 or 12 U. S. cents. There is also a realisation that low cost alone will not be sufficient to keep the natural rubber attractive to the that low cost alone will not be sufficient to keep the natural rubber attractive to the consumer. What is being tried in Malaya is to produce natural rubber to meet the specific needs of the manufacturer Technically classified natural rubber is now firmly estublished. Various new rubbers such as cyclised rubber, superior processing rubber, and new graft polymers of natural rubber and plastic materials, are also being introduced. In the words of Dr. Bateman, Controller of Research and Chairman of the Malayan Rubber Fund Board "the practice of just selling rubber, and perhaps trying to get the best of the bargain, and then leaving the user "to get on with it" is passing from the scene."

40. Summary and Conclusions

- 40. 1. When compared with Malaya, India is only a minor producer of rubber. Geographic and climatic conditions are not similar. The yield per acre is lower and the cost of production higher in India than in Malaya. India's advantage lies in the expanding domestic market, while Malaya has to sell its large production of rubber in foreign markets in competition with synthetic rubber as well as natural rubber from other countries. (Paragraph 4. 7).
- 40.2. In India greater attention should be devoted to research and advisory services. The Rubber Board should immediately start training schools for smallholders and plantation workers (Paragraph 11).
- 40. 3. The striking features of the Replanting Scheme in Malaya as distinct from
- (i) For administrative purposes in Malaya they have kept the replanting plans for estates and smallholders separately.
- (ii) They have fixed targets for individual estates at 3 per cent a year or 21 per cent within a period of 7 years, and for smallholders 334 per cent in 7 years. In India only yearly targets for the industry as a whole has been fixed.

- (iii) For the replanting of smallholders the responsibility for the supply of planting material is taken by Government, and the Replanting Board ensures the supply of manure and other essential services required.
- (iv) In Malaya within the ceiling fixed the estates and smallholdings are allowed to replant, new plant or replant with other specified crops. In India subsidy is not given to new planting and replanting with other crops.
- (v) In Malaya the replanting subsidy for estates is 400 dollars per acre. The individual estates are also given back the replanting cess of 4.5 cents, on the basis of their production. For smallholders replanting grant is 600 dollars per acre. They are not given the replanting cess separately. In India the replanting subsidy is Rs. 1000/- per acre. The control price also includes Rs. 9/- per 100 lbs. rehabilitation allowance. (Paragraph 14).
- 40. 4. For the development of new areas in places like Andaman and Nicobar Islands block planting schemes like those organised by the Federal Land Development Authority in Malaya may be tried. (Paragraph 17. 3).
- 40. 5. The performance of different clones under Indian conditions should be studied and the Board should give better guidance to the planter in the selection of planting material.

The desirability of establishing a higher percentage of buddings particularly in estates should be examined. The Board should take the responsibility of collection and distribution of clonal seeds for planting seedlings. The Madras Government should be requested to establish a Seed Garden in the Government Plantations in the Kanyakumari District. The importation of germinated seeds from Prang Besar and Chemara gardens should be taken up. (Paragraph 25).

- 40.6. A new development which requires watching is the possibilities of the production of rooted cuttings of better clones. (Paragraph 26.1).
- 40, 7. A new technique under development is to bud seedlings of two to eight months old, using buds stripped from green terminal shoots. It is still in the experimental stage. (Paragraph 26, 2)
- 40. 8. The fertiliser mixtures now recommended in India are based on the experience gained in other countries. Unless research is intensified in India, it will not be possible for the Board to advise the planters on the economic uses of the right type of fertiliser. (Paragraph 28).
- 40. 9. Some changes are possible in our tapping practices. These are topics which should be first discussed at the levels of estate superintendents and individual planters before any concrete recommendations could be made. (Paragraph 30).
- 40. 10. In Malaya attempts are made to introduce new types of rubber to meet the needs of the consumer. SP rubber is specially designed to overcome problems arising in the processing of compounds and its advantages are most striking in extruded and calendered products. (Paragraph 31. 1).
- 40, 11. A development which may prove to be of great use for quality control is the technical classification of rubber. (Paragraph 31, 2).
- 40. 12. In Malaya, dealings in rubber, grading, packing and shipping are all regulated by legislation. (Paragraph 32).

