

**THE
RUBBER RESEARCH INSTITUTE OF CEYLON**

ANNUAL REVIEW FOR 1967

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THE RUBBER RESEARCH INSTITUTE OF CEYLON

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(as at 31st December, 1967)

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Mr. M. S. Perera
Mr. Rajah Salgado
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Mr. L. C. de Mel (co-opted)
Mr. E. D. de Alwis (co-opted)
Dr. R. T. Wijewantha

Selection Committee :

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Mr. C. Chanmugam
Mr. D. B. Ellepola
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Scientific Committee :

Mr. J. W. Craig
Mr. H. G. R. de Mel
Mr. D. B. Ellepola
Mr. S. Randeny, J.P.
Dr. R. T. Wijewantha
Heads of Scientific Departments (co-opted)

Smallholdings Department Selection Committee :

Mr. C. Chanmugam
Mr. S. Randeny, J.P.
Dr. R. T. Wijewantha
Mr. B. C. Moldrich (co-opted)
Mr. H. H. Peiris (co-opted)

Secretary to the Board

B. C. Moldrich, B.A. (Cey.)

Lawyers

F. J. & G. de Saram,
Proctors, P. O. Box 212, Colombo.

Auditors

Cecil Arseculeratne & Co.,
Chartered Accountants,
Hemas Building, York Street, Colombo 1.

Bankers

Bank of Ceylon, York Street, Colombo 1.

Registered Office and Laboratories

Dartonfield, Agalawatta.

Smallholdings Department

74, Davidson Road, Colombo 4.

THE RUBBER RESEARCH INSTITUTE OF CEYLON

STAFF

(As at 31st December, 1967)

Director ... R. T. Wijewantha, B.Sc. (Cey.), B.Sc. (Special)
Hons. (Lond.), M.Sc. (Lond.), Ph.D. (Calif.),
M. Sig. Xi, M.I.Biol.

RESEARCH DEPARTMENTS

Botany

Head of Department ... L. B. Chandrasekera, B.Sc. (Cey.), Dip. Ag. Sci.
(Cantab.)

Assistant Botanists ... R. Satchuthananthavale, B.Sc. (Madras), M.A.
(Madras), Ph.D. (Sheffield)
Miss A. C. I. Yahampath, B.Sc. (Cey.)

Senior Technical Assistant ... W. G. V. Fernando

Technical Assistant ... C. Amaracone

Field Assistants ... D. A. Brahakmana
D. R. Colonne
U. K. D. Lewis
W. T. Silva

Genetics and Plant Breeding

Head of Department ... D. M. Fernando, B.Sc. (Cey.), M.Sc. (Mc-Gill)

Geneticist ... Y. D. A. Senanayake, B.Sc. Agric. (Cey.), M.S.
(Louisiana), Ph.D. (Calif.)

Technical Assistant ... P. Samaranyake

Senior Field Assistant ... H. B. H. de Silva

Field Assistants ... D. S. Gamage
A. K. M. S. Senaratne
W. A. C. Wijesinghe

Plant Pathology

Head of Department ... Vacant

Assistant Plant Pathologist ... Mrs. V. Satchuthananthavale, B.A. (Madras),
M.Sc. (Madras), Ph.D. (Sheffield)

Senior Technical Assistant ... H. L. Munasinghe, L. I. Biol.

Technical Assistants ... D. M. Dantanarayana
W. C. Dayaratne
T. M. Fernando
Z. E. Irugalbandara
E. G. Mendis
S. K. Samaraweera

Soils Chemistry

<i>Head of Department</i>	...	Vacant
<i>Soils Chemist</i>	...	C. G. Silva, B.Sc. (Cey.), M.S. (Hawaii)
<i>Assistant Soils Chemist</i>	...	*R. S. John, B.Sc. Ag. (Cey.)
<i>Senior Technical Assistant</i>	...	T. Kanthasamy
<i>Technical Assistants</i>	...	H. A. Seemon F. P. W. Silva
<i>Field Assistants</i>	...	W. M. Abeysinghe M. A. Mendis J. T. K. V. Nageswaran

Rubber Chemistry

<i>Head of Department</i>	...	Vacant
<i>Rubber Chemist</i>	...	S. W. Karunaratne, B.Sc. (Cey.), A.R.I.C. A.I.R.I., A.N.C.R.T., M.Sc. (Aston)
<i>Assistant Rubber Chemist</i>	...	Mrs. J. Sivabalasunderam, B.Sc. (Madras), A.R.I.C.
<i>Senior Technical Assistant</i>	...	M. T. Veerabangsa
<i>Technical Assistants</i>	...	A. S. Dekumpitiya W. D. Dharmasena G. G. Gnanasegaram D. D. Medagama

Statistical Section

<i>Assistant Statistician</i>	...	N. Nadarajapillai, B.Sc. (Cey.)
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EXTENSION SERVICES

Estates Advisory Department

<i>Head of Department</i>	...	A. B. Dissanayake, B.Sc.Ag. (Cey.), B.A. (Cey.)
<i>Estates Advisory Officer</i>	...	K. W. de Silva
<i>Assistant Advisory Officers</i>	...	A. Dahanayake, B.Sc.Ag. (Cey.) D. S. Muthukuda H. T. Wickremasekera, B.Sc.Ag. (Cey.)

Smallholdings Department

<i>Chief Advisory Officer (Smallholdings)</i>	...	H. H. Peiris
<i>Deputy Chief Advisory Officer (Smallholdings)</i>	...	Vacant

Divisional Advisory Officers

<i>(Smallholdings)</i>	...	P. S. G. Cooray M. B. Dissanayake B. D. Pedrick D. R. Ranwala K. P. Siriwardene D. B. Weligodapola J. D. S. Wickremaratne L. A. Wijesinghe
<i>Office Assistant</i>	...	R. A. Somadasa
<i>Chief Clerk</i>	...	C. Jayasinghe
<i>Accounts Clerk</i>	...	K. J. L. Perera, F.S.A.A., A.C.B.I.
<i>Artist Clerk</i>	...	M. J. P. Lusena
<i>Clerk-Translators</i>	...	W. A. A. Perera I. L. Sirisena
<i>Clerks</i>	...	M. Jayasuriya G. P. A. I. G. Pathirana R. E. Perera A. Wijesinghe
<i>Rubber Instructors</i>	...	W. D. Abeysena D. L. Abeysinghe M. D. Albert H. A. D. Ariyaratne K. I. Ariyaratne S. D. Athukorale W. S. Dassanayake P. W. David W. E. W. de Mel A. J. L. de Silva H. R. Dias J. M. E. Dissanayake K. Ekanayake P. B. Fernando P. I. N. Fernando P. T. S. Fernando R. Gunadasa L. L. C. Gunasekera W. W. Gunasekera U. D. V. Gunasinghe A. P. Gunatilake R. K. Gunatilake B. A. Gurusinghe G. P. G. S. Hapugoda R. B. Heendeniya T. B. Herath D. Hettiarachchi S. D. Hidellearachchi T. W. Jayalath A. K. Jayatissa W. D. Jayawardena

<i>Rubber Instructors</i>	...	K. S. Kodikara R. B. Madawala P. R. Nonis D. Palihakkara M. P. V. P. S. Perera S. C. Rajasinghe D. J. Ratnayake W. D. D. Rupasinghe M. C. Samarasekera R. G. Siripala U. S. Somapala J. H. Suaris J. Sumanasekera A. Suriyaarachchi O. M. W. Tilekeratne G. Weeratunga C. Wickrematilake W. S. Wijesekera V. Wijesinghe D. R. Wijesooriya W. M. D. Wijesundera R. P. D. J. Wijewardena U. S. Wijeyapala
<i>Mechanic</i>	...	K. A. Siripala

ADMINISTRATION

Correspondence and Accounts Sections

<i>Chief Administrative Officer and Secretary to the Board</i>		B. C. Moldrich, B.A. (Cey.)
<i>Assistant Administrative Officer</i>	...	Vacant
<i>Office Assistant</i>	...	J. A. Attygalle
<i>Accounting Assistant</i>	...	H. Kulasena, A.C.C.S.
<i>Personal Assistant to the Director</i>	...	P. Samarasinghe
<i>Confidential Clerk</i>	...	W. D. Jayawansa
<i>Record Clerk</i>	...	D. G. Udawatta
<i>Clerk/Typists</i>	...	M. J. Abeyasinghe D. D. D. Adikaram K. G. A. K. Dharmawardene T. H. Wijesena B. H. Withanachchi
<i>Accounts Clerks</i>	...	A. K. D. Amaradasa A. L. Gunawardene P. S. P. Wijesiriwardene
<i>Junior Clerks</i>	...	J. D. Gunaratne Miss N. K. Seneviratne
<i>Junior Accounts Clerk</i>	...	J. H. C. S. Perera

<i>Translator cum Typist</i>	...	J. A. A. R. I. St. R. Perera
<i>Book-keeper</i>	...	E. P. D. Roberts, F.C.B.I. (Lond.)
<i>Store-keeper</i>	...	D. P. W. Goonesekera
<i>Stores Assistant</i>	...	B. L. P. Gunaratne

Library

<i>Librarian and Publications Officer</i>	...	Vacant
<i>Library Assistant</i>	...	W. Ranasinghe
<i>Clerk</i>	...	D. C. Thambawita

Works Section

<i>Works Engineer</i>	...	P. C. J. F. Keerthisinghe
<i>Foremen</i>	...	M. M. Anderson W. S. J. Benjamin K. C. L. Fernando
<i>Clerk</i>	...	E. T. Seneviratne
<i>Transport/Stores Assistant</i>	...	B. D. Ponnampereuma

ESTATES

Dartonfield Group

<i>Estate Superintendent</i>	...	L. Wijeyagoonewardena
<i>Assistant Estate Superintendent</i>	...	M. R. T. Mendis
<i>Office Assistant</i>	...	T. S. J. Peiris
<i>Senior Accounts Clerk</i>	...	A. C. Swaris
<i>Accounts Clerks</i>	...	C. Jeyaraj B. H. Rodrigo
<i>Junior Clerk</i>	...	A. L. Ratnayake
<i>Chief Field Assistant</i>	...	H. M. Buultjens
<i>Senior Field Assistants</i>	...	L. P. de Mel D. C. Kannangara
<i>Factory Assistant</i>	...	O. de Alwis
<i>Apothecary</i>	...	P. H. A. Perera
<i>Dispenser</i>	...	G. J. A. Silva
<i>Field Assistant</i>	...	H. A. Haramanis

Assistant Rubber Maker ... S. Hettiarachchi

School Teachers ... Mrs. K. P. Goonewardene
D. L. W. Lionel
S. Nadarajah

Assistant Nursery Manager L. H. Samaranayake

Kuruwita Sub-station

Visiting Superintendent ... B. Cocking

Senior Field Assistant ... M. C. Perera

Note: Names of officers of a single group under each department have been alphabetically listed.

* on study leave overseas.

RUBBER RESEARCH INSTITUTE OF CEYLON

DIRECTOR'S REVIEW FOR 1967

By

R. T. WIJEWANTHA

GENERAL

A record output of nearly 141,000 tons of rubber was established in 1967. The trend in increased production should continue for a few more years as more and more of the replanted acreage are brought into production. It is uncertain however whether the percentage increase recorded has been solely due to the above factor or whether the use of more intensive tapping systems too has been a contributory cause. This needs further study as there is a danger of long-term detrimental effects on plantations if more intensive tapping systems than those recommended are used over a period of time.

The yield per acre has also increased steadily in recent years. The average yield in 1967 for the area under production was about 631 lb per acre in contrast to 609 lb per acre for the previous year.

The Minister of Trade and Commerce convened a meeting in June to discuss the problems of the rubber industry. This was followed in July with a two-day seminar at which eleven speakers including the Director of the Institute and Mr. D. S. Muthukuda of the Estates Advisory Department presented papers on different aspects of the industry. Summarised versions of these papers are available as an issue of the Rubber Research Institute of Ceylon Bulletin. Resulting from the discussions at the seminar, a Technical Specification Drafting Committee with the Director of the Institute as Chairman was established. The Board of the Rubber Research Institute has also approved the symbol SCR (Standard Ceylon Rubber) for all technically specified rubbers originating in Ceylon. The need for technical characterisation of our rubber and improved presentation are recognized as pre-requisites for future trends in marketing. It is also necessary to develop a scheme to technically specify the traditional forms of rubber manufactured in Ceylon.

The Director and the Rubber Chemist of the Institute visited Malaysia in November to obtain first hand information on the practical aspects of manufacture of the new types of rubber, the technical classification and the improved methods of packing and shipment. The cost of equipment and factory conversion, manufacturing costs and the returns from Heveacrumbs, Natcom and Dynat processes were discussed in our report to the Board, and it was our opinion that equipment having low capital costs which could convert the cup lump and tree lacc to improved grades would yield profitable returns. The conversion of our scrap to superior grades of the 'newer rubbers' would also contribute to additional foreign exchange earnings. A producer planning to invest however, should be assured that the minimum amount of raw material is available to run the unit under optimal conditions unless small units which can run profitably with low intakes can be developed. It is heartening to note that requests for incentives

advocated by the Institute as well as several potential manufacturers and Planters' Association have now found favour with the Government as announced recently by the Ministry of Commerce and Trade.

Dr. O. S. Peries, Head of the Plant Pathology Department, Mr. M. Nadarajah, Head of the Rubber Chemistry Department and Mr. A. J. Jeevaratnam, Head of the Soils Chemistry Department left the services of the Institute with effect from 17th January, 20th February and 31st July, respectively.

Mr. L. B. Chandrasekera was confirmed as Head of the Botany Department and Mr. D. M. Fernando as Head of the Genetics and Plant Breeding Department with effect from 17th January. They were on duty throughout the year.

Mr. Camillus Silva, Soils Chemist was in charge of the Soils Department from 1st August in the absence of a permanent Head.

Mr. S. W. Karunaratne returned to the island on 19th September after successful completion of his post-graduate studies at the University of Aston, Birmingham. He was appointed Rubber Chemist with effect from 2nd December and was in charge of his department from the date of his return to the Institute. Mrs. J. Sivabalarunderam, Assistant Rubber Chemist was in charge of the department under the overall control of the Director from 21st February until the return of Mr. Karunaratne.

Messrs. A. B. Dissanayake, Head of the Estates Advisory Department, H. H. Peiris, Chief Advisory Officer Smallholdings, L. Wijeyagoonewardena, Estate Superintendent and B. C. Moldrich, Chief Administrative Officer, were on duty throughout the year.

Dr. Y. D. A. Senanayake, B.Sc. Hons. (Cey.), M.Sc. (Louisiana), Ph.D. (Calif.), was appointed Geneticist with effect from 2nd May.

Mr. B. Cocking, Visiting Superintendent, R.R.I.C. Sub-station, Kuruwita continued to over-see the Sub-station during the year.

Dr. (Mrs.) V. Satchuthananthavale was in charge of the Plant Pathology Department under the overall control of the Director in the absence of a permanent Head of the Department.

We record with deep regret the death of Mr. D. E. A. Abeywickrema, Deputy Chief Advisory Officer Smallholdings on 4th August.

Mr. K. Wilson de Silva, Estates Advisory Officer was confirmed in his appointment with effect from 1st January.

Messrs. A. Dahanayake, B.Sc.Ag. (Cey.) and H. T. Wickremasekera, B.Sc.Ag. (Cey.) were appointed Assistant Estates Advisory Officers with effect from 2nd May.

Mr. D. S. Muthukuda, Senior Technical Assistant, Rubber Chemistry Department was promoted Assistant Estates Advisory Officer effective 20th March.

Mrs. S. C. Goonetillake, Librarian and Publications Officer left the services of the Institute on 10th June while Mr. A. S. Nanayakkara, Assistant Administrative Officer reverted to Government service on being appointed to the Ceylon Administrative Service.

Mr. R. S. John, Assistant Soils Chemist continued his post-graduate studies at the University of Aberdeen.

The following Intermediate Staff Officers were on duty during the year :—

Dr. R. Satchuthananthavale, Assistant Botanist
 Mr. N. Nadarajapillai, Assistant Statistician
 Mr. P. C. J. F. Keerthisinghe, Works Engineer
 Mr. M. R. T. Mendis, Assistant Estate Superintendent
 Miss A. C. I. Yahampath, Assistant Botanist

Mr. V. B. Solomon, Assistant Statistician who was on post-graduate studies in the U.S.A. resigned from the services of the Institute effective 1st September without returning to the island.

Mr. A. de S. Liyanage who joined the services of the Institute as Assistant Plant Pathologist on 5th February resigned on 31st July to take up appointment in the Department of Agriculture.

Dr. R. L. Wastie and Dr. Chee Kheng-Hoy, two Pathologists from the Rubber Research Institute of Malaya spent a week in June at the Institute to make studies on *Phytophthora* in Ceylon.

Dr. E. G. Cockbain, Senior Principal Scientist of the Natural Rubber Producers' Research Association and co-ordinator on biosynthesis of latex for the International Rubber Research and Development Board visited the Institute for a few days from 28th September to 3rd October. During his stay he gave a popular lecture in Colombo on "the biosynthesis of latex."

Dr. C. G. Moore, Deputy Director of Research of the Natural Rubber Producers' Research Association was at the Institute from 26th to 28th October. He addressed the rubber industry on "recent developments at the N.R.P.R.A. and developments in education in polymer science and technology in the United Kingdom".

The Hon. Haji Mohamed Ghazali Bin Jawi, Minister of Agriculture and Co-operatives of Malaysia and party visited the Institute on 19th July. Among other visitors to the Institute were a delegation from the U.S.S.R. and two F.A.O. officials who were engaged in studying crop diversification in the island.

Assistant and Minor Staff changes in the various Departments have been reported on by the respective departmental heads.

The salaried staff at the end of the year was as follows :—

Senior Staff (Heads of Departments)	...	...	6
Senior Staff (non-Heads of Departments)	...	...	4
Intermediate Staff	...	...	11
Assistant Staff	...	...	147
Minor Staff	...	...	65
			<hr/>
			233
			<hr/>

Meetings, Conferences and Seminars etc.

The Director and other research officers of the Institute attended the following meetings, seminars and conferences :—

1. C.A.A.S. annual sessions
2. Symposium on "Development of Dry Zone Agriculture" sponsored by the C.A.A.S.
3. Planters' Association meetings and meetings of the Planters' Association General Committee
4. Meetings of the Low-Country Products Association
5. Meetings of the District Planters' Associations
6. Bureau of Ceylon Standards— Divisional Committee meetings and meetings of the Technical Specification Committee
7. Meetings of the Rubber Replanting Advisory Board
8. Seminar organised by the Ministry of Commerce and Trade
9. Ad hoc meetings convened by the Ministry of Agriculture and Food

Visits by Scientific Staff

<i>Department</i>	<i>Advisory</i>	<i>Experimental</i>	<i>Others</i>	<i>Total</i>
Botany Department	17	58	2	77
Genetics and Plant Breeding Dept.	—	425	3	428
Plant Pathology Dept.	40	264	—	304
Soils Chemistry Dept.	7	73	15	95
Rubber Chemistry Dept.	103	55	95	253
Statistical Section	—	15	7	22
Estates Advisory Dept.	615	9	52	676

NOTES ON DEPARTMENTAL WORK

The research and technical staff of the Institute were depleted in the year under review. The Board however decided during the early part of the year to halt the recruitment of scientific personnel until the findings of a Sub-Committee of Inquiry were submitted and discussed by the Board. As a direct result of this decision initiation and expansion of new research projects became well nigh impossible due to the pressure of work on the existing staff.