- 40.13. The services of one of the Chemical Engineers from Malaya should be obtained to study the working of the plantation factories and to advise on the improvements required in the lay-out, modernisation of equipment, etc. (Paragraph 33).
- 40, 14. There is no immediate possibility for importing rubber from Malaya on Rupee-payment. (Paragraph 34).
- 40, 15. As compared with Malaya the wage rates in India are much lower. The higher wages have been possible in Malaya due to the higher productivity. (Paragraph 35, 3).
- 40. 16. The question of increasing the tappers' task to the mutual advantage of the employer and labour has to be settled by negotiation by the parties concerned. The Rubber Board should start immediately tappers training schools in two or three centres. (Paragraph 36).
- 40. 17. The Malayan tax structure would appear to be simple and more precise in application. (Paragraph 37. 3. 3).
- 40. 18. Planters conferences at district as well as at all-India levels should be encouraged. (Paragraph 38).
- Malaya is confident that both on cost and quality it will be able to stand on its own in competition with any new polymer. (Paragraph 39).

41. Acknowledgments

We wish to express our thanks to the Federal Government of Malaya, the Indian High Commission in Malaya, which organised our tour in consultation with the former, the Acting Director and his colleagues of the Rubber Research Institute of Malaya, and the various officials and non-officials whose assistance had been of considerable help for us to understand the developments in Malaya.

RAMA VARMA. V. R. NARAYANAN NAIR. CHACKO A. KALLIVAYALIL. K. J. KURIEN.

February 25, 1963.

APPENDIX 1

Programme in Malaya

5th October,	1962	12 Noon 3 P. M.	Dep: Cochin.
Cale Control	1063		Arr: Madras.
6th October,		11 P. M.	Dep: Madras.
7th October,	1962	7.30 P. M.	Arr: Kuala Lumpur.
8th October,	1962	Visit to the Rubber Research Instit with the Acting Director and the F	tute of Malaya and discussions leads of Divisions.
9th October,	1962	Visit to the Experiment Station of the Called on the High Commissioner to Malaya. Disscussion with Shri P. P. Na National Union of Plantation Work	o the Government of India in
10th October,	1962	Disscussion with the Chairman, C Schemes. Discussion with the Chief Replanting Visit to Smallholdings.	
11th October,	1962	Visit to Temerloh-Kg Awah Seed Ga Government Rubber Replanting Sch Chairman visited the Research Lab Visit to a smallholding on the way	oratories of Socfin Co. Ltd.
12th October,	1962	Discussion with the Officers of the M Visit to the RRIM and witnessed dis	inistry of Commerce & Industry . splay of films, slides and posters.
13th October,	1962	Visit to Castlefield Estate to with darkness with carbide lamps. Discussion with the Estate Addvisory Service at RRIM. F Director of RRIM. Witnessed Weedicide demonstration Estate arranged by I. C. I. (Malaya Visit to an estate in Damansara.	visory Service & Smallholders' final discussions with Acting
14th October,	1962	Visit to Lumut—Smallholders and ir Chairman met the Controller of R Rubber Fund Board.	nterplanted areas. esearch and Chairman of the
15th October,	1962	Visit to Ladang West County Esta Visit to Prang Besar Estate. Chairman met Mr. T. U. Walker, I Visit to Manting and saw several s en route.	Director, Guthrie Agency.

16th October, 1962	Visit to bunger Sidu Estat	nge Offices at Kuala Lumpur. te, Banting, N. Kelang.
17th October, 1962	Chairman met Prof: Ugkt	y two members—Dr. V. R. Narayanan n visited). a Aziz and the following officials: Deputy Controller of Income-tax, and of Co-operative Development.
18th October, 1962	Left Kuala Lumpur, Or Arrival at Singapore at 8.	the way visit to Diamond Jubilee Estate. 30 P. M.
19th October, 1962	Visit to South Union God Visit to Tropical Product Visit to Green and Colli Singapore Rubber Packer Chairman met the Assis	Co., Ltd., Singapore. er Ltd. Called on the Chairman of the s' Association.
20th October, 1962		
21st October, 1962	11.20 A. M.	Dep: for Airport.
	1.30 P. M.	Dep: Singapore.
	5.30 P. M.	Arr: Madras.
22nd October, 1962	12.30 P. M.	Dep: Madras.
	3.30 P. M.	Arr: Cochin.