It is to the credit of the staff of the Institute that they have carried out their responsibilities in spite of these difficulties and their services to the industry under such conditions should be placed on record.

Botany: Additional results on yield stimulation experiments using a R.R.I.C. mixture have confirmed the earlier findings that average annual yield increases of about 25% could be achieved particularly in low-yielding rubber which is being tapped on the renewed bark.

A small-scale experiment carried out on clone Tjir 1 indicates that while injection of copper sulphate pellets into holes bored in the stock has yield stimulation properties, the yield response was inferior to that obtained with the application of R.R.I.C. mixture which contains 2,4,5-T as the active ingredient.

An experiment in which clone Tjir 16 was tapped on S/2,d/3,67% system with two applications of yield stimulants a year had given increased yields in the second consecutive year. The yield per tapper per tapping averaged over 3 tapping tasks had been 18.5 lb and 19.3 lb during the first and second years respectively. The yields recorded for the controls were 10.1 lb and 9.7 lb per tapper per tapping respectively.

No significant difference was evident in a small-scale experiment to determine the effect of tapping with and without rest during the 'wintering period' on yield and the rate of girthing.

We regret once again that attempts to obtain suitable material in commercial estates for tapping experiments have so far been unsuccessful.

Clone evaluation trials confirm that RRIC 45 continues to give good yields while maintaining its favourable secondary characteristics. The high-yielding RRIC 36 is recommended as an 'eco-clone' for drier districts.

Among the clones that are recommended for moderate-scale planting in estates RRIC 5, 7, 37, 41, 86, 88, 89, RRIM 605 and 623 appear to be promising.

Clone RRIC 37, like the clone RRIC 36 is very susceptible to Bark Rot in the wet districts. The clone RRIC 86 had been relatively free of panel diseases and should yield better than clone PB 86.

AVROS 427 and 1734 — These two clones have been selected for moderate-scale planting in estates. In experimental areas their yields have been better than that of clones PB 86 and RRIC 36. The incidence of Bark Rot in these two clones has been negligible.

Other recent selections for small-scale planting are the clones RRIC 40, 55, 61, 90, 91, 99, 100 and 101.

The setting down of yield trials of the most promising clone selections was being continued. A part of the experimental area at Rosebury Estate, Koslanda, was interplanted with cacao in 1967. The purpose of this trial is to assess the effects of interplanting rubber with a subsidiary crop in the dry districts where the climatic conditions are not very favourable for high yields in rubber.

Preliminary studies indicate no differences in the growth rate of PB 86 budlings when seedlings of Tjir 1, RRIC 7, 41, 52, 86, 88 and 89 were used as stocks.

Experiments have shown that where bare root budded stumps are used for planting, ring-barking budded seedlings above the point at which they are cut back two weeks before uprooting could reduce the dormant period in the field.

However, any undue delay in uprooting of ring-barked plants would result in scion buds sprouting in the nursery. In the dry districts, where the duration of rainfall during the planting season is relatively short, early sprouting would ensure better establishment before the onset of the dry intermonsoon period.

With suitable soil mixtures, standard budded stumps could be raised in 400 gauge 12" x 27" lay-flat polythene bags for a period of up to 6 months. These should be suitable for use as supplies especially in the wet districts.

Genetics and Plant Breeding: The vigorous breeder's clones which were tapped initially at 4½ years showed a sharp increase in yield in the 2nd year without adverse effects on their growth. Two of these clones, namely 663 (RRIC 100) and 1174 (RRIC 101) were released for commercial planting in Group III. Two other early starter clones were also selected for further multiplication and large-scale trials. Several other trials of selections were under investigation. The evaluation of yield trends in clones possessing resistance to *Oidium* and *Dothidella* was also begun.

Laboratory studies on cytogenetic investigations were initiated in 1967. Initial meiotic PMC studies of the early ever flowering clone H 440 suggest that the cytological behaviour of this clone is normal. A project was initiated to utilize the large seedling population of Egal-Oya nurseries in order to obtain genetical material for future cytological and breeding investigations. Routine examination of the latex content of *Hevea* petioles and estimations of the rubber seed oil content of the different clones were continued.

Clone Ch 26 was used over a very wide range of crosses of high-yielding, vigorous, and *Oidium*-resistant material in order to introduce even more vigour and yield. Over 18,000 hand pollinations were completed during the season and over 500 seedlings obtained. Over 100 seedlings were established of the cross Ch 26 x 815, and reciprocal and Ch 26 x 266. A few seedlings of parentage 1103 x Ch 26 and Ch 26 x 663 were also obtained.

Plant Pathology: Only one staff officer was on duty throughout the year. Consequently the work of this department was orientated to pursue the experiments which were already in progress. Advisory work was mainly confined to special pathological problems of *Hevea*.

Twenty specimens with aberrant symptoms were received for diagnosis and advice on their control measures. The majority of specimens were diseased due to fungal attack while the remaining specimens had symptoms caused by pest attack, physiological disorders or mechanical damage.

Studies on the occurrence of the two sexually compatible groups of *Phytophthora* on *Hevea* were continued. 142 isolates were recovered from 7 estates. The majority (86.6%) were identified as Group I *Phytophthora* spp. and the remainder were *P. meadii*. The former were isolated from the petiole, pod, stem and leaf blade and the latter was isolated from the petiole and pod. Since the inception of these studies, *P. meadii* has not been removed from the stem and the leaf blade. The predominance of Group I *Phytophthora* spp. indicates that this species plays a major role in leaf and panel diseases of *Hevea*. Laboratory studies revealed that Group I *Phytophthora* spp. produce only chlamydospores whereas *P. meadii* produce only oospores. This suggests that the former species could over-winter in nature in mummified pods, infected shoots and old bark lesions.

In general the incidence of *Oidium* leaf-fall was mild except for a few isolated cases. The incidence of secondary leaf-fall caused by *Phytophthora* was also mild in 1967. A few estates which reported heavy leaf-fall also reported heavy pod-set.

The incidence of Black Stripe was also light. Three commercial estates carrying fungicidal trials had a low incidence of Black Stripe.

In an experiment to confirm the suitability of sulphur as a soil amendment for the control of White Root disease caused by *Fomes lignosus*, the incidence of the disease declined in all the treatments. During the first two vulnerable years the control plots showed a high incidence in comparison to the treated soil.

The setting down of an experiment designed to assess the effect of retaining the timber from the previous stand, on the incidence of *Fomes* in the replanted area was completed. Assessments of the incidence of the disease on the treatments as well as the effect of the treatments on the growth and performance of *Hevea* will now be made at 6-month intervals.

Soils Chemistry : The reconnaissance survey of the rubber growing areas which was completed in 1967 has recognized the existence of 8 soil series. Laboratory investigations were confined to the analysis of leaf samples in order to determine the mineral status of the plant and also to the analysis of soil samples to determine their chemical status.

Investigations to find a substitute for sodium arsenite have revealed that in immature areas Gramoxone with 2, 4-D and disodium methane arsonate could be used in keeping natural ground covers under control in the inter-row areas. A residual herbicide like Diuron was found to be useful in keeping the planting rows in a clean weeded condition. Amino triazole alone and mixed with 2,4-D was found to check *Mikania* and some grasses. DSMA with 2, 4-D was also observed to kill the natural vegetation effectively. Mixtures of sodium chlorate and 2, 4-D did not give very favourable results. The cost of these various weedicides has not been worked out. Observations on areas where weed control experiments were conducted indicate that natural vegetation should be controlled to the point of eradication only when such vegetation could be replaced with a leguminous ground cover. Under all other circumstances the natural vegetation should be kept only under control.

The large number of long-term fertilizer experiments are now in the process of being analysed and studied, with a view to changing our manurial recommendations where such changes cost-wise have become necessary. A foliar analysis cum soils analysis service as a tool for making more precise and useful fertilizer recommendations for particular 'fields' was accepted in principle by the Board of Management, but lack of staff prevented its implementation during the year under review.

Results of investigations carried out in the course of advisory work brought to light the incidence of high boron contents in two instances. In another estate even though the leaves showed marginal scorch and other typical symptoms of boron toxicity leaf analysis did not show any appreciable increase in leaf boron in the affected leaves.

Rubber Chemistry : In order to formulate a technical specification scheme for Ceylon rubbers large-scale sampling and testing of sheet and crepe were undertaken. The results have been encouraging. Heveacrumb, one of the newer

forms of rubber is now being manufactured at the Institute's pilot plant on Peen-kande estate. Heveacrub from fractions, cup lump, tree laces as well as mixes have now been tried out and tested for technical properties. Further experiments have now been designed to improve the quality of the crumb produced. The Institute is now in a position to advise on the manufacture of the newer forms of rubber produced by any of the newer processes such as by pelletisation, comminution, granulation or mechano-chemical crumbling.

The plasticity retention index (PRI) studies were continued. The manufacture of foam rubber from creamed latex and rubberising of jute hessian also received the attention of this department.

Statistics : Assistance was given to the research departments in the design, analysis and statistical interpretation of field experiments. Assistance was also continued to be given to a private firm engaged in assessing the economic feasibility of extracting a commercial grade oil from rubber seed.

Advisory Departments : The Estates Advisory Department and the Small-holdings Department continued to give valuable advice to the industry. The objective of early routine advice is to keep an estate or a holding at an efficient level of production and manufacture. Such advice though costly in terms of dissemination, is cheap in terms of national economic returns, because, keeping an estate at an efficient productive level and improving the quality of the manufactured rubber will ultimately reflect in higher earnings to the country. The separation of the extension services from the responsibilities of the research departments has also provided additional time for the research staff to devote to their research investigations.

PUBLICATIONS RECORD — 1967

General

Annual Report of the Rubber Research Board for 1964 (Sinhala) — Part I
 " " " " " " " " " (") — Part II
 " " " " " " " " " (Tamil) — Part I
 " " " " " " " " " (") — Part II
 " " " " " " " " " 1965 (Sinhala) — Part I
 (in press)
 " " " " " " " " " (English) — Part II
 (in press)
 " " " " " " " " " 1966 (") — Part I
 (in press)

Brief Annual Report for 1966 (English)

1st & 2nd Quarterly Journal for 1967, Vol. 43, Parts 1 & 2

3rd & 4th Quarterly Journal for 1967, Vol. 43, Parts 3 & 4 (in press)

R.R.I.C. Bulletin (New Series), Vol. 2, Nos. 1 & 2

R.R.I.C. Bulletin (New Series), Vol. 2, Nos. 3 & 4 (in press)

Advisory Circular No. 76 — Brown Root Disease

Advisory Circular No. 77 — Cover Crops

Advisory Circular No. 78 — A Note on boron toxicity in young replantings.

Roneoed Leaflets

Circular letter to Agency Houses dated 6-1-67 *re* General Information Sheet.

R.R.I.C. *Oidium* Questionnaire dated 10-2-67.

R.R.I.C. *Phytophthora* Questionnaire dated 17-3-67.

Circular letter to Agency Houses dated 13-10-67 *re* Exchange Clones.

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Nadarajah, M., Sivabalasunderam, J. and Dekumpitiya, A. S. Further factors affecting the plasticity retention index of natural rubber. *Rubb. Res. Inst. Ceylon Quart. J.* 43, 13 - 18, 1967.

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*Senanayake, Y. D. A. Fruit culture in Ceylon — potentials and possibilities. *J. National Agr. Soc. Ceylon* 4, 69 - 78, 1967.

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Wimalajeewa, D. L. S. Studies on the physiology of spore germination in *Gloeosporium alborubrum*. *Rubb. Res. Inst. Ceylon Quart. J.* **43**, 4-12, 1967.

Short Notes

Question and Answer on PRI — by J. Sivabalasunderam. *R.R.I.C. Bulletin* (New Series) **2**, 38 - 39, 1967.

Question and Answer on wind resistant clones — by D. M. Fernando. *R.R.I.C. Bulletin* (New Series) **21**, 39, 1967.

Books

*Appadurai, R. R. and Y. D. A. Senanayake (1967). *Principles and the Practice of Agriculture* (for the G.C.E. — Sinhalese) 216 pp., 64 illus., Lake House Investments Ltd.

* Based on work done elsewhere, published in 1967.

REVIEW OF THE BOTANY DEPARTMENT

By

L. B. CHANDRASEKERA

Staff

Mr. J. B. Chandrasekera, Acting Head of the Botany Department was confirmed as Head of this department with effect from 17th January 1967. He was on duty throughout the year.

The Assistant Botanists, Dr. R. Satchuthananthavale and Miss A. C. I. Yahampath were on duty throughout the year.

One post of Botanist remains vacant.

Correspondence

	<i>Inward</i>	<i>Outward</i>
General	21	42
Technical	309	320

Publications

1. Brief Annual Report of the Botany Department 1966
2. Detailed Annual Review of the Botany Department 1966

The following articles were submitted for publication in the R.R.I.C. Bulletin :—

1. Stock Experiments
2. Brown Bast
3. Performance of Clones

ADVISORY WORK

Advisory correspondence involving special botanical problems were attended to by the Botany Department. The Head of the Department paid 17 advisory visits to commercial estates during the period under review. He also addressed the Planters' Association meetings held at Ratnapura and Kegalla on "tapping".

Assistance, by way of advice and supervision, was given in the Estate Department by technical officers of the Botany Department in establishing a commercial budwood nursery at Hedigalla.

YIELD STIMULATION EXPERIMENTS

Field Experiment No. 1 — Long-term Yield Stimulation — Clone LCB 1320

This experiment had to be discontinued in early 1967 owing to extensive wind damage that occurred in the experimental plots.

Field Experiment No. 2 — Yield Stimulation and Tapping — Clone Tjir 16

In this experiment, each of the following treatments are applied to 3 tapping tasks :—

- (1) Tapped S/2, d/3, 67% and stimulated at 6-months intervals.
- (2) Tapped S/2, d/2, 100% but not stimulated.

In the stimulated blocks R.R.I.C. Mixture I is applied to 1 inch of scraped bark below the tapping cut. The yields recorded during the first two years of the experiment are summarised in Table 1.

TABLE 1
Yield in lb dry rubber

	Stimulated and tapped on S/2, d/3, 67%		Unstimulated and tapped on S/2, d/2, 100%	
	Total crop in lb for 3 tasks	Average yield per tapper	Total crop in lb for 3 tasks	Average yield per tapper
Dec. 1965 — Nov. 1966	5,095·0	18·5	4,159·0	10·1
Dec. 1966 — Nov. 1967	6,541·0	19·3	4,713·0	9·7

The yields given above represent averages based on estate records of daily yields per tapper.

Field Experiment No. 35 — Small-Scale Yield Stimulation Experiment

In this experiment, which was to have served as a preliminary small-scale trial, each of the following treatments are applied to 5 trees of clone Tjir 1. Tapping is being done on bark of first renewal on the S/2, d/2, 100% system :—

1. R.R.I.C. Mixture I applied to 1½ inch strip of scraped bark below the tapping cut.
2. Treatment I combined with injection of 3 grammes copper sulphate in the form of pellets into holes bored in the stock.
3. Injection of 3 grammes of copper sulphate pellets into holes bored in the stock.
4. Control (untreated).

The average yields recorded since the experiment was started in August 1966 are presented in Table 2.

TABLE 2

SMALL-SCALE YIELD STIMULATION EXPERIMENT — NIVITIGALAKELE

Yield in grammes per tree per tapping

	Treatment			
	A	B	C	D
Yield before treatment	34.3	33.4	38.2	43.5
After treatment				
Adjusted yields 1966	73.0	65.1	58.5	43.2
Adjusted yields 1967	36.6	35.8	34.4	29.5

- A — RRIC Mixture I
 B — RRIC Mixture I + copper sulphate
 C — Copper sulphate
 D — Control

While injection of copper sulphate pellets has had yield stimulation properties, the yield response was inferior to that of application of the R.R.I.C. Mixture, which contains 2, 4, 5 - T as the active ingredient. This experiment will be discontinued in 1968.

TAPPING EXPERIMENTS

Field Experiment No. 4 — 1964 "Winter" Tapping-cum-Yield Stimulation Trial

A small-scale experiment was set down in 1964 in order to test the effects of the following treatments on yield and rate of girdling in clones Nab 12 and PB 86 :—

- (a) Yield stimulation on virgin bark/tapping without "winter" rest.
- (b) Yield stimulation on virgin bark/tapping with a "winter" rest.
- (c) No stimulation and tapped without "winter" rest.
- (d) No stimulation and tapped with a "winter" rest.

Each treatment is applied to 20 trees of each of the clones Nab 12 and PB 86 and replicated 3 times. The girth and yield data for the first 4 years are presented in Table 3.

TABLE 3

WINTER TAPPING AND YIELD STIMULATION EXPERIMENT — DARTONFIELD

Yield in grammes per tree per tapping
Test-tapped from March 1964

	A	B	C	D
(Nab 12)				
Average girth in inches (1964) ...	27.5	27.9	27.5	27.4
Average girth in inches (1965) ...	28.7	29.2	28.6	28.3
Average girth in inches (1966) ...	29.0	29.9	28.8	28.9
Average girth in inches (1967) ...	30.0	30.9	29.8	30.0
Average yield before treatment	41.9	41.5	39.2	41.0
* Average adjusted yield (1964) ...	58.0	55.2	56.4	50.2
Average adjusted yield (1965) ...	44.3	43.6	43.4	41.2
Average adjusted yield (1966) ...	39.0	39.5	43.2	35.0
Average adjusted yield (1967) ...	40.3	39.1	38.9	36.6
(PB 86)				
Average girth in inches (1964) ...	27.0	27.1	27.0	27.9
Average girth in inches (1965) ...	28.2	28.4	28.6	29.6
Average girth in inches (1966) ...	28.5	28.8	28.7	29.9
Average girth in inches (1967) ...	29.7	29.9	30.4	31.1
Average yield before treatment	31.7	35.0	32.8	39.1
* Average adjusted yield (1964) ...	44.7	46.3	42.1	41.4
Average adjusted yield (1965) ...	41.9	39.7	40.1	36.7
Average adjusted yield (1966) ...	37.4	36.2	37.5	37.7
Average adjusted yield (1967) ...	38.4	40.2	37.8	38.5

* Yield results for 5 months.

- A — Yield stimulation of virgin bark/tapping without winter rest
- B — Yield stimulation of virgin bark/tapping with winter rest
- C — No stimulation and tapped without winter rest
- D — No stimulation and tapped with winter rest

The yield results confirm that no significant yield increases could be achieved by the use of yield stimulants on virgin bark. Tapping continuously without a rest during the "wintering" period has not had a significant effect either on yield or rate of girthing of trees.

A serious setback to tapping investigations had been the non-availability of suitable areas either at the Institute's experimental stations or in commercial estates. Arrangements have therefore been made to postpone replanting of the 1949 large-scale clone trial at Hedigalla so that tapping experiments may be carried out at least on a small-scale. Initiation of these experiments awaits the appointment of a Botanist, the post of which is now vacant.

CLONE EVALUATION TRIALS

Field Experiment No. 5 — 1946 Replanted Area — Nivitigalakele

The two clones RRIC 88 and RRIC 89, in view of these promising yields and good vegetative characters, have been recommended for small-scale planting

in estates. They have also been included in a number of large-scale yield trials sited in commercial estates. The test tapping results of the original 25-tree plots are presented in Table 4.