APPENDIX 2

Full Text of the Observations of the RRIM Experts who Visited India in 1960 on our Tapping Practices

TAPPING

Loss of Tapping Days by Rain

It would be most desirable to reduce the number of tapping days lost through rain. On some estates attempts have been made to use rainguards, but we received conflicting reports on their value. Large scale experiments are required to determine the total saving in relation to cost, to assess the risk of panel diseases under them, and develop the necessary protective measures. All rainguards seen were of the same general adhesive formulation, usually roofing compound. A satisfactory design of rainguard should popularise their use and might materially increase the yield of estates in the northern rubber growing districts particularly.

Loss of Tapping Days by Drought

The problem of time lost because of drought is rather different. Most estates prefer to give the required 14 days paid holiday to labour during this season, but it is prefer to give the required 14 days paid holiday to labour during this season, but it is prefer to give the result of the rest period and still obtain a worthwhile field. On one or two estates attempts have been made to do this, with a reasonable degree of success.

Tapping Intensity

It is a common practice in India to tap clonal seedlings alternate daily throughout life, but to tap buddings third daily throughout life. This is a reversal of the system used in other countries, and we have been unable to learn the basis for it. Normally, clonal seedlings when tapped alternate daily show a high incidence of brown bast, particularly between the fourth and tenth years of tapping. This was verified in the field, where brown bast was found to be as high as 25% on some estates, yet only completely dry trees were considered as cases of brown bast. It is normal in other countries to count as a brown bast tree one of which merely a portion of the tapping cut is dry, so the position is probably even worse than this figure indicates.

Tapping of Clonal Seedlings

It is clear that effort is needed to impress on all rubber growers the importance of tapping clonal seedlings at a reduced intensity of 67%, at the same time dealing with the recognition of brown bast and its prevention. In certain areas brown bast was being treated, but this is unnecessary; all that is required is to rest affected trees for a given period, usually six months, dating the tree for timely reopening.

Tapping of Clones

Most clones are selected on a basis of 100% tapping; thus, except in certain well known cases, it is not normally necessary to tap them at a reduced intensity. To do so does not particularly assist the growth of the tree but it does lose crop. With the present price of rubber it would be economic to expend a little more in tappers' wages in order to obtain an increased crop. It should be pointed out to planters that the loss of crop is about 15% to 20% if a clone is tapped third daily as opposed to alternate daily. Demonstrations of these points in the field, with publications and advice by Rubber Instructors, would do a lot to increase the yields of budded areas.

Heights of Opening

In India buddings are usually opened at a height of 42 inches from the union, and clonal seedlings at 18 to 20 inches from the ground. We suggest that these heights should be raised to conform with the heights used in other countries. We were told that tappers are unable to reach a greater height, but labourers of the same nationality in other countries are able to do so. The objects of this suggestion are to allow the maximum period for bark renewal and to prevent the formation of virgin bark islands on the tree, as occurs for instance when a second panel in virgin bark is opened about 10 inches above renewed bark. Such bark islands often yield so little as to be scarcely worth tapping. Many areas were observed to be opened on a new panel on this system and they are bound to give a poor yield. It is suggested that facts be demonstrated to planters, who at the moment do not appreciate the problem. In India buddings are usually opened at a height of 42 inches from the union, and

High Tapping

Throughout the country we commonly saw trees marked for replanting after having been tapped three or four times on virgin and renewed panels from 42 inches downwards only. A considerable loss of crop will ensue if these trees are not tapped on a high panel from 100 or 120 inches down to the old panels. It was put to us by a number of managers that labourers are unwilling to carry out high tapping, and demand excessive remuneration for carrying a ladder. We feel that, with sufficient incentive, tappers would be willing to undertake this work. Initial labour troubles in Malaya were soon overcome when high yields were experienced. A considerable increase in yield from most of the older clones, including those planted in India, can be obtained by tapping on a high panel

usually it is more than sufficient to cover the increased cost of tapping the necessarily reduced tasks.