TABLE 4
LARGE-SCALE CLONE TRIAL — 1946 REPLANTED AREA — NIVITIGALAKELE

Yield in lb dry rubber per tree per year		
	RRIC 88	RRIC 89
No. of trees tapped in 1967	21	19
Yield — 1960	22.3	21.2
„ — 1961	25.2	21.7
„ — 1962	23.1	22.4
„ — 1963	20.3	20.0
„ — 1964	24.1	22.1
„ — 1965	24.6	26.0
„ — 1966	26.6	23.9
„ — 1967	31.1	25.4
Brown Bast cases in 1967	3	7
Canker and Bark Rot cases in 1967	—	1
Wind damage cases 1967	1	—
Girth in inches in 1967	41.1	38.8
Bark measurements in mm		
— Virgin bark	13.4	12.2
— Renewed bark	11.0	9.4

The clone RRIC 88 has a slight bending habit in the first year of growth, but straightens out in the second year.

Field Experiment No. 6 — 1952 Small-scale Clone Trial — Hedigalla

Out of 625 five-tree clones established from a selection of the 1945 hand-pollinated seedlings, 6 clones were finally selected for yield and good secondary characters. These were designated RRIC 91 to 95. Among these, the two final selections representing the highest yielders, the clones RRIC 90 and 91 are now recommended for small-scale planting in estates. Test tapping results of this original 5-tree plots of these two clones are presented in Table 5.

TABLE 5
1952 CLEARING — HEDIGALLA
Tapped on S/2, d/2, 100% from July 1960
Yield in lb dry rubber per tree per year

Clone	No. of trees tapped in 1967	Yield							Girth in inches	Bark thickness in mm	
		1961	1962	1963	1964	1965	1966	1967		Virgin bark	Renewed bark
RRIC 91	5	22.9	25.3	22.3	25.3	24.6	36.5	30.3	39.5	10.7	9.7
RRIC 90	4	20.5	21.1	26.0	26.5	26.4	31.4	25.6	33.6	10.3	8.3 (1BB)

BB = Brown Bast

The clones RRIC 90 and 91 have been planted in further large-scale trials in 1962, 1965 and 1966.

Field Experiment No. 7 — 1954 Clone Trial — Nivitigalakele

Among the clones planted in this trial, only IRCI 7 and PB 28/59 are recommended for moderate-scale planting in estates. Test tapping results of clones in this trial are given in Table 6.

TABLE 6

1954 CLONE TRIAL — NIVITIGALAKELE
Tapped on S/2, d/2, 100% from March 1960
Yield in lb dry rubber per tree per year

	IRCI 10	IRCI 7	PB T-207	PB 6/5	PB 24/3	PB 28/59	PB 24/51	RRIM 501
Yield in 1961	18.8	10.2	7.0	8.9	8.6	14.2	7.6	9.7
„ „ 1962	10.5	9.2	9.5	10.2	9.9	15.3	8.3	11.9
„ „ 1963	8.4	8.8	9.1	10.3	10.5	14.2	9.0	12.6
„ „ 1964	9.1	9.5	10.7	11.9	12.0	15.1	10.3	13.6
„ „ 1965	8.1	10.6	11.2	10.4	12.6	16.3	10.0	13.1
„ „ 1966	10.2	13.1	13.1	10.7	12.2	19.5	12.9	13.9
„ „ 1967	9.8	15.4	11.9	8.4	10.5	18.6	13.0	13.8
No. of trees tapped in 1967	76-67	141-129	69-57	140-137	122-106	125-111	160-153	112-96
Canker and Bark Rot cases	3	3	5	2	4	5	1	4
Brown Bast cases	22	24	21	28	26	22	9	16
Wind damage cases	99	41	117	17	48	34	13	65
Total casualties to date	124	68	143	47	78	61	23	85
Mean girth in inches	24.8	28.9	27.2	25.2	27.5	29.7	28.1	26.7
Virgin bark thick- ness in mm	7.6	9.3	9.6	9.2	9.4	10.2	8.7	9.5

Field Experiment No. 9 — 1950 Clone Trial — Hedigalla

The test tapping results are presented in Table 7.

TABLE 7

CHEMARA CLONE TRIAL — HEDIGALLA
Tapped S/2, d/3, 67% from March 1957
Tapped S/2, d/2, 100% from 1960
Yield in lb dry rubber per tree per year

	Ch 26	Ch 3	PB 86 (Control)
Yield in 1961	24.7	16.6	14.3
„ „ 1962	27.0	19.4	18.1
„ „ 1963	20.1	26.7	20.1
„ „ 1964	22.6	19.2	20.7
„ „ 1965	17.9	17.0	22.1
„ „ 1966	18.4	17.9	20.2
„ „ 1967	15.5	19.1	18.4
No. of trees tapped in 1967	28—27	37—32	61—59
Brown Bast cases	1	5	2

In view of the relatively poor performance of the two clones Ch 3 and Ch 26 as compared with clone PB 86, yield recordings in this area will be discontinued from 1968.

Field Experiment No. 11 — 1950/51 Clone Trial — Hedigalla

Of the 5 clones originally planted in this trial, only clone RR 134 has yielded better than the control clone PB 86. This clone is now designated as RRIC 99 and is recommended for small-scale experimental planting in estates. Test tapping results of clones RRIC 99 and PB 86 are presented in Table 8.

TABLE 8

SMALL-SCALE CLONE TRIAL — TRIAL NO. 2 — HEDIGALLA

Tapped on S/2, d/3, 67% from 1958

Tapped on S/2, d/2, 100% from 1960

Yield in lb dry rubber per tree per year

Clone	Yield							No. of trees tapped 1967	Wind damage
	1961	1962	1963	1964	1965	1966	1967		
RRIC 99	14.2	19.4	17.7	20.4	17.9	18.2	15.7	57	
PB 86	13.3	16.3	15.9	17.0	16.9	17.7	19.4	60—59	1

Field Experiment No. 12 — 1949 Clone Trial — Hedigalla

The clones are planted in 25-tree plots replicated six times. The most promising clone in this area had been RRIC 86 which is now recommended for moderate scale planting in estates. The comparative yields of clones RRIC 86 and PB 86 are presented in Table 9.

TABLE 9

1949 LARGE-SCALE CLONE TRIAL — HEDIGALLA

Tapped on S/2, d/2, 100%

Yield in lb dry rubber per tree per year

Clone	No. of trees tapped in 1967	Yield						Girth in inches	Percentage of casualties upto 1967
		1962	1963	1964	1965	1966	1967		
RRIC 86	71—61	21.0	19.3	20.9	22.0	19.8	18.2	30.8	58
PB 86	100—87	15.6	15.7	18.1	20.9	16.9	17.3	33.1	40

The clone RRIC 86 in addition to better yields has the advantage of being relatively free from Bark Rot. This experimental area will be used in 1968 for small-scale tapping experiments.

Field Experiment No. 13 — 1954 Clone Trial, Hedigalla

The clones are planted in monoclonal blocks of 800 to 1000 trees per clone. Tapping commenced as individual trees reached tappable girth as follows:—

- First tapped in 1961 — RRIC 16, 18, 22, 26, 35, 36 and RRIM 501
 „ „ „ 1962 — RRIC 19, 21, 24, 25, 29, 31, 34, 37 and AVROS 255
 „ „ „ 1963 — RRIC 17, 23, 32, 33, PR 107 and PB 86
 „ „ „ 1964 — IRCI 10, NL 1 and one block of PR 107.

The test tapping results are presented in Table 10.

TABLE 10
 1954 LARGE-SCALE CLONE TRIAL — HEDIGALLA

Firts tapped in July 1961 on S/2, d/2, 100%
 Yield in grammes per tree per tapping

Clone	No. of trees tapped in 1967	Girth in inches	Yield					
			1962	1963	1964	1965	1966	1967
RRIC 36	491—376	28·6	33·0	44·1	41·8	37·9	41·8	52·9
PB 86	561—538	26·2	—	32·9	31·0	28·0	37·2	43·6
RRIC 37	515—481	25·6	28·8	23·0	28·4	25·3	36·4	42·1
RRIC 35	650—539	27·7	33·5	32·2	30·6	32·5	39·5	41·3
RRIM 501	584—535	25·9	28·2	39·6	39·7	42·9	34·7	40·1
RRIC 22	605—576	28·1	25·1	21·7	26·8	27·9	36·9	37·3
RRIC 32	594—576	25·9	—	21·4	23·6	25·7	30·7	33·2
RRIC 18	623—581	27·3	24·1	27·7	26·8	29·3	32·3	32·2
RRIC 34	543—465	26·1	36·3	32·3	26·3	28·1	27·1	30·8
RRIC 31	598—499	26·9	21·0	14·7	15·6	20·0	21·8	30·9
RRIC 19	569—539	27·4	16·0	18·5	25·3	23·5	24·3	28·8
PR 107 ('K' block)	110—100	22·6	—	—	10·3	15·5	18·7	28·3
RRIC 29	443—384	25·9	16·7	18·3	21·9	18·2	23·9	27·0
RRIC 21	600—533	28·3	14·4	10·4	15·4	16·2	22·6	25·5
RRIC 16	673—664	29·7	16·8	14·4	22·4	18·9	26·2	25·2
PR 107 ('H' block)	743—686	24·9	—	31·8	25·6	24·0	24·7	25·1
AVROS 255	779—689	25·9	21·3	23·6	24·5	25·5	28·7	24·1
RRIC 33	533—484	24·3	—	34·3	24·9	21·4	27·1	23·5
RRIC 24	685—643	29·9	10·7	10·9	14·2	12·9	20·9	23·2
RRIC 30	414—385	23·6	—	—	—	—	32·2	22·9
RRIC 17	663—607	24·8	—	21·7	19·7	17·9	23·8	22·2
NL 1	72—66	25·7	—	—	17·4	16·1	14·1	19·7
RRIC 25	585—573	25·6	16·7	12·7	13·4	12·2	14·1	19·5
RRIC 26	564—536	26·5	14·6	13·3	15·7	13·3	16·4	18·6
IRCI 10	665—609	22·3	—	—	17·6	19·2	22·6	17·8
RRIC 23	701—700	25·2	—	16·6	15·5	11·9	18·7	17·4
RRIC 20	504—420	21·9	—	—	—	—	15·7	14·0

The clone RRIC 36 is now recommended for large-scale planting in the dry districts.

Field Experiment No. 14 — 1955 Clone Trial, Hedigalla

The clones are planted in monoclonal blocks of 750 trees per clone. Tapping commenced in June 1952.

The yields of the more promising clones in this trial are presented in Table 11.

TABLE 11
1955 LARGE-SCALE CLONE TRIAL — HEDIGALLA
Yield in grammes per tree per tapping

Clone	No. of trees tapped in 1967	Yield						Girth in inches 1967	Bark Rot and canker	Brown Bast	Wind damage	
		1962	1963	1964	1965	1966	1967				Snapped	Up-rooted
RRIC 40	488—404	28·5	32·4	42·0	45·4	46·2	58·5	27·9	30	—	5	49
RRIC 50	468—458	17·7	33·2	38·4	40·3	59·5	58·5	25·7	—	—	5	5
RRIC 13	601—561	30·3	33·1	34·8	45·5	48·3	54·1	25·2	1	27	2	10
RRIC 46	258—146	31·1	36·0	36·2	45·8	55·9	54·8	24·1	71	—	15	26
RRIC 41	557—510	30·3	31·3	35·0	40·1	46·2	45·4	25·6	—	47	—	—

The clone RRIC 41 is recommended for moderate-scale planting in estates.

Field Experiment No. 15 — 1953 Clone Trial — Nivitigalakele

A clone of particular interest in this trial is RRIC 45 which is recommended for large-scale planting in Ceylon. It is planted as a monoclonal block of approximately 700 trees and tapped on the S/2, d/2, 100% system since 1962.

The test tapping results of clone RRIC 45 are presented in Table 12.

TABLE 12
1953 LARGE-SCALE CLONE TRIAL — NIVITIGALAKELE
Tapped on S/2, d/2, 100%
Yield in lb dry rubber per tree per year

Clone	No. of trees tapped in 1967	Yield						Girth in inches 1967	Bark Rot and canker cases	Brown Bast cases	Wind damage cases	Virgin bark thickness mm
		1962	1963	1964	1965	1966	1967					
RRIC 45	577-544	8·9	10·2	10·6	10·5	11·0	12·1	26·7	2	39	44	8·4

Field Experiment No. 16 — 1956 Clone Trial — Hedigalla

The clones are planted in monoclonal blocks of 300 trees per clone. Tapping commenced as individual clones reached tappable girth as follows :—

First tapped in July 1963 — RRIC 55, PB 86, IRCI 5, 9, RRIM 603, 605, 612, 618, PR 228, 252, 257, AVROS 1191.
 „ „ „ „ March 1964 — RRIC 39, 48, 54, 59, PR 253, 258, RRIM 617, AVROS 1447.
 „ „ „ „ 1965 — PR 247.
 „ „ „ „ 1966 — TR 1406, RRIC 42, AVROS 1328 and 1851.
 „ „ „ „ Sept. 1966 — IRCI 1, 3, 6, PR 256.

Test tapping results are presented in Table 13.

TABLE 13
 1956 LARGE-SCALE CLONE TRIAL — HEDIGALLA

Yield in grammes per tree per tapping

Clone	No. of trees tapped in 1967	Average girth in inches	Yield			
			1964	1965	1966	1967
RRIC 55	202—196	23.5	22.2	29.7	35.1	43.7
RRIC 48	249—234	22.4	26.0	28.4	39.7	41.5
IRCI 9	221—188	25.8	23.7	31.7	38.8	36.5
AVROS 1447	185—136	24.5	17.3	22.8	35.2	35.3
RRIC 54	228—226	23.4	15.8	23.6	24.7	34.7
PR 252	213	24.7	24.5	35.3	33.0	34.5
PR 228	258	23.8	18.8	22.8	29.7	32.0
RRIC 39	227—208	23.4	21.7	25.3	30.7	31.1
PR 258	215—209	22.2	15.5	19.3	26.8	30.3
RRIM 618	235—170	24.2	29.7	26.0	30.1	29.7
PB 86	240—233	26.9	20.6	23.1	28.1	29.5
IRCI 5	245—238	22.8	19.6	23.1	33.7	29.1
PR 253	205	22.2	25.7	20.3	28.1	28.7
PR 257	193	23.3	29.5	29.4	29.2	28.4
RRIM 605	230—208	23.8	14.7	15.7	22.4	28.1
TR 1406*	186—166	21.3	—	—	28.8	27.8
RRIC 59	198—171	23.7	13.9	19.2	24.2	26.0
RRIC 42*	240—203	23.8	—	—	25.4	26.0
RRIM 612	249—247	28.3	9.8	17.7	21.7	24.8
AVROS 1191	212—204	22.9	19.5	23.4	26.8	24.5
PR 247	181—179	24.1	—	28.1	30.6	24.4
IRCI 1**	180—154	19.8	—	—	22.9	24.2
RRIM 617	240—220	24.9	20.3	24.3	25.6	23.2
AVROS 1328*	270—253	21.6	—	—	23.5	22.6
RRIM 603	242—225	23.9	15.9	21.3	21.4	22.3
IRCI 3**	194—184	18.6	—	—	21.8	22.0
AVROS 1851*	249—206	24.2	—	—	21.2	22.0
PR 256**	154—139	17.4	—	—	20.8	20.4
IRCI 6**	164—132	19.6	—	—	16.5	19.3

* from March 1966

* from Sept. 1966

Clones RRIC 48, 55, IRCI 9 and PR 252 have been selected for further large-scale testing and for experimental plantings in estates.

Field Experiment No. 17 — 1956 Clone Trial — Dartonfield

The clones GT 1, WR 101, AVROS 385 and AVROS 427 are planted in 300-tree plots. 48 plants of RRIC 52 are planted along the boundaries. All clones except AVROS 385 are now recommended for small-scale planting in estates.

Clones GT 1, WR 101, AVROS 385 and 427 were first tapped in 1963. Clone RRIC 62 was tapped one year earlier in 1962. Test tapping results are given in Table 14.

TABLE 14
1956 CLONE TRIAL — DARTONFIELD
Yield in grammes per tree per tapping

	WR 101	GT 1	AVROS 385	AVROS 427	RRIC 52
No. of trees tapped in 1967	283	280—279	254	239	45
Yield in 1963	22·7	15·6	7·5	—	22·3
„ „ 1964	26·0	19·9	17·9	32·9	22·9
„ „ 1965	28·2	18·1	15·5	23·3	23·6
„ „ 1966	20·9	21·6	14·2	22·4	27·5
„ „ 1967	21·1	17·7	17·0	24·3	28·2

Although clone GT 1 is being planted in many commercial estates, its yield in the experimental areas had been rather disappointing.

Field Experiment No. 25 — 1957 Clone Trial — Estate A — Kalutara District

All clones are planted in monoclonal blocks of 300 trees per clone with clone PB 86 serving as the control. Tapping commenced in 1964. The test tapping results are presented in Table 15.

TABLE 15

SMALL-SCALE CLONE TRIAL — ESTATE A — KALUTARA DISTRICT
(tapped from March 1964)
Yield in grammes per tree per tapping

Clone	Girth in inches 1967	No. of trees tapped 1967	Yield			
			1964	1965	1966	1967
TR 1406	26.7	268—260	26.5	28.2	28.7	38.5
IRCI 2	24.6	250—248	21.0	27.1	26.8	40.2
IRCI 3	22.6	204—202	23.8	23.7	31.0	38.3
RRIM 607	24.7	278—270	25.2	24.8	22.1	29.3
AVROS 529	24.1	296—294	16.7	19.0	20.4	23.7
PB 86	23.1	250	17.5	17.3	16.4	23.1
Mean	24.3	—	21.8	23.4	24.2	32.1

Clones TR 1406, IRCI 2 and RRIM 607 are selections recommended for small-scale commercial planting.

Field Experiment No. 26 — 1957 Clone Trial — Estate B — Kalutara District

- (a) 10 acres — Five clones are planted in monoclonal blocks of 300 trees per clone.
(b) 20 acres — Eleven clones are planted in monoclonal blocks of 300 trees per clone.

In both areas, PB 86 serves as the control clone. Tapping commenced in April 1964. The test tapping results are presented in Tables 16 and 17.

TABLE 16

1957 CLONE TRIAL — ESTATE B — KALUTARA DISTRICT (10 ACRES)
(tapped from April 1964)

Yield in grammes per tree per tapping

Clone	Average girth in inches 1967	No. of trees tapped in 1967	Yield			
			1964	1965	1966	1967
AVROS 1734	26.5	200	35.6	40.5	39.7	36.7
AVROS 2037	27.9	204	21.1	20.6	23.6	36.1
PB 86	24.2	213	23.9	23.6	29.1	33.6
PR 254	25.1	254	19.0	19.6	28.4	33.5
RRIM 612	29.3	227—212	19.8	24.8	28.2	28.6
TR 1548	27.6	254	22.0	23.9	24.1	23.2
Mean	26.8	—	23.6	25.5	28.8	32.0

TABLE 17

1957 CLONE TRIAL — ESTATE B — KALUTARA DISTRICT (20 acres)

Tapped on S/2, d/2, 100%

(First tapped in March 1964)

Yield in grammes per tree per tapping

Clone	Average girth in inches 1967	No. of trees tapped in 1967	Yield			
			1964	1965	1966	1967
RRIC 61*	24.6	233	19.9	23.3	33.5	49.4
WR 101	25.0	196	22.0	19.1	28.2	37.0
RRIC 76	24.6	268	17.8	20.4	27.2	33.1
RRIM 623	26.2	250—248	29.8	33.3	39.3	32.1
RRIM 603	26.2	209—205	19.6	19.1	25.9	29.2
TR 1542*	23.9	221	16.8	15.7	19.2	27.5
RRIC 75	28.9	188—185	21.7	18.4	26.7	26.8
RRIM 622	24.3	215—189	21.3	19.1	19.6	26.1
RRIC 60	25.3	246	12.4	15.3	19.9	22.9
PR 248	25.6	228	17.2	18.0	20.1	21.5
RRIM 602	25.6	266—263	15.4	14.4	21.2	19.9
PB 86 (1)	} 24.0	266	} 18.0	} 19.9	} 23.4	} 25.7
(2)		261				
(3)		228				
Mean	25.4	—	19.3	19.7	25.4	29.3

* Tapped on S/2, d/3, 67% from March 1967

The clone AVROS 1734 has been recommended for moderate-scale planting in estates.