We found the general reaction to high tapping to be that it was equivalent to slaughter-tapping. Planters felt that the gain from the extra crop was not worth the trouble of persuading labour to carry out a novel practice. The Rubber Research Institute has information on the value of high tapping and is able to confirm the results obtained with a number of clones. Trials have been made on one or two estates but, except on one, the new high cut was too near the junction of virgin and renewed bark to give good

Intensive Tapping

Intensive night and low tapping on two well separated panels has been tried to our knowledge on only one estate in the proper form, but on unselected seedling trees, which do not normally respond well. As in the case of tapping on a high panel, it is again considered by most planters to be a system of 'slaughter-tapping'. This is most certainly not so. Tapping on a high panel is possible, given a reasonable bark consumption, for eight to ten years. Double tapping at an intensity of 133% (2 C 2. d/3. 133%) can be maintained for a longer period; both practices can be continued on renewed bark on the high panel as well as on renewed bark on the lower panel. Intensive high and low tapping on two well separated panels has been tried to our

A tapping intensity of 133% with a double cut system has proved particularly pro-fitable in other countries and has contributed greately to the yield of the tree after tapping in virgin and renewed bark on the lower panels. We feel that a similar advanage could be obtained from this system in rubber growing areas in India, provided that the cuts are well separated. We believe that the labour force would soon become accustomed to the procedure. Clonal responses to such exploitation vary. Usually clones respond better than do clonal seedlings, but both are satisfactory.

Bark Consumption

Bark consumption is considerably less in India than in other countries. It was often quoted with some pride as less than half an inch per month. Even allowing for the number of tapping days lost, there appears to be a case for investigating whether an insufficient shaving has been taken at each tapping. It is usually reckoned that three quarters of an enterprise month is the minimum that should be consumed on alternate daily tapping (S/2, d. 2, 100%). Where less than half an inch was being used we would expect some loss of yield

Depth of Tapping

The virtually complete absence of wounding on certain estates was striking. It was found that the tapping was often not sufficiently near the cambium to obtain maximum yield; perhaps up to some 10% of the crop was being lost by shallow (apping. It is well known, that more rings of latex vessels occur nearer the cambium; thus the nearer the tapping cut can approach it without wounding, the more latex vessels are severed and the better the can approach it without wounding, the more latex vessels are severed and the better the crop obtained. In areas under good commercial tapping one or two wounds are often error has occurred. We would, therefore, recommend that, to encourage deeper tapping, estates a penalties for available of the respective production. estates relax penalties for wounding.

YIELD STIMULATION

A number of estates have used yield stimulants, but with varying degrees of success. Experiments conducted by the Rubber Research Institute indicate that the response to yield stimulation is balle in the parties of the property of the parties. ponse to yield stimulation in India is no different from the response in other countries.

Efforts should be made to accustom estates and small growers to the use of yield stimulants, not as a 'slaughter tapping' practice, but as a commercial routine.

Correct Use and Advantages of Yield Stimulants

Yield stimulants should be used only when the trees are 18 to 20 years old. It is known from other countries that the use of stimulants, if properly applied, can be continued for considerable periods without failure of the yield response. It is estimated in the Federation of Malaya that, during 1959, the use of yield stimulants accounted for an extra 18,000 to 20,000 tons of rubber, produced at a cost of M § 134 per ton for materials and application. Such an opportunity to increase yields should be closely investigated, and urged upon all rubber producers.

Formulations of Yield Stimulants

Yield stimulants in present use contain either 2, 4-D (patented under the name of 'Stimulex') or 2, 4, 5-T. The patent on the latter substance has been assigned to the Rubber Research Institute of India by the Rubber Research Institute of Malaya. We suggest that production of the 2, 4, 5-T formulation should be officially fostered in India.

There are two methods of application, the more usual being every six months on the bark that is to be tapped out below the tapping cut within the next three months; alternatively, stimulant can be applied monthly above the tapping cut, but in the latter case only if the panel is not to be tapped again.

Particular Usage

Good use of a yield stimulant can be made when a tapping cut on a high panel in virgin bark approaches second or third renewed bark on a low panel. Here the use of a stimulant will enable crop to be obtained from what is otherwise a low yielding portion of bark. The main use is that indicated in the next paragraph.

A Rational System of Exploitation

To obtain maximum yield of the tree, its life from planting to final cutting out must be planned. Ten years ago it was common, in most countries, to find that best yields occurred on tapping the second panel of virgin bark and one or one and a half panels of first renewed bark, all on low cuts. Thereafter as tapping on renewed bark continued, the renewed bark grew progressively worse, yields dropped, and diminishing returns were obtained.

Recent developments have indicated that, by exploiting virgin bark on high panels, by increased intensity systems on older trees and by the use of yield stimulants, it is possible to maintain a constant high level of yield throughout a period of some 40 to 43 years. By this time it is probable that new and more valuable planting material will be available.

Proper supervision and reasonable maintenance are essential.

The basic principles involved have been investigated in other countries and should certainly be confirmed by the Rubber Research Institute, but could be applied immediately. Both clonal seedlings and buddings should be opened at a much greater height than they are at present. Tapping can thus continue on virgin bark and renewed bark for a considerable period. On the last panel of renewed bark yield stimulants can be used. Thereafter, high and low tapping at 133% can be employed, while in the later years of life, tapping at 200% intensity with use of yield stimulants is indicated. These methods could produce an immediate and sizable increase in the rubber crop of the country.

APPENDIX 3

Wage Structure of Plantation Labour in Malaya

1. WAGES OF TAPPERS

(a) General

The wages of tappers will consist of a guaranteed factor (which is made up of a basic element and a price element) and an output factor.

(b) Classification of Fields

(i) Future Changes in Classification

The classification of a field or area as at present classified under the provisions of the Agreement dated 7th February, 1959, may be changed from Category A to Category C or from Category B to Category C if the yield per acre in the preceding financial year has fallen below:—

if under Low Level Tapping	450 lbs.
if under High Level Tapping	700 lbs.
if under High/Low Level Tapping	750 lbs.

and from Category A to Category B if the yield per acre in the preceding financial year has fallen below:—

		200
if under Low Level Tapping	750	lbs.
if under High Level Tapping	850	lbs.
if under High Low Level Tapping	1000	lhs
: Gunder High I ow Level Tapping	1000	105

(ii) Areas newly brought into tapping

Areas newly brought into tapping will be classified in Category A not later than one complete calendar year after commencement of tapping, except where yield performance per acre or per tapper does not justify such classification, in which case it will be classified in Category A as soon as classification is justified. During the period preceding such classification, tappers in such areas shall, notwithstanding the succeeding provisions of this Clause, be paid at suitable daily or poundage rates.

(iii) Declassification of low-yielding areas

Declassification		acre of	which is belov	v:-
Fields or areas	, the yield pe	Toming.	300	lbs.
if under	Low Level	Tapping	300	lbs.
			450 ag 550	
if under H	ligh/Low Le	vel Tappu	6	

may be declassified and tappers in such fields or areas be paid at suitable poundage rates, provided that the average earnings of a tapper on any such

field or area shall not fall below the guaranteed factor and provided further that such poundage rates shall not be less than the average earnings for latex (d, r, c.) in such field or area immediately prior to declassification, adjusted up or down according to the price zone, divided by the average poundage of latex (d, r, c.) per tapper.

(c) Guaranteed Factor

A tapper shall be paid the guaranteed factor for each day worked irrespective of the size of his allotted task provided that:—

- there shall be no reduction, except at the discretion of the Management, in the size of the task actually being tapped at the date of this Agreement;
- (ii) the guaranteed factor'is payable for the performance by him of the full duties of a tapper on his task;
- (iii) a washout will be counted as a day worked for the purpose of this Clause.