The tapping intensities of clones RRIC 61 and TR 1542 was reduced to 67 per cent from March 1967 owing to extensive wounds resulting from Bark Rot.

Field Experiment No. 27 — 1958 Clone Trial — Estate B — Kalutara District

All clones are planted in monoclonal blocks of 300 trees per clone. Tapping commenced in April 1965.

Test tapping results for the first 3 years in tapping are presented in Table 18.

TABLE 18

1958 CLONE TRIAL — ESTATE B — KALUTARA DISTRICT (30½ acres)

Tapped on S/2, d/2, 100% from April 1965

Yield in grammes per tree per tapping

Clone	Average girth in inches 1967	No. of trees tapped in 1967	Yield		
			1965	1966	1967
AVROS 427	20.7	261	29.6	37.1	40.1
RRIC 55	22.5	180	—	32.7	31.7
RRIC 45	23.0	259	17.1	22.1	28.1
RRIM 605	22.2	268	21.7	22.5	27.9
RRIC 36	25.0	207	24.1	27.9	27.6
IRCI 2	21.9	263	19.0	21.7	26.2
IRCI 6	24.4	210	16.2	19.2	24.5
RRIC 41	24.6	269—255	18.2	19.5	22.2
RRIC 39	25.6	220—215	20.4	19.9	22.2
RRIC 28	22.4	215	19.5	19.9	22.1
RRIM 607	25.7	228	20.3	19.5	21.9
WJ 1	23.3	221	17.7	21.9	21.3
GT 1	23.2	295	13.3	16.6	21.0
RRIC 22	24.4	265—255	17.4	19.7	20.7
RRIC 37	22.3	223—218	16.3	20.2	19.4
RRIC 54	24.2	218—213	17.3	20.1	19.4
RRIC 52	27.4	263	13.8	15.0	15.1
AVROS 385	25.4	272	11.1	11.6	13.4
PB 86 (1)	22.5	212	17.6	22.9	22.9
(2)		243			
(3)		237			
(4)		231			
Mean	23.7	—	18.4	21.6	23.6

Clone AVROS 427 has been selected for moderate-scale planting in estates. In very wet years in the wet planting districts this clone can be subject to *Phytophthora* leaf fall. Other clones recommended for experimental planting are RRIC 55 and GT 1.

Field Experiment No. 28 — 1957/58 Clone Trial — Estate C — Kalutara District

Test tapping results of a selection of clones planted by a commercial estate are given in Table 19.

TABLE 19
CLONE TRIAL — COMMERCIAL ESTATES — KALUTARA DISTRICT—ESTATE C

Tapped on S/2, d/2, 100%
Yield in grammes per tree per tapping

Clone	No. of trees tapped in 1967	Yield				Girth in inches 1967	Remarks
		1964	1965	1966	1967		
<i>Division 1</i> (1957 clearing) *							
RRIC 36	185	31.9	34.5	36.6	44.6	24.2 ✓	= Tapped on S/2, d/3, 67% from March 1967
IRCI 7	220—216	28.1	33.8	35.7	40.9	25.3 ✓	
RRIC 5	220	22.8	26.1	28.7	40.8	24.8	
RRIC 7	183	29.7	27.1	38.4	39.4	24.0	
RRIC 37	195	28.4	28.8	30.5	37.0	22.4 -	= Tapped on S/2, d/3, 67% from March 1967
RRIC 45	278	23.6	24.5	29.5	34.0	23.1 ✓	
RRIC 41	243	28.6	24.2	29.5	34.0	24.5 ✓	
Mean	—	27.6	28.4	32.7	38.7	24.0	
<i>Division 2</i> (1958 clearing) **							
RRIC 41	265—240	22.7	21.0	26.2	27.8	23.5	

* First tapped in September 1963

** First tapped in June 1964

IMMATURE AREAS

Field Experiment No. 18 — 1961 Clone Trial — Dartonfield

The clones are planted as monoclonal blocks. The clones RRIM 513, RRIC 7 and RRIC 52 are planted at spacings of 12" × 20". Clones RRIC 45, 88, 89, PB 86 and PB 28/59 are spaced at 8" × 30". A summary of the girth measurements for the years 1966 and 1967 are given in Table 20.

TABLE 20

1961 LARGE-SCALE CLONE TRIAL — DARTONFIELD
Average girth in inches

	RRIC 52*	RRIC 7*	RRIM 513*	RRIC 45*	PB 86**	RRIC 88**	PB 28/59**	RRIC 89**
No. of trees 1967	535	481	514	520	547	497	549	465
Average girth 1966	18.2	15.4	15.9	15.7	13.6	16.7	14.3	13.2
Average girth 1967	22.6	18.6	18.9	19.0	16.6	20.7	17.2	16.5
Girth increase 1966/1967	4.4	3.2	3.0	3.3	3.0	4.0	2.9	3.3

* Planted in N.E. season

** Planted in S.W. season

Field Experiment No. 19 — 1962 Large-scale Clone Trial — Nivitigalakele

The clones IAN 45-717, PB 86, RRIC 5, 39, 51, 86, 90, 91, 92, 93, 94, 95, 96, 97, RRIM 623, 628 and 701 are planted in plots of 150 trees per clone.

Within a 150-tree plot the following clones are planted at approximately 10 trees per clone:—

Clone Nos. 82, 566, 759, 815, 1009, 1103, 1317, 1458, Harbel 1, IAN 6497, PB 28/59, RRIC 7, 36, 45, 62, RRIM 607, 707.

The average girth figures of the clones are presented in Tables 21 and 22.

TABLE 21

1962 LARGE-SCALE CLONE TRIAL — NIVITIGALAKELE
Average girth in inches

Clone	No. of trees 1967	Average girth			Girth increase	
		1965	1966	1967	1965/66	1966/67
RRIC 95	113	12.6	16.9	20.5	4.3	3.6
RRIC 91	127	12.9	16.8	20.3	3.9	3.5
RRIC 5	118	12.1	15.9	18.9	3.8	3.0
RRIC 89	126	11.0	15.5	18.7	4.5	3.2
RRIC 86	128	11.3	15.0	17.9	3.7	2.9
RRIM 701	133	11.3	15.0	17.9	3.7	2.9
IAN 45-717	137	10.1	14.3	17.7	4.2	3.4
RRIM 623	97	10.6	15.1	17.6	4.5	2.5
RRIC 96	134	10.6	14.3	17.4	3.7	3.1
RRIC 94	141	10.4	14.0	16.8	3.6	2.8
RRIC 93	136	10.2	13.9	16.6	3.7	2.7
RRIC 92	124	9.8	13.5	16.3	3.7	2.8
RRIM 628	129	9.3	13.4	16.0	4.1	2.6
RRIC 51	134	8.9	12.6	15.6	3.7	3.0
PB 86	132	9.4	12.9	15.5	3.5	2.6
RRIC 90	141	8.0	11.3	14.1	3.3	2.8
RRIC 97	143	7.5	11.0	14.1	3.5	3.1

TABLE 22

1962 SMALL-SCALE CLONE TRIAL — NIVITIGALAKELE

Average girth in inches

Clone	No. of trees	Average girth			Girth increase	
		1965	1966	1967	1965/66	1966/67
No. 82	8	13.2	18.3	22.5	5.1	4.2
RRIC 52	8	12.4	16.6	20.7	4.2	4.1
PB 28/59	6	13.2	17.3	20.5	4.1	3.2
No. 1317	10	11.8	16.3	20.3	4.5	4.0
No. 759	10	10.7	15.5	20.2	4.8	4.7
No. 1009	10	13.1	16.7	20.1	3.6	3.4
No. 1103	10	13.3	16.9	20.1	3.6	3.2
No. 1458	10	12.5	16.7	19.4	4.2	2.7
No. 815	9	11.5	15.3	19.2	3.8	3.9
RRIC 45	10	11.1	14.9	18.9	3.8	4.0
No. 566	10	10.5	14.6	18.7	4.1	4.1
RRIM 607	8	8.5	12.9	17.6	4.4	4.7
RRIC 7	8	10.3	14.3	17.3	4.0	3.0
RRIM 707	9	9.3	13.8	17.2	4.5	3.4
RRIC 36	10	10.0	13.5	16.3	3.5	2.8
IAN 6497	8	9.1	12.8	15.9	3.7	3.1
Harbel 1	9	8.9	11.9	14.9	3.0	3.0
<i>Extra trees</i>						
RRIM 707	38	11.5	15.6	18.6	4.1	3.0
RRIC 36	38	10.0	13.9	16.9	3.9	3.0
RRIM 628	31	9.3	13.0	16.1	3.7	3.1

Field Experiment No. 20 — 1963 Clone Trial — Nivitigalakele

The clones RRIC 6, 39, 41, 59, 60, 64, 75, 98 and PB 86 were planted as mono-clonal blocks in May 1963. The girth measurements of clones at 4 years of age are presented in Table 23.

TABLE 23

1963 LARGE-SCALE CLONE TRIAL — NIVITIGALAKELE
Average girth in inches

Clone	No. of Trees	Girth 1967
RRIC 41	129	13.9
RRIC 60	276	10.9
RRIC 39	127	10.9
RRIC 6	139	10.9
RRIC 75	185	10.3
RRIC 64	244	10.1
PB 86	287	9.2
RRIC 98	[126	8.5
RRIC 59	243	7.0

Field Experiment No. 21 — 1964 Yield Trial — Nivitigalakele

This trial was planted in 1964 in order to assess the comparative yields of clones RRIC 41, 45, 52 and 86. Each clone is planted in plots of 106 trees replicated 3 times. The average girth measurements of clones at 8 years of age are presented in Table 24.

TABLE 24

1964 LARGE-SCALE CLONE TRIAL — NIVITIGALAKELE
Average girth in inches as at June 1967

Clone	Block No.	Plot No.	Girth	Clone average
RRIC 41	1	1	9.7	
RRIC 41	2	8	11.1	
RRIC 41	3	12	8.7	9.8
RRIC 86	1	2	8.2	
RRIC 86	2	5	10.3	
RRIC 86	3	10	9.4	9.8
RRIC 52	1	3	10.6	
RRIC 52	2	6	10.5	
RRIC 52	3	11	9.9	10.3
RRIC 45	1	4	9.7	
RRIC 45	2	7	9.2	
RRIC 45	3	9	9.9	9.6

Field Experiment No. 22 — 1965 Clearing — Nivitigalakele

10 acres of clone RRIC 45 were planted in 1965. This area will be used for tapping experiments.

Field Experiment No. 23 — 1965 Small-scale Clone Trial — Dartonfield

Each of the clones RRIC 5, 88, 89, 90, 91 and RRIM 600 are planted in 50-tree plots replicated 3 times.

Field Experiment No. 24 — 1965 Spacing Trial — Kuruwita

The 3 clones RRIC 41, 45 and 52 are planted at spacings of 8" × 30" and 12" × 20" for each clone. Each plot consists of 150 trees per clone replicated 3 times.

Field Experiment No. 33 — 1962 Clone Trial — Estate D — Kalutara District

Clones RRIC 7, 45, 52 and IRCI 7 are planted in monoclonal blocks of 1800 trees per clone. The girth measurements of clones taken in 1967 are summarised in Table 25.

TABLE 25
1962 LARGE-SCALE CLONE TRIAL — KALUTARA DISTRICT
Average girth in inches

Year	RRIC 52		RRIC 45		RRIC 7		IRCI 7	
	Girth	Girth increase	Girth	Girth increase	Girth	Girth increase	Girth	Girth increase
1964 (Sept.)	7.1	—	4.9	—	3.6	—	5.4	—
1965 (Sept.)	10.0	2.9	8.0	3.1	5.8	2.2	9.1	3.7
1966 (Sept.)	14.9	4.9	11.1	3.1	8.0	2.2	13.0	3.9
1967 (Sept.)	19.2	4.3	15.2	4.1	12.0	4.0	17.2	4.2

Field Experiment No. 29 — 1964 Yield Trial — 10 Acres — Salawa Estate

Clones RRIC 45, 86, 88 and Nab 15 are planted in 150-tree plots replicated 8 times. The girth measurements of the clones at 3 years of age are summarised in Table 26.

TABLE 26
1964 YIELD TRIAL — COMMERCIAL ESTATES (SALAWA ESTATE)
Average girth in inches

Clone	Block Number			Mean 1967
	1	2	3	
	1967	1967	1967	
Nab 15	11.4	12.2	9.9	11.2
RRIC 45	12.0	11.2	11.9	11.7
RRIC 86	8.9	11.5	11.0	10.5
RRIC 88	10.4	10.7	10.0	10.4

Field Experiment No. 36 — 1966 Yield Trial — 10 Acres — Malaboda Estate

Clones RRIC 45, 86, 88 and RRIM 701 are planted at 135 trees per plot replicated 3 times.

Field Experiment No. 37 — 1966 Yield Trial — 10 Acres — Udapolla Group, Deraniyagala

Clones RRIC 5, 45, Nab 15 and RRIM 701 are planted at 150 trees per plot replicated 3 times.

Field Experiment No. 38 — 1966 Yield Trial — 10 Acres — Kiribatgalla Group, Nivitigala

Clones RRIC 45, 88, 91 and AVROS 427 are planted at 134 trees per plot replicated 3 times.

Field Experiment No. 39 — 1966 Yield Trial — 15 Acres — Halgolle Group, Yatiyantota

Clones RRIC 45, RRIM 605 and 701 are planted at 250 trees per plot replicated 3 times.

Field Experiment No. 40 — 1966 Yield Trial — 10 Acres — Biddescar Group, Kegalla

Clones RRIC 36, 45 and RRIM 605 are planted at 160 trees per plot replicated 3 times.

Field Experiment No. 41 — 1966 Yield Trial — 20 Acres — Yatawatta Estate, Matale

Clones RRIC 36, 41, 86 and PB 86 are planted at 265 trees per plot replicated 3 times.

Field Experiment No. 42 — 1966 Yield Trial — 34 Acres — Kumarawatta Group, Moneragala

Clones PB 86, RRIC 5, 45, 36 and 88 are planted at 290 trees per plot replicated 4 times.

Field Experiment No. 44 — 1967 Yield Trial — 10 Acres — Biddescar Group, Polgahawela

Clones RRIC 36, 45, 89 and RRIM 600 are planted in 135-tree plots replicated 3 times.

Field Experiment No. 45 — 1967 Yield Trial — 10 Acres — Zion Estate, Rattota

Clones RRIC 36, 45, 89 and PB 86 are planted in 175-tree plots replicated 3 times.

Field Experiment No. 46 — 1967 Polyclone Trial — 2½ Acres — Hedigalla

Approximately 2½ acres, which would form 2 tapping tasks, were planted with clones RRIC 41, 45, 86, 88 and 89 during the N.E. planting season in 1967. The clones were planted at random so as to form a mixed planting. The purpose of this trial is to assess the yields that may be realised from such mixed plantings.

INTERCROPPING TRIALS

The purpose of these trials is to investigate the possibility of interplanting rubber with subsidiary crops, especially in the dry planting districts where the climatic conditions are not favourable for high yields in rubber. The following experiments are in progress.

Field Experiment No. 30 — 1964 Trial — 15 Acres — Rosebury Estate — Koslanda

Clones RRIC 45, 52 and PR 107 are planted in plots of 300 trees per clone replicated 3 times. Half of each plot was interplanted with cacao seedlings during the North East planting season in 1967.

Field Experiment No. 31 — 1965 Trial — 15 Acres — Redegama Estate, Rambodagalla

Clones RRIC 36, 45 and PB 96 are planted at 300 trees per plot replicated 3 times. Half of each plot will be interplanted with cacao at a later stage.

STOCK EXPERIMENTS

Field Experiment No. 34 — Small-scale Stock Experiment — Nivitigalakele

As clone Tjir 1 is no longer recommended for large-scale planting in Ceylon, experiments commenced in 1966 in order to assess the suitability of seedling stocks other than that of clone Tjir 1. In the first small-scale preliminary trial planted in 1966, clone PB 86 was budded as seedling stocks of clones RRIC 7, 41, 52, 86, 88, 89 and *Hevea spruceana*. The buddings were planted at random in the field. The growth rate of these buddings during the first year was measured as height above the graft union at monthly intervals. The growth rates were practically the same for all stocks *Hevea spruceana* where the growth was markedly depressed. The average girth measurements taken at 3 feet above the graft union at the end of 21 months growth are summarised in Table 27.

TABLE 27

Average girth in inches 21 months after planting

Clonal stock	Girth
Tjir 1	4.8
<i>H. spruceana</i>	3.9
RRIC 7	5.4
RRIC 88	5.0
RRIC 89	4.7
RRIC 86	5.0
RRIC 52	4.9
RRIC 41	5.3

Owing to the very limited number of seeds that were available for this trial, the results are treated as only of a preliminary nature. More comprehensive trials will be set down in 1968 when more seed of the newer clones would be available.

LIST OF FIELD EXPERIMENTS

- (1) Long-term Yield Stimulation Experiment — Clone LCB 1320
- (2) Yield Stimulation and Tapping Experiment — Clone Tjir 16
- (4) Winter Tapping-cum-Yield Stimulation Trial — Dartonfield
- (5) Large-scale Clone Trial — 1946 Replanted Area — Nivitigalakele
- (6) 1952 Small-scale Clone Trial — Hedigalla
- (7) 1954 Clone Trial — Nivitigalakele
- (9) 1950 Clone Trial — Hedigalla
- (11) 1950/51 Small-scale Clone Trial — Hedigalla
- (12) 1949 Large-scale Clone Trial — Hedigalla
- (13) 1954 Large-scale Clone Trial — Hedigalla
- (14) 1955 Large-scale Clone Trial — Hedigalla
- (15) 1953 Large-scale Clone Trial — Nivitigalakele
- (16) 1956 Large-scale Clone Trial — Hedigalla
- (17) 1956 Clone Trial — Dartonfield
- (18) 1961 Large-scale Clone Trial — Dartonfield
- (19) 1962 Large-scale Clone Trial — Nivitigalakele
- (20) 1963 Large-scale Clone Trial — Nivitigalakele
- (21) 1964 Yield Trial — Nivitigalakele
- (22) 1965 Ten Acre Monoclonal Block of RRIC 45 — Nivitigalakele
- (23) 1965 Small-scale Clone Trial — Dartonfield
- (24) 1965 Spacing Trial — Kuruwita Sub-station
- (25) 1957 Clone Trial — Estate A — Kalutara District
- (26) 1957 " " — " B — " "
- (27) 1958 " " — " B — " "
- (28) 1957/58 " " — " C — " "
- (29) 1964 Yield Trial — Salawa Estate
- (30) 1964 Yield/Intercropping Trial — Rosebury Estate — Koslanda
- (31) 1965 Yield/Intercropping Trial — Redegama Estate — Rambodagalla
- (33) 1962 Large-scale Clone Trial — Estate D — Kalutara District
- (34) 1966 Small-scale Stock Experiment — Nivitigalakele
- (35) Small-scale Yield Stimulation Experiment — Nivitigalakele
- (36) 1966 Yield Trial — 10 Acres — Malaboda Estate — Matugama
- (37) " " " — " " — Udapolla Group — Deraniyagala
- (38) " " " — " " — Kiribatgalla Group — Nivitigala
- (39) " " " — 15 " — Halgolla Group — Yatiyantota
- (40) " " " — 10 " — Biddescar Group — Kegalla
- (41) " " " — 20 " — Yatawatta State Plantation — Matale
- (42) " " " — 34 " — Kumarawatta Group — Moneragala
- (44) 1967 " " — 10 " — Biddescar Group — Polgahawela
- (45) " " " — " " — Zion Estate — Rattota
- (46) " Polyclone Trial — 2½ Acres — Hedigalla

REVIEW
OF
THE GENETICS AND PLANT BREEDING DEPARTMENT

By

D. M. FERNANDO

SUMMARY

Preliminary studies were commenced by the Geneticist on pollen germination and morphology. Routine examination of the latex content of *Hevea* petioles and estimations of the rubber seed oil content of the different clones were continued. Over 18,000 hand pollinations were completed during the season and the latest material incorporated. Clones 663 and 1174 from the 1961 trial at Kuruwita were released for commercial planting in Group III. High yields were observed in the *Oidium*-tolerant clone 1103. Selections of RRIC 52 and LCB 1320 selfed origin were made for trial on avoidance of *Phytophthora* owing to reduced fruit set. One small-scale trial of 3 replications of 10 plants each of 53 cultivars was planted at Kuruwita. Six more large-scale trials were planted during the year at Nivitigalakele, Neboda, Uda Karawita, Hedigalla, Gampola and Bibile.