(d) Basic Element

The basic element in the guaranteed factor shall be \$2.25 a day for a monthly average price of 60 cents a pound provided, however, that:—

- (i) if the monthly average price of rubber for any month falls between 50 and 60 cents a pound the basic element shall be \$ 2.05 a day;
- (ii) the basic element shall be increased or decreased by 10 cents for every 10 points or part thereof by which the Retail Price Index published by the Department of Statistics rises above 125 or falls below 90.

(e) Price Element

The price element in the guaranteed factor shall be as follows:-

When the monthly average price falls

70 and	80 cents		20 cents
80 and	90 cents	-	35 cents
90 and	100 cents	_	50 cents
100 and	110 cents		65 cents
110 and	120 cents	-	80 cents
120 and	130 cents		95 cents
130 and	140 cents		110 cents
140 and	150 cents	-	125 cents
150 and	160 cents		140 cents
	80 and 90 and 100 and 110 and 120 and 130 and	70 and 80 cents 80 and 90 cents 90 and 100 cents 100 and 110 cents 110 and 120 cents 120 and 130 cents 130 and 140 cents 140 and 150 cents 140 and 160 cents	80 and 90 cents — 90 and 100 cents — 100 and 110 cents — 1110 and 120 cents — 120 and 130 cents — 130 and 140 cents — 140 and 150 cents — 140 and

The monthly average price of rubber for the purpose of this Sub-Clause and of Sub-Clause (d) (i) shall be the average of the daily Noon Buyers' Price for R. S. S. No. 1. in bales F. O. B. Singapore for the month ending on the 20th of the preceding month.

(f) Output Factor

(i) Latex:—A tapper shall, in addition to the guaranteed factor, be paid at the following rates in accordance with the average daily poundage of latex (dry

rubber content) brought in by him during the month, such average being calculated to the nearest pound:—

On Category A Fields—6 cents a pound for poundage in excess of an average of 14 lbs.

On Category B Fields—8 cents a pound for poundage in excess of an average of 9 lbs.

On Category C Fields—10 cents a pound for poundage in excess of an average of 5 lbs.

(ii) Scrap: A tapper shall be paid 4 cents a pound (wet weight) for scrap brought in by him.

(g) Late Tapping

Tappers shall be informed not later than 10 A. M. whether there will be tapping. When tapping (other than double tapping) is ordered to commence after 10 A. M. the rates in Sub-Clause (f) (i) above will be

On Category A Fields-to 8 cents a pound for poundage in excess of 14 lbs. On Category B Fields— to 11 cents a pound for poundage in excess of 9 lbs. On Category C Fields- to 14 cents a pound for poundage in excess of 5 lbs.

(h) Application of Stimulants

A tapper required to apply stimulant will be paid for such work.

(i) Poundage Boards

A board, or boards, shall be put up on which the poundage in respect of each tapper is displayed daily.

2. WAGES OF FIELD WORKERS

It is hereby agreed that field workers employed by estates in the membership of the Association shall, with effect from 1st January, 1962, be paid in accordance with the following provisions:-

(a) Male Workers :-

The daily rates for male workers shall be as follows: on the basis of the monthly average price calculated in the manner set out in Sub-Clause (1) (e) above:-

monthly average pr	ice care	Prize-Zone	Rate
Prize-Zone	Rate	100/110	335
50/60	245	110/120	350
60/65	265	120/130	365
65/70	270 290	130/140	380 395
70/80	305	140/150	410
80/90	320	150/160	
90/100		shall be for	ir-fifths of the

(b) Female Workers: - The daily rates for female rates set out in Sub-Clause (a) above.

- (c) The rates set out in Sub-Clause (a) above shall be increased or decreased by 10 cents for every 10 points or part thereof by which the Retail Price Index published by the Department of Statistics rises above 125 or falls below 90.
- (d) The rates in Sub-Clauses (a) and (b) above are payable to fully able-bodied adult workers and the rates for workers who are not fully able-bodied shall be agreed at estate level. For the purposes of this Sub-Clause a worker who is over 16 years of age shall be deemed to be an adult. Any dispute whether a worker is fully able-bodied or not will be settled by examination of the worker by the Medical Officer of the estate or, where there is no Medical Officer of the estate, by the Medical Officer of the Government Hospital.
- (e) The daily rates payable under this Clause are for eight hours of work inclusive of a break of half an hour permitted for refreshment in the field.

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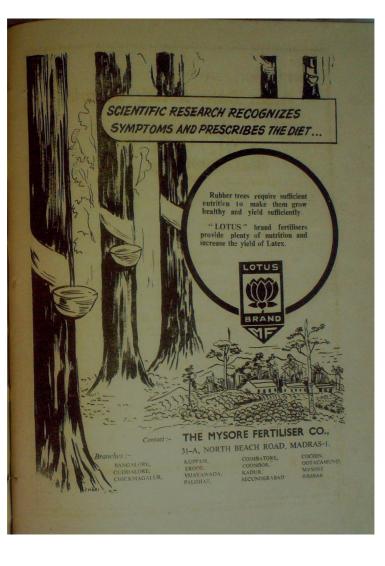
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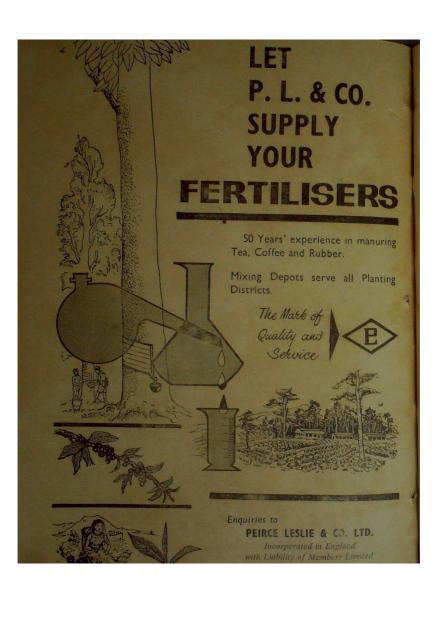
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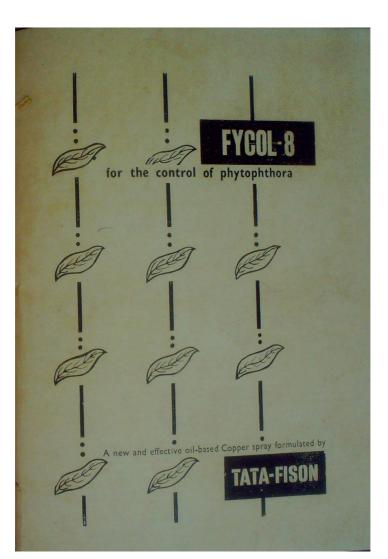
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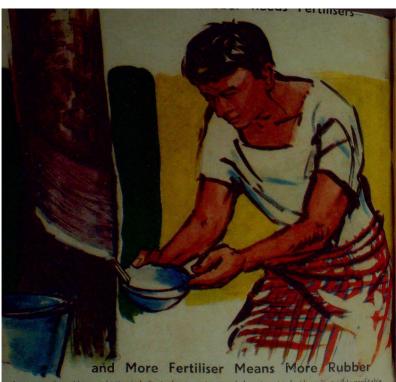
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At present the rubber production in India is about 50,000 tonnes per year. Though there has been a marked increase in production amounting to as much marked increase in production amounting to as much as 58%, during the past eight years, the industrial and household uses of rubber products have increased cent per cent. It is calculated that the requirements of natural rubber by the industry will be about 54,300 tonnes by 1965 as compared to the estimated production of about 45,000 tonnes. Thus the most presing problem facing this industry is to adopt, without delay, ways and means to enhance the natural production of rubber. There can be no doubt that by the adoption of systematic manuring and plant protection practices, the acre yields of latex can be considerably increased. Investment in fertilisers is quickly profitable.

The three grades of fertiliser mixture prepared according to the recommendations of the Rubber Board are available in all the Central and Sub-depots of the FACT. FACT Agronomy

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THE FERTILISERS AND CHEMICALS TRAVANCORE LIMITED

Registered Office:

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KERALA.

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