GENERAL

Staff

The Head of the Department, Mr. D. M. Fernando was on duty throughout the year. Dr. Y. D. A. Senanayake was appointed Geneticist and assumed duties on 2nd May 1967.

Buildings and Facilities

No progress was made in extending the buildings. The purchase of a second engine afforded a continuous electricity supply towards the end of the year.

The Land Rover assigned to the department was taken back to headquarters at the commencement of the year and replaced with a newer vehicle towards the end of the year.

Visits

The Head of the Department made 40 visits in connection with experimental work. The Geneticist made 18 visits and 367 visits were made by the rest of the staff during the year in connection with experimental work.

Meetings

The writer attended two Kalutara District Planters' Association meetings and one Kelani Valley District Planters' Association meeting.

Publications

The following publications were prepared by the staff of the department :—

- (i) Annual Review of the Department for 1966.

The following two articles submitted earlier to the C.A.A.S. were published in the Institute's Journal (ii) and Bulletin (iii).

- (ii) A rapid method for estimating the rubber content of *Hevea* tissues
- (iii) Problems of achieving agricultural production potentials in rubber

The following publications by the Geneticist were released during the year (work done elsewhere) :—

- (iv) Principles and Practice of Agriculture (Text book in Sinhala)
- (v) Fruit Culture in Ceylon — Potentials and possibilities (*J. National Agr. Soc. Ceylon*)
- (vi) Tag — A wax emulsion for extending the shelf life of fresh fruits (*J. National Agr. Soc. Ceylon*)
- (vii) Origin of *Fragaria* polyploids I. cytological analysis (*Amer. J. Bot.*).

LABORATORY WORK

Preliminary studies on pollen germination and morphology were made by the Geneticist to whom laboratory space and equipment were kindly made available at Dartonfield by the Head of the Botany Department. Initial meiotic PMC studies of the early ever flowering clone H 440 suggest that the cytological behaviour of this clone is normal. A project was initiated to utilize the large seedling population of Egal Oya nurseries in order to obtain genetical material for future cytological and breeding investigations. Routine examination of the rubber content of *Hevea* petioles was continued. Investigations were commenced on the rubber seed oil content of the seeds of the different cultivars.

HAND POLLINATION PROGRAMMES

Clone Ch 26 was used over a wide range of crosses of high-yielding, vigorous and *Oidium*-resistant material in order to introduce more vigour and yield. Over 18,000 pollinations were completed during the season and over 500 seedlings obtained. The results of the programme are given in Table 1.

TABLE 1

HAND POLLINATION PROGRAMME FOR 1967

No. of pollinations made
No. of seedlings obtained

	266	663	815	1103	1805	1458	Ch 26	H 440	IAN 458-73	PB 5/51	RRIC 89
Ch 26	349	1268	2713	212		678					
	110	44	133	8		6					
IAN 45-873			188				927				
			8				15				
H 440							658	2448			
							8	9			
1103					988		3354		1080		1080
					6		81		21		21
815							2382			252	
							112			12	
RRIC 89		189		121			200				
		18		14			20				

RELEASES FOR COMMERCIAL PLANTINGS

Clones 663 and 1174 from the 1961 trial at Kuruwita were released for commercial planting at Group III level. Arrangements to establish two 300-plant nurseries of each clone for budwood supply to estates were completed towards the end of the year.

EPIPHYTIC INDUCTION

An overhanging branch of a mature rubber tree provided a portion of the 1966 hand-pollinated seedling population with an intense source of infection. Almost 100 per cent susceptibility was noted in the two exposed families viz. IAN 45-873 × Ch 26 and IAN 45-710 × RRIC 52 to *Phytophthora*.

Further observations on the *Oidium* resistance of progeny of *Dothidella*-resistant parents confirmed 1966 results.

DISEASE RESISTANCE

*Oidium Leaf Disease**Kepitigalla Group — Matale*

The adverse effects of the 3 feet spacing between trees began to be felt.

With the commencement of test tapping in other plots (Trials 4 and 5) it is proposed to discontinue readings on these clones.

Clodagh Group — Matale

It was found that clone 1103 which gave very favourable yields in two plots (Trials 4 and 5) in the low country showed satisfactory growth and foliage in the two 30-tree plots at this elevation of 1400 feet.

Gloeosporium Leaf Disease

Nakiadeniya Group — Udugama — 1964 Clearing

The incidence of *Gloeosporium* attack on the test clones was negligible and their growth was considerably better than the control PB 86. The girth measurements are given in Table 2.

TABLE 2
Gloeosporium TEST AREA
Average girth at 36 inches height

Clone	Trees	Girth in ins.	Clone	Trees	Girth in ins.
815	18	14·9	6505	12	11·0
20	27	13·9	864	18	11·0
759	20	13·7	6338	12	10·8
3202	20	13·7	1108	17	10·7
79	30	13·2	687	7	9·9
2040	19	13·1	PB 86	10	9·7
815	9	13·1	RRIC 50	98	9·3
3189	8	12·8	PB 86	25	9·3
815	16	12·8	PB 86	8	7·5
3229	6	12·1			
1923	27	12·0			
IAN 6585	28	11·9			
3221	11	11·9			
1108	33	11·7			
1108	241	11·2			

Phytophthora

Trial Area — Peenkande Group

The seed set in this area was negligible. Infection from overhanging branches was absent as dry weather prevailed. With the emergence of high-yielding

material of selfed origin as ten-tree plots in the 1963 clearing at Kuruwita (Trial 6) it is proposed to abandon this experimental area in favour of selection from non-fruiting clones (Trial 6).

Dothidella

1960 Clone Trial — Peenkande Group

This area planted in non-replicated quarter acre blocks of selected imported clones was brought into tapping this year and the yields are given in Table 3. It would appear from these results that in the IAN 45 series we have a stand-by of sufficiently economic cultivars to fall back upon in the event of the sudden entry of *Dothidella ulei* into Ceylon. IAN 45-710 seems particularly suitable for highland and dry zone planting and IAN 45-873 could be considered for entry into Group III plantings on estates in the wet zone.

TABLE 3
1960 CLONE TRIAL AT MAHAVALLE DIVISION OF PEENKANDE GROUP
Yields in gms/tree/tapping
Tapped 2S/2, d/4, 100% intensity
Tapping commenced 1967

Clone	Trees tapped	Girth at 5 feet		Yield in gms/tree/tapping Average of 2 cuts
		ins.	cms.	
IAN 45—710	35	23·7	60·2	23·4
IAN 45—717	32	23·6	59·9	23·6
IAN 45—873	35	25·9	65·7	33·2
FX 2261	33	23·2	58·9	22·4
FX 3810	34	24·7	62·7	19·1
AVROS 427	19	21·1	53·6	47·8
AVROS 385	23	23·6	59·9	19·2
TR 1548	29	23·6	59·9	21·3
ST 71	21	21·8	55·3	21·6
IRCI 7	36	25·2	64·0	32·1
OY 1	8	21·5	54·6	8·7
IRCI 10	20	21·4	54·3	15·5
Harbel 1	17	21·5	54·6	24·2
RRIC 86	14	22·5	57·1	16·2
C 695	31	23·1	58·6	27·2
PR 228	32	23·4	59·4	35·5
PB 86	35	22·8	57·9	26·1

Hevea Trials in the Moneragala District

Crown-budded area — Nakkala Estate

The selving of RRIC 7 which was repeated here was unsuccessful owing to poor germination.

Supplementary Trial — Kumarawatte Group

Observations on vigour of plants selected earlier in the wet zone was continued.

Trial 9 — 1965 Clone Trial — Moneragala

Clones 1174 and 451 were observed to be growing very satisfactorily in all the replications.

Trial 13 — 1966 Clone Trial — Moneragala

In this trial also clone 451 was observed to be showing good survival and very satisfactory growth.

Trial 1

Small-Scale Clone Trial — Kuruwita — South West Planting

This clearing was brought into tapping at 4½ years of age in order to investigate the possibility of selecting material which would reduce the time lag of seven years between planting and tapping. The yields obtained in the second year of tapping (Table 4) were very satisfactory. Two of the best clones 663 and 1174 were released for Group III recommendation and the possibility of increasing the profitability of natural rubber by this method appears very real. Of the control PB 86 the best 50 out of 500 trees planted were taken into this type of tapping.

TABLE 4
AVERAGE GIRTH IN CM AND YIELDS IN GRAMS PER TREE PER
TAPPING OF SOME SELECTIONS FROM THE 1961 CLONE TRIAL AT KURUWITA
(Girth at 60" from union, tapping on S/2, d/3, 67% tapping system)

Clone	Parentage	Trees tapped	Girth		Girth increase	Yield	
			1966	1967		1966	1967
1174	Ch 26 × RRIC 7	6	57.9	60.2	2.8	64.4	76.3
663	RRIC 52 × PB 86	3	49.7	55.1	5.4	39.5	75.5
663	RRIC 52 × PB 86	10	49.3	55.1	5.8	34.0	66.5
1305	RRIC 41 × Ch 26	3	59.2	69.1	9.9	57.5	70.9
1305	RRIC 41 × Ch 26	5	51.3	60.3	9.0	44.2	48.6
1152	RRIC 45 × RRIC 13	7	49.2	57.6	8.4	35.8	61.9
1152	RRIC 45 × RRIC 13	4	49.8	57.6	8.4	33.3	61.8
266	Mil 3/2 × Tjir 1	4	52.2	54.3	2.1	47.7	60.8
266	Mil 3/2 × Tjir 1	8	53.7	60.0	6.3	30.3	55.3
1173	Ch 26 × RRIC 7	10	54.8	61.1	6.3	47.1	51.8
1222	Ch 26 × RRIC 36	4	51.3	58.4	7.1	41.4	47.1
82	RRIC 41 × RRIC 10	6	53.9	61.9	8.0	27.5	45.9
734	RRIC 52 × Tjir 1	9	55.6	62.7	7.1	23.8	42.9
PB 86		50	47.3	54.8	7.5	26.0	30.1

Trial 2

1961 Clone Trial — N.E. Planting

C 695 imported from Liberia showed a very high yield which was not consistent with its yields on a 35-tree basis in the 1960 planting at Peenkande. IAN 2903 which showed high yields in its first year of tapping was found very susceptible to wind damage and bark burst. IAN 2829 and IAN 2848 showed favourable yields and growth.

Trial 3

1962 Clone Trial — Kuruwita

RRIM 623 showed the best growth with 20.1 inches girth of 253 trees. RRIC 14 and RRIC 41 also showed almost equivalent growth with over 19 inches girth in both clones. The growth of the *Dothidella*-resistant clone IAN 6497 was disappointing. The results are given in Table 5.

TABLE 5
1962 CLONE TRIAL — KURUWITA

Girth measurements

Clone	No. of trees	Girth in cms. 1966	Girth in cms. 1967
AVROS 529	123	33.1	48.0
AVROS 2037	236	29.6	42.9
Harbel 1	252	28.1	32.7
IAN 45-717	236	28.0	39.6
IAN 6497	119	23.7	35.0
IRCI 7	129	30.7	43.1
IRCI 9	123	26.5	37.8
PB 86	212	30.0	39.3
PR 228	124	27.8	40.1
PR 251	126	28.5	40.3
PR 259	132	23.2	35.0
RRIC 7	136	26.2	38.1
RRIC 14	222	40.3	49.5
RRIC 36	238	30.2	38.8
RRIC 37	132	30.5	42.6
RRIC 41	121	39.9	50.0
RRIC 45	252	32.8	43.1
RRIC 51	262	33.4	42.6
RRIC 52	276	35.6	47.4
RRIM 607	232	27.2	39.8
RRIM 623	255	40.9	51.0
RRIM 628	174	20.6	31.7
RRIM 701	246	35.6	47.4
RRIM 707	221	28.9	42.9
WR 101	117	35.9	46.4
TR 3702	255	25.9	39.8
TR 1548	246	28.9	38.3

Trial 4

1962 Small-scale Clone Trial — Kuruwita

Early tapping in this area indicated very satisfactory yields for clone 1458 and the *Oidium*-tolerant clone 1103.

The results of the first year's tapping are given in Table 6.

TABLE 6
1962 SMALL-SCALE CLONE TRIAL — KURUWITA
Yield in grams per tree per tapping and girths in cms. at 5 feet
Tapped S/2, d/3, 67%

Clone	Parentage	Trees tapped	Girth	Yield 1967
1458	LCB 1320 × RRIC 7	9	50.1	50.6
1103	RRIC 52 × RRIC 7	6	47.6	40.7
2002	LCB 1320 × GPM 1	8	50.4	28.2
1108	RRIC 52 × RRIC 7	4	49.4	19.2
815	PB 5/139 × RRIC 52	6	51.3	18.9
784	PB 5/139 × RRIC 52	5	48.2	16.7
828	PB 5/139 × RRIC 52	4	53.0	12.9
2124	RRIC 52 × Wagga 6278	8	48.3	11.4

Trial 5

1962 — Small-scale Clone Trial — Nivitigalakele

Favourable yields were shown in this clearing also by the clones 1458 and 1103 as at Kuruwita (Trial 4). The results of the first year's tapping are given in Table 7. Clone 82 which was planted earlier (Trial 1) on test also confirmed earlier yield observations.

TABLE 7
YIELDS IN GRAMS PER TREE PER TAPPING AND GIRTHS IN CMS AT 5 FT.
Tapped S/2, d/3, 67%

Clone	Parentage	Trees tapped	Girth	Yield
1458	LCB 1320 × RRIC 7	3	49.5	42.3
1103	RRIC 52 × RRIC 7	3	48.5	40.1
82	RRIC 41 × RRIC 10	4	53.0	39.0
815	PB 5/139 × RRIC 52	3	50.2	16.3
RRIC 52	—	2	51.7	20.7

Trial 6

1963 Small-scale Clone Trial — Kuruwita

A Morris-Mann early tapping test was run in this area during the year. In the effort to find clones that would not get infected with *Phytophthora* owing to reduced fruit set, clones 4008 and 4011 of selfed RRIC 52 origin and 3148 of selfed LCB 1320 origin were selected for further trial.

The following are some of the better selections noted :—

Clone	Parentage	Trees tapped	Girth in ins. at 3'	Morris-Mann Yield in gms/tree/tapping
2228	RRIM 513 × LCB 1320	10	19.7	24.1
1501	RRIC 45 × GPM 1	10	15.2	22.4
T 132	RRIC 37 × Wagga 6278	7	17.7	20.9
3060	Ch 26 × Wagga 6278	7	17.2	20.5
3333	Ch 26 × RRIC 36	6	18.6	20.2
2992	RRIC 36 × Ch 26	7	16.7	18.9
2994	RRIC 36 × Ch 26	8	17.1	18.0
GT 711	—	8	15.6	17.2
2231	RRIM 513 × LCB 1320	10	17.4	16.0
3059	Ch 26 × Wagga 6278	10	17.0	14.6
4003	RRIC 52 × RRIC 52	10	17.1	13.1
PB 86	—	8	14.6	12.8
4011	RRIC 52 × RRIC 52	7	16.2	12.8
2122	RRIC 52 × Wagga 6278	10	18.4	11.2
3148	LCB 1320 × LCB 1320	3	18.2	11.0

Trial 7

1964 Clone Trial — Kuruwita — S.W. Planting

The best growth was noted in the two *Oidium*-tolerant clones 815 and 1108 and the selection 6338 (LCB 1320 × RRIC 7).

1964 Clone Trial — Kuruwita — N.E. Planting

In the course of a cyclone appreciable wind damage was recorded in clones 6333 and 6336 both of LCB 1320 parentage. Above average growth was observed in all the replications of the *Oidium*-tolerant selections 1103 and 1108.

Trial 8

1965 Small-scale Clone Trial — Dartonfield

The first series of girth measurements for this area were recorded and were uniformly satisfactory at this stage.

Trial 10

1965 Clone Trial — Clodagh Group

Clone 451 showed the most satisfactory growth. Clone 5329 (IAN 3434 × RRIC 52) also maintained satisfactory foliage.

Trials 11, 12 and 13

1966 — Clone Trials at Kuruwita, Nivitigalakele and Moneragala

Routine attention was given to the above 3 trials consisting of 100 plants of each clone replicated 3 times in each experiment.

New Trials

The following new clone trials were planted in the course of 1967 :—

Trial No.	Site	Design	Clones tested
14	Nivitigalakele	3 replications of 100 plants each clone	815, 1103, 1174, RRIC 623
15	Kuruwita	3 replications of 10 plants of each clone	53 selections from hand-pollinated crosses
16	Neboda	3 replications of 100 plants each	451, 1103, 1004, 815 * and RRIC 623
17	Uda-Karawita	3 replications of 100 plants each	815, 1004, 663, 1174, RRIC 45 and RRIC 623
18	Gampola	3 replications of 100 plants each	451, 614, 784, 1004, 1010, 1103, IAN 45-710*
19	Hedigalla	3 replications of 150 plants each	1108, RRIC 45, 451*, 1010*, 1174*
20	Bibile	3 replications of 100 plants each	1004, 1108, 663, 1305, 1174, IAN 45-710, RRIC 45, 451*

* denotes observation plots.

Oidium-tolerant material was also supplied on request for a 10-acre planting at Matale and test material suitable for early tapping was supplied for a 16-acre planting in the Kelani Valley District.

INDEX TO TRIALS

- Trial 1 : 1961 Small-scale Clone Trial — Kuruwita*
- Trial 2 : 1961 Medium and Small-scale Clone Trial — Kuruwita*
- Trial 3 : 1962 Large-scale Clone Trial — Kuruwita*
- Trial 4 : 1962 Small-scale Clone Trial — Kuruwita*
- Trial 5 : 1962 Small-scale Clone Trial — Nivitigalakele*
- Trial 6 : 1963 Small-scale Clone Trial — Kuruwita*
- Trial 7 : 1964 Clone Trial (S.W. and N.E.) — Kuruwita*
- Trial 8 : 1965 Small-scale Clone Trial — Dartonfield*
- Trial 9 : 1965 Small-scale Clone Trial — Moneragala*
- Trial 10 : 1965 Medium-scale Clone Trial — Matale*
- Trial 11 : 1966 Clone Trial — Kuruwita*
- Trial 12 : 1966 Clone Trial — Nivitigalakele*
- Trial 13 : 1966 Clone Trial — Moneragala*
- Trial 14 : 1967 Clone Trial — Nivitigalakele*
- Trial 15 : 1967 Small-scale Clone Trial — Kuruwita*
- Trial 16 : 1967 Clone Trial — Neboda*
- Trial 17 : 1967 Clone Trial — Uda-Karawita*
- Trial 18 : 1967 Clone Trial — Gampola*
- Trial 19 : 1967 Clone Trial — Hedigalla*
- Trial 20 : 1967 Clone Trial — Bibile*
-

REVIEW OF THE PLANT PATHOLOGY DEPARTMENT

By

(MRS.) V. SATCHUTHANANTHAVALA

SUMMARY

The Head of the Plant Pathology Department and two Technical Assistants resigned from their posts.

Incidence of *Oidium* leaf disease, *Phytophthora* leaf fall and Black Stripe were light during the year 1967; as such useful assessments could not be made from the field experiments carried out for the control of these diseases.

Work on the *Fomes* root disease experiment at Glenesk Estate was completed. Incidence of *Fomes* root rot has decreased in the experimental area at Galawatte Estate.

Studies on the occurrence of the sexually compatible groups occurring on *Hevea* indicate that Group I *Phytophthora* spp. plays the major role in the *Phytophthora* leaf and panel diseases of *Hevea*.

Studies on the perennation of *Phytophthora* spp. indicate that Group I *Phytophthora* may overwinter in old infected *Hevea* plant material in the form of chlamydospores.

Twenty diseased specimens of *Hevea* were received for diagnosis and advice on the control measures to be adopted. These were attended to.

DETAILED REVIEW

Staff

Dr. O. S. Peries, Head of the Plant Pathology Department resigned from the services of the Institute on 16-1-67. Dr. R. T. Wijewantha, the Director was the nominal Head of the Department and Dr. (Mrs.) V. Satchuthananthavale was in charge of it during the period under review.

Mr. A. de S. Liyanage took up appointment as Assistant Plant Pathologist on 5-2-67 but from that date to 18-2-67 was attached to the Advisory Department. He resigned from his post on 31-7-67.

Senior Technical Assistant, Mr. H. L. Munasinghe was away from 17-9-67 to the end of the year.

Technical Assistants, Messrs. T. Shanmuganathan and A. Jayasekera resigned from their posts on 26-6-67 and 6-6-67 respectively. Technical Assistants, Messrs. E. G. Mendis, T. M. Fernando, S. K. Samaraweera, D. M. Dantanarayana, W. C. Dayaratne and Z. E. Irugalbandara were on duty throughout the year.

ADVISORY WORK

Advisory work was mainly confined to special pathological problems of *Hevea*.

Visits

Advisory 40

Experimental 264

Correspondence

	<i>Outward</i>	<i>Inward</i>
General	4	36
Technical	95	261

LABORATORY AND FIELD WORK

The full programme envisaged for 1967 was not carried out. Only one staff officer was on duty. On the instructions of the Director this officer did not initiate the new projects. Experiments which were in progress were continued.

LABORATORY WORK

Diseased Specimens

The following specimens were received for diagnosis and advice on the control measures to be adopted.

TABLE 1

	Sample	Disease	Causal Agent	Number
(a)	<i>Fungi</i>			
	1. Root	Brown root disease	<i>Fomes lamaensis</i>	1
	2. Root	White root disease	<i>F. lignosus</i>	2
	3. Leaves	<i>Gloeosporium</i> leaf disease	<i>G. alborubrum</i>	2
	4. Leaves	Powdery mildew	<i>Oidium heveae</i>	2
	5. Leaves	Secondary leaf fall	<i>Phytophthora spp.</i>	1
	6. Stem	Die-back	<i>Phytophthora spp.</i>	2
	7. Bark with borers	Bark Rot	<i>Phytophthora spp.</i>	1
(b)	<i>Pests</i>			
	1. Seedlings	Roots damaged	Cockchafer grubs	1
	2. Leaves (Gl 1)	Leaves damaged	Bats	1
(c)	<i>Physiologic disorder or Mechanical damage</i>			
	1. Leaves	' Physiologic yellows '		4
	2. Leaves	Boron toxicity		1
	3. Bark with borers	Lightning damage		1
(d)	<i>Mould</i>			
	Blanket crepe	<i>Penicillium sp.</i>		1

Studies of *Phytophthora* on *Hevea*

Studies on the occurrence of the two sexually compatible groups of *Phytophthora* on *Hevea* were continued. In 1967 diseased plant material was collected from seven estates. Collection at each estate was at random to give a representative sample. Occurrence of the two sexually compatible groups are given in Table 2.

TABLE 2

Estate	Total No. of isolates	No. of isolates in	
		Group I. <i>Phytophthora</i> spp.	Group II. <i>P. meadii</i>
1. Arapolakande	15	10	5
2. Dartonfield	28	27	1
3. Eladuwa	20	20	0
4. Ellakande	13	9	4
5. Frocester	26	17	9
6. Ingoya	13	13	0
7. Yatadola	27	27	0
Total	142	123	19

Isolates from various plant materials are separated into the two groups in Table 3.

TABLE 3

	Petiole	Pod	Stem	Leaf blade	Total
Group I. <i>Phytophthora</i> spp.	78	38	2	5	123
Group II. <i>P. meadii</i>	18	1	0	0	19

Of the isolates collected in 1967, 86.6% belong to Group I *Phytophthora* spp. Since the inception of these studies in 1962 never have been *P. meadii* isolated from the bark or leaf blade. Three of the isolates from leaf blade were from infected leaflets of clone G1 1, a clone which is believed to be tolerant to *Phytophthora* diseases.

Predominance of Group I *Phytophthora* spp. in the field indicates that this species plays the major role in the leaf and panel *Phytophthora* diseases of *Hevea*.

Perennation

Infected pods were incubated at 20°C after ascertaining that *Phytophthora* species occurring on them were of Group I. At the end of six months oospores

were not observed on these pods or on the autoclaved carrot slices maintained in the dark at the same temperature. On both substrate plenty of chlamydo spores were present. *P. meadii* produced numerous oospores on autoclaved carrot slices under similar conditions.

Absence of oospores and profuse production of chlamydo spores observed in Group I *Phytophthora* spp. indicate that it could tide over unfavourable conditions in the form of chlamydo spores. In nature it may overwinter in the mummified pods, infected shoots and old bark lesions in the form of chlamydo spores.

Culture collection

The culture collection of pathogenic fungi of *Hevea* received routine attention.

Rhizobia cultures

Cultures of selected strains of *Rhizobia* were maintained in the laboratory and were issued free to estates on request for inoculation of leguminous cover crops.

DISEASES — GENERAL

Leaf Diseases

Powdery mildew

Incidence of *Oidium* leaf fall was mild during the 1967 season. However, few estates reported fairly heavy incidence on clone Tjir 1 and few other clones which had wintered late in the season.

Phytophthora leaf disease

Incidence of secondary leaf fall was mild during the South West monsoon 1967. In Ratnapura district leaf fall was light or negligible while in Kalutara and Kelani Valley districts few estates reported heavy leaf fall. Estates which reported heavy leaf fall also reported heavy pod set. Data from a few estates with light and a few with heavy leaf fall are given below.

District	Rainfall*	Pod set	Incidence
Ratnapura	100·6	light	light
Kalutara	96·71	light	light
Kelani Valley	73·38	light	light
Kegalle	34·86	light	light
Kalutara	82·07	heavy	heavy
Kalutara	76·15	heavy	heavy
Kelani Valley	66·35	heavy	heavy

*Rainfall figures are the sum total for the months of May, June, July, August and September.

Correlation observed between pod set and leaf fall once again indicates the importance of intensity of pod set in the multiplication of the fungus and the incidence of the disease.

Bark Disease

Black Stripe and Bark Rot

Incidence of black stripe was light in 1967. Only two estates reported heavy incidence, one from Matale district in February 1967 and the other on susceptible clone RRIC 36 from Galle district in October 1967.

FIELD EXPERIMENTS

The long-term experiments for the control of leaf, panel and root diseases were continued during the period under review.

Leaf diseases

Powdery mildew

Three experiments were carried out on outside estates.

- (a) Rate of dusting on tolerant clone PB 86 at Eladuwa Estate
- (b) Rate of dusting on susceptible clone Tjir 1 at Culloden Estate
- (c) Time of application of fungicide on clone Tjir 1 at Eladuwa Estate

Wintering of clone Tjir 1 was uneven. Incidence of *Oidium* leaf fall was light during 1967; as such no conclusions could be drawn from the above experiments.

Phytophthora leaf fall

Experiment to test the efficacy of copper-based fungicides on the control of secondary leaf fall was again repeated at Yatadola Estate. Incidence was light for any evaluation.

Yield/Leaf diseases

Yield data were collected from Eladuwa, Ellakande and Culloden Estates. Complete data could not be obtained during some months due to rain.

Bark Disease

Black Stripe and Bark Rot

- (a) Fungicide trial on clone PB 86 at Malaboda Estate
- (b) Fungicide trial on clone GI 1 at Sirinivasa Estate
- (c) Testing of fungicides and water proof panel dressings on clone PB 86 at Ellakande Estate

Incidence of Black Stripe was low during 1967 in the above estates.

Root disease

White Root disease — Fomes lignosus

- (a) Amendment of soil with sulphur and method of diagnosis of White Root disease at Galawatte Estate.

Census of the incidence of disease was taken twice during 1967. Results show that the incidence is on the decline in all the treatments. During the first two years, incidence had been high in the control plots compared to the plots in which soil was amended with sulphur, this period being the susceptible age of *Hevea* to White Root Rot.

- (b) Methods of clearing, incidence of White Root disease and growth of *Hevea* — Experiment at Glenesk Estate.

Work on the above experiment was completed. Assessments of the incidence of White Root disease in the treatments as well as the effect of the treatments on the growth and well being of *Hevea* would now be made at intervals of 6 months.

REVIEW OF THE SOILS CHEMISTRY DEPARTMENT

By

C. G. SILVA

SUMMARY

RESEARCH FINDINGS — MINERAL NUTRITION

Response to fertilizer applications

During the period under review two experiments had to be discontinued, one due to the fact that this area was acquired by the Government for a plywood factory and the other because irreparable damage had been caused to the young plants due to the careless handling of sodium arsenite by the estate labour. Two other experiments would also have been discontinued if not for the owners and the estate management extending more than their share of co-operation in allowing us to continue these trials despite expected financial losses due to the nature of the treatments. In the field trials conducted by this department annual girth measurements were taken in the immature areas and in the mature areas test-tapping has been done regularly. Trial No. 1 at Hedigalla continued to give the same trends of results as last year.

Optimum levels of nitrogen, phosphorus, potassium and magnesium

The results of trial No. 13 show that the interaction of cultivation practices with potassium is on the border line of significance. The results of trial No. 18 show that the responses to different levels of the standard fertilizer mixture were statistically significant.

Response to the application of fertilizer requirements in the form of one or more fertilizer compounds as estimated by foliar analysis compared to the response to application of standard NPK + Mg. fertilizer mixtures

Out of the five trials in this series one was discontinued and the other four did not give any significant differences in growth or yield.

The investigation to study the possible use of wood ash as a cheap source of fertilizer did not give any conclusive results.

INVESTIGATIONS ON WIND DAMAGE

Trial No. 16 designed to study the effect of reduced levels of NP and K on the incidence of wind damage failed to show any significant differences in losses due to treatment effects.

CULTIVATION PRACTICES, GROUND COVERS AND WEED CONTROL

Weed Control : Gramoxone with 2, 4-D and disodium methane arsonate (DSMA) in immature areas were found to be effective in the control of weeds.

SOIL SURVEYS

Based on the reconnaissance soil survey just concluded a paper entitled "Provisional classification of rubber soil of Ceylon and their relationship to Malayan soils" was prepared. The determination of some physical properties of these soils was also undertaken. A detailed soil survey of a few acres of rubber land was completed at Nakiadeniya Group for the oil palm project.

ADVISORY WORK

Generalised recommendations: The small quantities of fertilizer mixtures packed in jute hessian bags lined with polythene using urea and dolomite as the sources of nitrogen and magnesium respectively have shown excellent storage properties.

Specialised advice: The blue prints were drawn up for a specialised advisory service on soil and foliar analyses. Investigations showed that in two instances there were high boron contents in the leaves while in the third place even though the leaf symptoms were those of boron toxicity the leaf analyses did not show same.

DETAILED REVIEW

GENERAL

Staff

The Head of the Soils Chemistry Department, Mr. A. J. Jeevaratnam was on duty till the end of July.

The Soils Chemist, Mr. C. G. Silva was in charge of the department from August.

Mr. R. S. John, Assistant Soils Chemist continued his post-graduate studies at the University of Aberdeen.

Mr. E. R. Chelliah, Technical Assistant resigned in June 1967 and Mr. D. J. M. Samarasinghe resigned in September 1967.

The vacancies for two Technical Assistants continued to remain unfilled throughout the year. The vacancy for a Field Attendant also continued to remain unfilled.

Meetings, conferences, seminars etc.

1. Tea Research Centenary Conference 6/5 and 7/5
2. Symposium on Dry Zone Agriculture organised by C.A.A.S. 30/7 to 31/7
3. Meetings of the Standing Committee on Agro-chemicals 3/6, 24/10, 17/11
4. Meeting of the Scientific Committee 30/11
5. Symposium on fertilizers organised by the Ceylon Chemical Society 25/9
6. Symposium organised by the Soil Conservation Society 13/11
7. Meetings of the District Planters' Association —
Kalutara 10/10
Kelani Valley 19/11

Visits

	<i>Advisory</i>	<i>Experimental</i>	<i>Others</i>	<i>Total</i>
Soils Chemist	6	13	10	29
S.T.A. Soils	1	50	3	54
Technical Assistants*	—	10	2	12

* The field trips by the Soils Chemist and the two Technical Assistants in connection with soil survey work, the trips done by the Field Assistants in connection with field experiments and visits by those officers who resigned are not included.

Correspondence

	<i>Inward</i>	<i>Outward</i>
Technical	*416	187
General	51	39

* Includes returns on wind damage from estates.

Reports, roneoed leaflets and papers

(a) *For restricted circulation*

1. Annual Report of the Soils Chemistry Department for 1966
2. Progress Reports of the Soils Chemistry Department for the 1st, 2nd and 3rd Quarters for 1967

(b) *For publication* — (already submitted)

1. "Provisional classification of the rubber soils of Ceylon and their relationship to the Malayan soils" by the Soils Chemist.
2. "Manganese status of the rubber soils of Ceylon" by the Soils Chemist as co-author. (In preparation)

(c) *Publications*

1. "Evaluation of the potassium status of some soils encountered in the rubber growing areas of Ceylon" by R. S. John, Assistant Soils Chemist.

ADVISORY WORK

Because the Estates Advisory Department undertook the advisory work of a routine nature the responsibility for issuing the generalised recommendations and the execution of advisory work of specialised nature continued to remain the function of the Soils Chemistry Department.

Generalised recommendations

Advisory Circulars — The revision of the advisory circular on manuring and the preparation of two new advisory circulars, one on soil conservation and the other on ground covers and weed control started in 1966 were not completed.

Because the field investigations had provided us to conclude that urea and dolomite were in no way inferior to the conventional sources of nitrogen and magnesium respectively and because of the economic advantages that would result in using these sources of nitrogen and magnesium in fertilizing rubber, the compounding of fertilizer mixtures with these fertilizers were worked out.

These mixtures have been tentatively designated as follows :—

1. R. 10 : 15 : 12 : 5
2. R. 8 : 12 : 10 : 4
3. R. 8 : 12 : 6 : 4
4. R. 8 : 12 : 4 : 4

Because of the hygroscopic nature of urea and the practical difficulties that may arise as a result, certain observations were conducted by having the mixtures packed in polythene bags. Small quantities of the mixtures packed in jute hessian bags and jute hessian bags lined with polythene were ordered for observation and tests on handling properties. Those mixtures packed in polythene lined jute hessian bags had excellent storage properties and were found to be in a very good condition in respect of handling properties even at the end of eight months from the date of mixing. However, in view of the fact that some fertilizer firms had expressed reluctance in machine mixing urea, these new mixtures were not recommended for general use on rubber estates. These initial difficulties would eventually be overcome and these new mixtures would be recommended for use by estates that would want to avail themselves on a pilot scale in the first instance.

Specialised advice : With the intention of improving the standard of our fertilizer recommendations work was initiated on establishing a specialised advisory service based on soil and foliar analysis. This programme was initially to be implemented in immature rubber areas. It was however decided that the results of leaf analysis already available should be studied in order that an idea of the existing average nutrient levels could be available and that more work would be necessary of a fundamental nature before this sophisticated method of determining the nutrient requirements of *Hevea* could be used for an improved fertilizer programme.

The requests from estates of a specialised nature were referred to the Soils Chemistry Department. Most of these visits revealed that deficiencies of a major nutrient or inadequate degree of management or soil conservation measures below the expected standards, were the causes of backward growth or low yields. In two instances where the symptoms were that of either boron toxicities and/or calcium deficiency the addition of dolomite was the answer. Yet in another estate even though the leaves showed marginal scorch and other typical symptoms of boron toxicity and/or calcium deficiency, leaf analysis did not confirm either of the two suspected nutrient imbalances.

RESEARCH INVESTIGATIONS

Investigations aimed at improving estimation of soil and tree nutrient status in determining optimum fertilizer requirements

Reconnaissance survey : The field work involved in preparing and refining this work was completed. In the survey area there was a group of soils designated as "the upland soil complex" by earlier workers and which in our preliminary work had been designated as "non lateritic" soils. This group of soils was further sub-divided into different soil series mainly on the nature of the parent material. The result was a soil map of the area with eight soil series. They are —

1. Parambe series ... 575 sq. miles
2. Homagama series ... 400 ,, ,,
3. Agalawatta series ... 430 ,, ,,
4. Ratnapura series ... 55 ,, ,,

5. Matale series	...	14 sq. miles
6. Boralu series	...	780 „ „
7. Madampe series	...	38 „ „
8. Deniya series	...	—

A model for each soil series was selected and soil samples from three profiles of each soil series were removed for the necessary analysis. Black and white photographs were also removed of each of these profiles. All this work was recorded in the paper entitled "Provisional classification of the rubber soils of Ceylon and their relationship to Malayan soils" and submitted for the Natural Rubber Conference 1968.

Detailed surveys : In connection with the envisaged crop diversification programme and the introduction of oil palm in some of the rubber lands in the South Western part of Ceylon a detailed soil survey of three small areas at Diggdola, Mamandola and Peelidola divisions of Nakiadeniya Group was completed. These areas were differentiated into three soil classes using the soil criteria suggested by Dr. R. A. Bull, the Director of the Oil Palm Research Station at Chemara, Malaysia.

Laboratory investigations on soil samples collected during the survey was in progress.

Sampling and analysis of leaves from different clones and experimental areas receiving different fertilizer treatments

The following determinations were carried out on leaf samples collected from experimental areas :—

Nitrogen	...	416
Phosphorus	...	334
Potassium	...	397
Calcium	...	461
Magnesium	...	461
Boron	...	24

Mineralogical analysis of soil samples

It was possible to send 16 soil samples from the soil profiles to the Royal Tropical Institute, Netherlands for mineralogical analysis. The x-ray and differential thermal analysis of each clay fraction and the heavy mineral separation of the sand fraction of each of these soil samples were requested.

Manganese status of the rubber soils of Ceylon

This project was initiated with Dr. F. S. C. P. Kalpage of the Department of Agriculture, University of Ceylon. Soil samples from each soil series were analysed for total, available and exchangeable manganese. On studying this data it was realised that in order to interpret these results usefully and to be of any value to our knowledge of these soils at least two more profiles from each soil series should be studied. This work was initiated towards the end of the year.

RESPONSE TO FERTILIZER APPLICATIONS, CULTIVATION TREATMENTS AND GROUND COVERS

Field Experiments

All the twenty-one field experiments that were in progress at the end of 1966 to study the effects of fertilizers, ground covers and cultivation practices on growth and/or yield of immature and/or mature rubber could not be continued in 1967.

In respect of the DP trial at Salawa Estate we were informed that the Department of Industries had selected that area for the establishment of a plywood factory. The Department of Industries was addressed by the Institute with a view to stay such action. In the meantime the estate management had intensified exploitation on a part of the area. Under these circumstances this trial had to be discontinued.

In trial No. 21 at Tudugalla Estate, where five levels of NPK and Mg were tested on clone RRIC 45 most of the one-year old plants were severely damaged by sodium arsenite spray falling on the stems in the course of the estate labour carrying out weed control operations. This trial also had to be abandoned.

The servicing and recording of growth and/or yield data on all the field trials in progress was carried out by the three Field Assistants and two Field Attendants under the direction of the Head of the Department until July and was under the direction of the Acting Head of the Department till the end of the year.

The volume of work involved having increased since yield assessment by test tapping was initiated wherever possible, much of the time of the Acting Head of the Department was utilized in personal supervision of these trials. This became more difficult because of the programme of decentralisation started in 1966 and the consequent stationing at Kuruwita of one Field Assistant who was placed in-charge not only of the five trials at Kuruwita but was also given in-charge of the trials at Parambe Group and Dewalakande Estate.

Under the above circumstances and also because there was no programme of starting new experiments envisaged for 1967 during the year under review new field trials were not laid down.

Field Experiment No. 1 — Trial of N and K in presence of P

This trial at Hedigalla which had been in progress for a period of fifteen years was the subject of a paper that was submitted for the Natural Rubber Conference 1968.

Field Experiment No. 2 — Effect of four levels of K in presence of N and P

Application of different amounts of potassium up to four times the amount contained in the standard R.4:6:2+Mg mixture did not give any significant response in growth and yield.

Field Experiment No. 3 — 2³ NPK trial

The treatment effects seem to indicate the same trends as reported previously. The growth and yield data from this trial have not been analysed in detail.

Field Experiments 4, 5, 12 and 13 — 3×3×3 nutrients cum cultivation treatment trials

Field trials 4 and 5 were brought into tapping in 1966. The data on girth measurements and the yield assessments by test tapping have not been analysed statistically. The results of trial No. 13 indicated that there has not been sufficient time for the treatments to have exerted themselves with the different cultivation practices already showing treatment effects. The interaction of cultivation practices with potassium appears to be on the border line of significance.

Field Experiments 6 to 10 — Response to applications of fertilizer requirements as determined by the technique of physiological diagnosis

Out of the five long-term field trials in this series one was discontinued (Trial No. 10) for reasons outlined earlier. In the remaining four trials the treatment effects do not show any significance in girth and/or yield.

Field Experiment No. 11 — Experiment on two sources of Mg in the presence of NP and K

The main purpose of this experiment was to ascertain whether application of magnesium in the form of crushed dolomite depressed the growth of rubber plants. The girth measurements recorded from this area have not been statistically analysed.

Field Experiment No. 14 — Growth response to NP and Mg each from three different fertilizer materials — Gallewatte 1961 replanting PB 86 — 3 × 3 × 3 factorial design

Nitrogen as nitrate	...	...	N ₀ (applied as NaNO ₃ first and then as ammonium nitrate)
Nitrogen as ammonia	...	...	N ₁ (applied as sulphate of ammonia)
Nitrogen as urea	...	...	N ₂ (applied as urea 46%N)
Phosphate as superphosphate	...	...	P ₀
Phosphate as rock phosphate	...	...	P ₁
Phosphate as ammonium phosphate	...	...	P ₂
Magnesium as common epsom salt	...	...	Mg ₀
Magnesium as dolomite	...	...	Mg ₁
Magnesium as kieserite	...	...	Mg ₂

Even though the girth increases have not shown any statistical significance the trends observed in favour of urea and dolomite last year seem to continue.

Field Experiment No. 15 — Trial on granulated compound fertilizers

According to the records maintained of the girths of these trees the average girth of these blocks receiving any one of the three brands of granulated compound fertilizers continued to show an additional improvement in growth which of course was different between blocks. However, the differences among treatments means were not statistically significant.

Field Experiment No. 16 — Effects of different levels of NP and K on a clone susceptible to wind damage

In this experiment which was intended to study the effect of reduced levels of nitrogen and potassium *viz.* normal rate, half rate and nil and of reduced levels of phosphorus *viz.* normal rate and half rate it was noticed that there were no significant differences in yield and growth due to treatments.

In this area test tappings were interfered with by the re-allocation of tapping tasks to meet commercial standards, disregarding experimental requirements altogether. Certain trees in this area also developed signs of potassium deficiency. But with the excellent co-operation from the management it was possible for us to continue with this trial.

Field Experiment No. 17 — Time of fertilizer application

Yield assessments by test tapping were not analysed and hence are not reported here.

Field Experiment No. 18 — Effect of eight levels of standard NPK + Mg mixture R. 4 : 6 : 3 + Mg on four clones viz. RRIC 7, RRIC 45, RRIC 52 and PB 86

The statistical analyses of the girth measurements recorded in 1967 show that there was difference between clones. Growth in terms of girth differed in the four clones. All four clones responded similarly to the fertilizer treatments and these responses were statistically significant. There were signs of diminishing returns at higher levels.

Field Experiment No. 19 — Trial on leguminous cover vs. natural ground covers

In this simple trial to compare the effect on growth of rubber of a pure leguminous cover as against natural covers kept under control by spraying herbicides it was evident that so far there is no apparent difference in the growth of the rubber plants even though managed differently with respect of ground covers.

Field Experiment No. 20 — Trial with different levels of NPK and Mg on an unmanured mature area

The results of this trial await processing and analysis. Hence the results are not reported.

INVESTIGATIONS ON WIND DAMAGE

Monthly returns have come in from those estates that were prepared to supply us with the information on incidence of damage by wind as requested by us in our questionnaire. This data has been compiled and awaits statistical analysis.

USE OF HERBICIDES FOR WEED CONTROL ON RUBBER PLANTATIONS

As a result of the information gathered in 1966 that the best chemical weed control programme in rubber areas could be accomplished only by the use of mixtures of herbicides, the different herbicides that showed promise during the screening trials were used singly or in mixtures.

A mixture of Gramoxone with 2, 4-D and disodium methane arsonate (DSMA) in immature areas was observed to be more effective than even sodium arsenite in keeping natural ground covers under control. The presence of *Mikania* seems to be the reason for the use of 2, 4-D.

In the inter-row, in mature areas it was found that amino-triazole and DSMA with 2, 4-D were effective in keeping weeds under control. It was also realised that sodium chlorate with or without 2, 4-D could not control weeds satisfactorily.

INDEX TO FIELD EXPERIMENTS

1. Trial of nitrogen and potassium in the presence of phosphorus on four clonal materials — 1952 clearing — Hedigalla
2. Effect of four levels of potassium in the presence of N & P (six clones) — 1958 replanting — Eladuwa Estate
3. 2^3 NPK Trial — Tjir 1 clonal seedlings. Area considered marginal for rubber — 1958 replanting — Kumarawatte Group
4. 3^3 N×P×cultivation treatments trial in the presence of K & Mg on clone PB 86 — 1959 replanting — Parambe Group — Kegalle District
5. 3^3 K×Mg×cultivation treatments trial in the presence of N & P on clone PB 86 — 1959 replanting — Parambe Group — Kegalle District

Trials on fertilizer application according to physiological diagnosis

6. Galle District — clone PB 86 — immature/mature phase — 1959 replanting — Nakiadeniya Group
7. Kalutara District — clone PB 86 — immature phase — 1960 replanting — Gallewatte Estate
8. Kegalle District — clone GI 1 — mature phase — 1951 replanting — Parambe Group
9. Kalutara District — clone PB 86 — mature phase — 1949 replanting — Eladuwa Estate
10. Kelani Valley District — clone PB 86 — mature phase — 1949 replanting — Salawa Estate
11. 2^3 NPK trial in the presence of Mg from two sources on clone PB 86 — 1961 replanting — RRIC Sub-station — Kuruwita
12. 3^3 N×P×cultivation treatments trial in the presence of K & Mg on clone PB 86 — 1961 replanting — RRIC Sub-station — Kuruwita
13. 3^3 K×Mg×cultivation treatments trial in the presence of N & P on clone PB 86 — 1961 replanting — RRIC Sub-station — Kuruwita
(N.B. — Same as experiments 4 & 5 but with the difference that loppings of Guatemala grass used for one of the cultivation treatments obtained from within and from outside the experimental plots.)
14. Growth response to the three major nutrients N, P & K each from three different fertilizer materials — 1961 replanting — Gallewatte Estate

15. Growth response to three brands of complete concentrated fertilizers — 1961 replanting — Gallewatte Estate
16. Trial with different levels of N, P & K on clone susceptible to wind damage *viz.* clone LCB 1320 — 1959 replanting — Mirishena Estate
17. Time of fertilizer application trial — mature phase — clone PB 86 — 1951 replanting — Dewalakande Estate
18. Effect of 8 levels of standard fertilizer mixture R. 4 : 6 : 3+Mg on 4 clones — 1963 replanting RRIC Sub-station — Kuruwita
19. Trial on leguminous ground covers vs. natural ground cover kept under control by herbicide spraying — 1963 replanting — R.R.I.C. Sub-station — Kuruwita
20. Trials with different levels of N,P,K and Mg on clonal rubber that had not been manured for a long period (ten years or more).
21. Effect of five levels of NPK+Mg on clone RRIC 45

REVIEW OF THE RUBBER CHEMISTRY DEPARTMENT

By

S. W. KARUNARATNE

SUMMARY

The Rubber Chemistry Department has been actively engaged in estate advisory service during the period under review. Advice was given to estates on problems connected with manufacture of rubber and concentration of latex and the feasibility of factory conversion to different types of manufacture.

For the first time Heveacrumb rubber was produced in Ceylon at Peenkande Estate and intensive advice was given on the manufacture of this special form of rubber.

Trial runs were carried out on the manufacture of Heveacrumb from 100% 1st fraction, 100% cup lumps, 75% cup lump plus 25% panel scrap and 100% panel scrap.

Specification tests for the 4 lots indicate that the 1st fraction rubber cannot be technically specified due to a high percentage of N whereas 100% cup lumps give a dirt value of over 0.05%. A suitable combination of 1st fraction rubber and cup lumps is expected to give a product with a reduced N value and dirt content and to fall within technical specification grade 1. Further trials will be carried out to weigh all possibilities of manufacturing crumb rubber to make it an economic proposition.

Nakiadeniya Group pioneered in the development of their own laboratories for technical specification testing and continued assistance was given to this Group to carry out dirt content and volatile matter content in their Group. Inter-laboratory cross checks were carried out at regular intervals and the results showed fair agreement.

Sampling of rubber from packing houses was carried out on a lot system to establish how Ceylon rubbers fit into the technical specification scheme. In spite of the fact that sampling was not restricted to those originating from a selective group of large estates the results compare favourably with the Malayan Standards for RSS, scrap crepes and latex crepes.

A paper on "Further factors affecting the PRI of natural rubber" was submitted for publication in the 1st and 2nd Quarterly Journal of R.R.I.C.

ADVISORY WORK

Latex

Determination of d.r.c. of latex: Assistance continued to be given to estates to draw up corrected ready reckoners by comparing metrolac readings with values obtained from trial coagulations. Several visits to estates have been made by the Senior Technical Assistant in this connection.

Adulteration of latex: Samples of latex and coagula suspected to be adulterated by tappers have been received for analysis and reports on them were submitted.

Latex concentrate : Requests have been received for the supply of concentrated latex from both firms and individuals and these have been complied with wherever possible. Assistance was also given to the Ceylon Co-operative Industries Union Ltd. in setting up a plant, training of personnel and manufacturing centrifuged latex. A number of centrifuged latex samples were received for testing and reports on their quality were submitted.

Sheet Rubber

Defects in smoked sheets : Enquiries regarding various defects in smoked sheets have been received and several estates have been visited for detailed investigations of the causes. Many of the defects were traced to pre-coagulation of the latex, too long a dripping time and this includes the period the wet sheets are in the smokehouse awaiting firing, worn out hand-operated machinery or to inadequate smoking or drying conditions.

Smokehouse testing : A number of smokehouses have been tested and recommendations were made with regard to proper flue testing, ventilation, firing etc. In the case of smokehouses with underground flue systems and outside furnaces, there seems to be a tendency to almost completely throttle flue openings. The result was that even intensive firing did not give appreciable increases in temperature and in the cases it did, was more as a result of radiant heat. If suitable precautions are taken there need not be any fire risk in sufficiently opening up the flue vents, provided they are baffled with metal or cement asbestos sheets of suitable size, so that they overlap the sides of the flue vents by about a foot, and resting about 6" above the flue vent, supported on bricks. The other precautions that need to be taken are (1) not to hang sheets near flue vents, (2) replacing all wooden rack posts near flue vents with cement posts, (3) not to overload the furnace ; firing should be on a " little and often " basis.

Crepe Rubber

Crepe drying facilities : Instrumental checks on drying tower operations have been carried out and where necessary, recommendations have been made regarding temperature, ventilation, reaper spacing and boiler operations. A fact generally overlooked is the need for periodical cleaning of the boiler chimney. A clogged chimney has a damping effect on the fire.

The type of drying tower in use on most estates has been designed to take in laces with an average moisture content of 15% and any laces with a moisture content greatly in excess of this figure, as in the case of the final milling of sole crepe laces where sometimes excessive water is used, is likely to cause an overload on heating installations. If such circumstances are unavoidable, it is suggested that the laces be given a preliminary dripping in a loft before insertion into the drying tower.

Bulking and coagulating facilities : In view of the increases in crop, estates are now finding it increasingly difficult to manage with existing facilities for bulking and coagulating latex. Our advices have been sought in connection with the expansion of these facilities and their proper lay-out.

Scrap crepe: Inquiries regarding treatment of scrap rubber have been received and suitable recommendations have been made to improve quality and grading. A few cases of heavy contamination of scrap rubber by Swedish red powder have been encountered which were virtually impossible to remove by conventional methods of soaking. Our present recommendation, in preference to Swedish red powder, is ultra-marine blue, e.g. Robin blue.

Scrap percentages: Normal scrap percentages for budded rubber are about 12 — 15%. This does not, however, imply that under all normal conditions, the % scrap from any particular small area will invariably be between 12 and 15% of total crops, as it will be apparent that the % scrap can depend upon several factors e.g. clones, intensity of tapping and stimulation, age of the trees, field organisation, weather, etc.

Supply of latex: Low ammonia sodium penta chloro phenate stabilised latex was supplied to P.W.D. to continue their investigations on the use of rubberised bitumen as road surfacing. Creamed latex was supplied to Mercantile Corporation, General Industries and C.I.S.I.R. As facilities for biosynthetic work is not available in the Institute, the Rubber Chemistry Department co-opted with the N.R.P.R.A. Biochemistry Research Group by sending regular supplies of fresh field latex suitably treated for fundamental studies on the biosynthesis of natural rubber latex.

CRUMB RUBBER MANUFACTURE

In collaboration with the Superintendent of Peenkande Group preliminary trials on crumb rubber manufacture were started in the 1st week of December. Usual teething troubles arose and the vibrating screen had to be refitted. The water spray on the vibrating screen was improvised.

Samples were tested at our laboratories and were also sent to prospective purchasers abroad. The size of the baling press box measuring 28" × 14" had to be altered to the standard ISO bale size of 22½" × 15" × 7" giving a net weight of 75 lb.

The results of the specification tests are as follows:—

Heveacrumb from 1st fraction

Sample No.	Dirt % wt.	V.M. % wt.	PRI	N ₂ % wt.	Ash % wt.	Cu ppm	Mn ppm	Colour
1	0.023	0.43	91.3	1.176	0.30	<8	<8	Yellowish brown
2	0.021	0.60	91.3	0.868	0.28	<8	<8	— do —
3	0.020	0.42	83.3	0.868	0.27	<8	<8	— do —
4	0.027	0.32	88.0	1.232	0.32	<8	<8	— do —
5	0.035	0.99	88.0	1.092	0.33	<8	<8	— do —
6	0.015	1.02	87.5	1.260	0.20	<8	<8	— do —

Heveacrumb from cup lumps

Sample No.	Dirt % wt.	V.M. % wt.	PRI	N ₂ % wt.	Ash % wt.	Cu ppm	Mn ppm
1	0.067	0.18	50.0	0.280	0.40	<8	<8
2	0.074	0.16	45.5	0.280	0.38	<8	<8
3	0.085	0.27	41.7	0.252	0.38	<8	<8

Heveacrumb from 75% cup lumps/25% panel scrap

Sample No.	Dirt % wt.	V.M. % wt.	PRI	N ₂ % wt.	Ash % wt.	Cu ppm	Mn ppm
1	0.130	0.207	70.4	0.450	0.28	<8	<8
2	0.116	0.189	63.6	0.421	0.29	<8	<8
3	0.109	0.199	69.0	0.418	0.26	<8	<8

Heveacrumb from panel scrap

Sample No.	Dirt % wt.	V.M. % wt.	PRI	N ₂ % wt.	Ash % wt.	Cu ppm	Mn ppm
1	0.231	0.63	66.7	0.756	0.65	<8	33.0
2	0.173	0.39	75.0	0.868	0.62	<8	32.1
3	0.282	0.50	65.2	0.616	0.70	<8	38.0
4	0.315	0.68	75.0	0.616	0.68	<8	37.4
5	0.225	0.69	71.4	0.644	0.65	<8	35.8
6	0.278	0.51	64.0	0.672	0.61	<8	40.0
7	0.228	0.62	70.4	0.616	0.58	<8	37.0
8	0.234	0.60	64.3	0.644	0.59	<8	37.0

Maximum limits for the non-rubber constituents of the three SMR grades.

	SMR 5	SMR 20	SMR 50
Dirt % wt. retained on ASTM 325 mesh ...	0.05	0.20	0.50
Ash % wt.	0.5	1.0	1.5
Copper ppm	8	8	8
Manganese ppm	10	10	20
Nitrogen % wt.	0.7	0.7	0.7
V.M. % wt.	1.0	1.0	1.0

Specification tests for the 4 lots indicate that the 1st fraction rubber cannot be technically specified due to high % of N whereas 100% cup lumps give a dirt value of over 0.05%. Good field collection techniques, careful storage, adequate pre-treatment and proper homogenisation will no doubt reduce the dirt content of cup lumps, but the usefulness of a granulator to get the best grade from cup lumps cannot be overlooked. High Mn (<20 ppm) in panel scrap crumb could be reduced to acceptable limits if the scrap is treated prior to processing with oxalic, phosphoric or sulphuric acid.

Even though the PRI figures were satisfactory, the rubber was rather soft in all trials performed.

The initial Wallace plasticity was less than 40 and the Mooney viscosity of the raw rubber (ML 1+4 at 100°C) was less than 70.

The rubber was dried in a one stage semi-continuous dryer of the RRIM/GEC type at a temperature of 230°F for 5 to 6 hours.

Sampling of rubber from packing houses to establish how Ceylon rubber fit into the technical specification scheme.

Sampling was carried out from the following packing houses :—

- (1) Torbay stores
- (2) Mackie & Co.
- (3) Sherman de Silva & Co.

Results of the technical specification testing are given in Table 1.

TABLE 1

Visual grading	No. of bales sampled	Technical grade (% on No. of bales sampled)				Reason for falling outside specification
		1	2	3	Outside specification	
Latex crepe 1X	12	91.7	—	—	8.3	High VM
1	12	91.7	—	—	8.3	High VM
2	18	100	—	—	—	
3	24	79.2	—	—	20.8	High VM + N
4	24	54.2	—	—	45.8	High VM + N
Scrap crepe 1	28	50.0	14.3	—	35.7	High VM
2	30	53.3	26.7	—	40.0	High VM
3	30	—	16.7	26.7	56.7	High Mn + Dirt + VM
4	32	—	18.8	15.6	65.6	High Mn + Dirt + VM
5	32	—	—	31.3	68.8	High Mn + Dirt + VM
RSS 1	50	76.0	18.0	—	6.0	High VM
2	50	76.0	18.0	—	6.0	High VM
3	56	58.9	12.5	—	28.6	High VM
4	53	54.7	37.7	—	7.5	High VM
5	52	44.2	32.7	—	23.1	High VM

Latex Crepe

More than 95% of latex crepe visual grades 1X, 1 and 2 fall into technical grade 1. Less than 5% fall outside specifications due to high VM.

Out of the total consignment of bales of latex crepe sampled about 10% fall outside specifications due to high N content. This is to be expected because estates take a 10 to 15% fraction during crepe manufacture.

If no fraction is taken and latex is bulked prior to coagulation it is expected that the N content will fall below specification limit of 0.7% and the total consignment of latex crepe will fall within specification limits.

Scrap Crepe

35 to 40% of the scrap grades 1 and 2 fall outside specification due to high VM. This is most probably due to the air drying of blanket lace. In scrap crepe grade 3 and 4, out of the 40% that fall within specification none falls into technical grade 1 and the distribution in technical grades II and III is 40 : 60,

In scrap crepe grade 5 approximately 70% of the bales fall outside specifications and the 30% which fall within the specification fall into technical grade 3. High Mn in scrap crepe grades 3, 4 and 5 can be reduced within the specification limits by adequate treatment of the scrap prior to processing. Soaking in acid solutions including acid serum water is very effective in reducing the Mn in scrap rubber to tolerable limits.

RSS

Due to the high VM about 15% of RSS grades 1 to 5 fall beyond specification limits. If the VM could be reduced all RSS grades fall within technical grades 1 and 2 and in the case of samples originating from Mackie Stores and Sherman de Silva's they fall into technical grade 1 in the case of RSS 1 to 4. About 20% of RSS 1, 2 and 3 originating from Torbay Stores fall into technical grade 2, and this is distributed equally in all 3 grades.

TABLE 2

Results of sampling from Mackie and Sherman de Silva's stores

Visual grading	No. of bales sampled	Technical grade (% on No. of bales sampled)				Reason for falling outside specification
		1	2	3	Outside specification	
RSS 1	12	100	—	—	—	High VM High VM High VM
2	12	83.3	—	—	16.7	
3	18	61.1	—	—	38.9	
4	18	100	—	—	—	
5	18	44.4	11.1	—	44.4	

TABLE 3

Sampling from Torbay Stores

Visual grading	No. of bales sampled	Technical grade (% on No. of bales sampled)				Reason for falling outside specification
		1	2	3	Outside specification	
RSS 1	38	68.4	23.7	—	7.9	High VM High VM High VM High VM High VM
2	38	73.7	23.7	—	2.6	
3	38	57.9	18.4	—	23.7	
4	35	31.4	57.1	—	11.4	
5	34	44.1	44.1	—	11.8	

Compare these results with Malaysian Standards for RSS, scrap crepes and latex crepes based on the sampling of a very selected group of large estates.

Technical Grade 1 SMR 5 All latex crepe
All RSS 1
All RSS 2
Part of RSS 3
+ Very small amount of scrap crepe 1

Technical Grade 2 SMR 20 Part of RSS 3
All RSS 4
All RSS 5
Scrap crepe 1
Scrap crepe 2
Technical Grade 3 SMR 50 Scrap crepe 3

Hypothetical classification for Ceylon rubbers based on improvements as suggested in the analysis of data.

Grade 1 All latex crepe
75% RSS 1
75% RSS 2
75% RSS 3
Part of RSS 4
Part of RSS 5
75% of scrap crepe 1
75% of scrap crepe 2

Grade 2 Remainder of RSS 4 and 5
25% of scrap crepe 1
25% of scrap crepe 2
Very small amount of scrap crepe 3 and 4.

Grade 3 Remainder of scrap crepe 3 and 4
75% of scrap crepe 5.

Further improvements on this grading systems are envisaged if refined methods for the collection of scraps are adopted followed by further sorting, adequate washing and treatment prior to processing. Once the bales are wrapped it is imperative that they should be well looked after and not allowed to stagnate, under adverse storage conditions for an unnecessarily long period of time.

PLASTICITY RETENTION INDEX

The plasticity retention index (PRI) has been developed in association with the Standard Malaysian Rubber Specification Scheme for natural rubber whereby a criterion indicating the quality of the rubber hydrocarbon is required. This is an attempt to measure the oxidisability of raw natural rubber and thereby subsequently determine the behaviour of the rubber during consumer factory processing and in service performance.

For specially formulated heat resistant compounds using efficient vulcanisation systems it has been demonstrated that there is no relationship between ageing behaviour and PRI, all rubber being essentially similar. It has been reported that many commercial anti-oxidants actually assist rubber oxidation in the raw state. These factors prompted an investigation into the chemical treatment of natural rubber and the corresponding effects on the PRI. Influence of the time of contact of panel scrap with the bark on PRI was determined and it was observed that the PRI dropped about 50% when panel scraps were stripped after 6 and 48 hours.

Treatment of panel scrap with pyrogallol and oxalic acid improves the oxidative resistance of the raw rubber and at equal concentrations pyrogallol was more effective than oxalic acid.

A comparative study of PRI values using two different versions of parallel plate plastimeters *viz.* the Hoekstra and the Wallace plastimeters indicated that the results were in fair agreement. The PRI naturally does not give an absolute measure of oxidation resistance in the sense that the value obtained is independent of the method of test. However the index does approximate to an absolute measure in the sense that it is little affected by the viscosity of the rubber.

REVIEW OF THE STATISTICAL SECTION

By

N. NADARAJAPILLAI

Staff

The Assistant Statistician, Mr. V. B. Solomon resigned from the services of the Institute with effect from 1st September, 1967.

The Statistical Section was mainly concerned with the design, analyses and statistical interpretation of the field experiments.

Analyses

Plant Pathology Department

The data from the following experiments were analysed :—

- | | | |
|--|-----|------------|
| 1. Bark Rot Experiment | ... | Ellakanda. |
| 2. do. | ... | Dalkeith. |
| 3. <i>Oidium</i> and <i>Phytophthora</i> Experiments | ... | Eladuwa. |
| 4. do. | ... | Godahena. |
| 5. do. | ... | Yatadola. |

Soils Chemistry Department

Analyses were carried out on the data made available from the following experiments :—

- | | | |
|----------------------------|-----|---|
| 1. Hedigalla | ... | 5 × 5 Graeco Latin square. |
| 2. Eladuwa | ... | Nutrition trial. |
| 3. Gallewatta | ... | do. |
| 4. Mirishena, Trial No. 16 | ... | Effect of different levels of NPK on clones susceptible to wind damage. |
| 5. Kuruwita, Trial No. 18 | ... | Effect of eight levels of standard NPK+Mg mixture (R. 4 : 6 : 3+Mg) on four clones. |

Record of the information on wind damage, furnished in record sheets received from various estates was maintained. This will be utilised to study the various factors that are responsible for wind damage.

Genetics and Plant Breeding Department

Analysis was carried out on the data made available from the clone trials at Kuruwita. These clones were brought into tapping at 4½ years.

Publications

N. Nadarajapillai and R. T. Wijewantha — Productivity potentials of rubber seed. *R.R.I.C. Bulletin* (New Series) Vol. 2, Nos. 1 & 2. March/June 1967.

N. Nadarajapillai — The Rubber Industry in Ceylon. This article was sent to the High Commission in Australia for publication in "*The Australian*".

Visits

Rubber seed oil project, 1967	...	...	11
Experimental	...	...	4
C.A.A.S. annual sessions and symposium	...	...	5
Lectures	...	...	2
			<hr/>
		Total	22
			<hr/> <hr/>

General

Rubber seed oil project

Assistance was continued to be given to Messrs. Lever Brothers Ltd. in the rubber seed oil project during 1967 as was rendered in 1966.

Meteorology

The meteorological stations at Dartonfield, Nakiadeniya, Atale, Parambe, Elpitiya, Doloswella, Kuruwita, and Nivitigalakele were continued to be maintained.

RUBBER RESEARCH INSTITUTE OF CEYLON — DARTONFIELD — AGALAWATTA

SUMMARY OF METEOROLOGICAL OBSERVATIONS — JANUARY — DECEMBER, 1967

Longitude 80° 09' E

Latitude 6° 32' N

Height above sea level 215 ft.

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	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean maximum temperature	88.6	89.7	91.2	91.7	88.7	87.9	85.9	87.3	87.7	87.9	89.9	89.7
Mean minimum temperature	69.7	69.8	70.6	72.1	73.7	73.4	72.8	72.1	71.9	71.0	71.3	70.7
Avg. of max. & min. temp. means	79.2	79.8	80.9	81.9	81.2	80.7	79.4	79.7	79.8	79.5	80.6	80.2
Highest max. temperature	91.3	91.8	94.3	94.3	92.8	89.8	87.8	88.8	89.8	89.8	91.8	91.3
Lowest max. temperature	84.8	84.8	81.3	88.8	81.8	83.3	80.8	84.8	80.3	85.8	88.8	85.8
Highest min. temperature	71.0	72.0	73.5	74.0	76.0	75.0	77.0	75.0	74.0	73.0	73.0	74.0
Lowest min. temperature	63.5	66.5	68.0	70.0	71.0	71.0	70.0	63.0	70.0	69.0	69.0	68.0
Mean earth temperature at 8"	56.9	58.1	58.9	60.0	59.2	59.2	57.6	58.3	58.1	56.4	57.8	57.8
Mean earth temperature at 4"	83.4	83.6	82.2	83.9	82.7	81.7	81.4	83.5	81.1	79.9	81.3	80.6
Mean earth temp. at 4' depth	79.6	80.5	84.5	85.3	85.2	85.2	84.7	83.9	84.1	82.4	82.8	83.2
Mean relative humidity in % at 8-30 a.m.	71.8	71.9	73.8	75.6	76.2	77.0	75.9	76.4	75.3	73.7	74.3	73.3
Monthly rainfall in inches	4.69	6.92	11.37	13.64	23.67	16.11	16.99	16.39	29.62	36.47	13.55	13.16
Cumulative rainfall in inches	—	11.61	22.98	36.62	60.29	76.40	93.39	107.78	139.40	175.87	189.42	202.58
Most rainfall in one day in inches	1.45	1.90	2.58	2.30	6.44	2.00	4.30	2.66	8.52	9.12	2.62	2.20
No. of rainy days (rainfall > 0.1")	6	12	13	17	25	22	23	21	15	19	21	17
Total hours of sunshine	159.6	156.7	188.4	184.4	114.3	96.1	104.0	146.6	151.4	140.3	126.8	144.0
Daily mean hours of sunshine	5.15	5.59	6.08	61.46	3.69	3.20	3.35	4.73	5.04	4.53	4.22	4.65
Mean atmospheric pressure in milli- bars at 8-30 a.m.	1010.77	1010.28	1009.82	1010.32	1008.35	1008.99	1008.02	1009.86	1010.06	1010.36	1009.47	1011.14
Mean temperature in attached Thermometer	79.2	80.2	82.0	84.5	83.3	83.1	82.5	82.2	82.6	81.9	82.2	81.6

REVIEW OF THE ESTATES ADVISORY DEPARTMENT

By

A. B. DISSANAYAKE

Introduction

The Estates Advisory Department was created with effect from 1st January 1966. The year 1967 is therefore the 2nd year of functioning of this department.

Staff

The Head of the Estates Advisory Department and the Estates Advisory Officer continued to be on duty throughout the year.

The following Assistant Advisory Officers were appointed during the year 1967 :

Mr. D. S. Muthukuda 22nd March 1967
Mr. A. Dahanayake 2nd May 1967
Mr. H. T. Wickremasekera 2nd May 1967.

Categories of Estates

The total area under rubber is 672,592 acres. This can be classified according to the size of the plantations as follows :—

Category	Size	Number of holdings	Extent in acres	% of total acreage
1. Smallholdings	0 — < 10	146,348	204,865	30.5
2. Small estates	10 — < 100	6,006	153,640	22.8
3. Medium estates	100 — < 500	662	148,268	22.0
4. Large estates	— > 500	181	165,819	24.7
Total		153,197	672,592	100.0

Of the above 4 categories, the smallholdings which comprise 30.5% of the total acreage are looked after by the team of officers attached to the Smallholdings Department. The Estates Advisory Department caters for the balance 3 categories comprising of nearly 70% of the total acreage under rubber.

The large estates generally seek advice on specific problems and are therefore visited on request after making an appointment.

The medium and the small estates comprising of a total of 44.8% have not received advice from the R.R.I.C. A system of routine visits are made to these estates for advice on all aspects of rubber cultivation and production.

Routine Visits

A total of 518 visits were made in respect of routine visits to medium and small estates during the year under review. In the case of routine visits, the visiting officer looks into all aspects of the industry, from planting to manufacture and smoking and gives advice. The visit is always followed by a report to the Superintendent or the Conductor-in-charge of the estate with a copy to the owner so that they may have on record the advice given and act on them as and when necessary. Along with these reports, the necessary Advisory Circulars are sent for their information.

Visits on Requests

In addition to the routine visits mentioned earlier, a total of 97 visits were made on request to large and medium estates. These visits were made in connection with specific problems referred to the Institute by the estates. All such visits too were followed by reports to the Superintendents and of the Agents giving the nature of the problem, the causes and the recommendations made.

In a number of cases, after looking into the problem for which the request was made, other little difficulties were discussed and helpful suggestions made to overcome them.

Other Visits

In addition to these, a total of 52 visits have been made to other Institutions such as District P. A. meetings, Smallholdings Department etc. in connection with the work of the Institute.

A further 9 visits have been made in connection with the survey of the existing grades of rubber for technical specifications.

It can therefore be seen that a total of 676 visits have been made by the officers of this department for the year 1967.

A break-up of all the visits according to categories of estates etc. would be as follows :—

	<i>No. of Visits</i>
<i>On request :</i>	
Large estates	54
Medium estates	43
<i>Routine :</i>	
Medium estates	74
Small estates	444
Other institutions, P.A. meetings etc. ...	52
Visits on technical specifications ...	9
Total ...	<u>676</u>

Visitors

A total of 5 visitors, three from the Rubber Research Institute of Malaya and two from the Natural Rubber Producers' Research Association, London, and a Russian Delegation were shown round and discussions held on matters of common interest. The Head and one of the Assistant Advisory Officers gave 4 talks on various aspects of the industry during the course of the year.

Training of the New Assistant Advisory Officers

First a series of talks were given by the writer, on all aspects of the rubber industry. These were followed by talks on the work done by the scientific departments by the respective Heads of these Departments.

The officers were then taken round on advisory visits to medium and small estates to train them in observations to be made in the field.

On requests for special problems from large estates, these officers accompanied the senior officers to study the problems that normally crop up in estates with the idea of acquainting themselves in the manner these problems are looked into.

These officers after their training have undertaken routine visits to medium and small estates on their own. The progress in their work has been satisfactory.

Follow-up Visits

A few follow-up visits have been made to small estates, some on a routine basis, while others had been made at the request of the owners. The response in most cases have been good and an improvement in the level of maintenance and the standard of manufacture have been observed.

Observations

It has been observed that most of the small estates close to towns are being blocked out and sold as building sites for houses.

Old rubber estates at fairly high elevations are being gradually converted to tea as a subsidy is being given for this purpose.

Rubber plantations in the fairly dry areas are trying to convert into coconut. It would be a good idea to allow subsidies for conversion into rubber of coconut and tea land in the good rubber growing areas and vice versa.

It has also been observed that in small estates, problems of manufacture are more important than maintenance work. Most owners of small estates appear to be absentee landlords whose estates are looked after by a Conductor or family retainer, who is accustomed to doing things in a set pattern and resists change. This resistance is being broken down by sending copies of reports to the owner and showing the necessity to produce as much as possible rubber of the best quality.

Appreciation

Lastly, I wish to place on record our thanks for the willing co-operation extended to this department by owners of estates, and their Superintendents and Conductors.

REVIEW OF THE SMALLHOLDINGS DEPARTMENT

By

H. H. PEIRIS

SUMMARY

The staff of this department was kept very busy throughout the year. Large numbers of subsidy replanting and new planting permits were issued once again. A slight increase of the rubber market prices was noticed during the year. The "crash programme" started last year was continued this year too, although the expected financial assistance was not received from the Department of Commodity Purchase. The organisation and supervision of all sulphur dusting groups were undertaken again this year. The Publicity Unit functioned throughout the year and assistance to smallholders was given in the usual form.

Sufficient amount of field officers' time was devoted to new planting work in spite of their other duties. Every smallholding for which a new planting permit is sought was visited and reported on by an Instructor before a permit was issued by the Rubber Controller. 952 such preliminary reports, 1,630 final inspection reports and 2,222 special reports were submitted to the Rubber Controller. 637 new planting permits covering an extent of 1,058 acres 2 roods 00 perches were issued by the Rubber Controller during the year. Field staff have lined a total of 147 permit areas of this and last year's covering an extent of 235 acres 0 rood 19 perches and 165 permit areas covering an extent of 268 acres 2 roods 22 perches for soil conservation measures and planting holes respectively. Divisional Advisory Officers have checked the lining of Rubber Instructors in 25 permit areas. 7,496 advisory visits have been made by the field staff to new rubber areas, and a total of 2,187 tappable trees in 42 smallholdings have been marked for tapping in demonstrations during the year. A sum of Rs. 5,364/67 was paid to 104 peasant class new planters as soil conservation grants. 80 permit areas were measured by Rubber Instructors for recommending soil conservation grants and 66 areas have been checked by Divisional Advisory Officers.

A considerable part of the Instructors' time was expended in assisting smallholders and small estate owners in replanting their lands according to requirements of the Replanting Subsidy Scheme. 3,916 replanting permits covering 5453 acres 0 roods 27 perches have been issued in respect of smallholdings, and every one of these 3,916 smallholdings was visited by a Rubber Instructor. 30,266 advisory visits have been made by the field staff to replanting and replanted smallholdings of this and previous years. Rubber Instructors have lined 1558 permit areas of this and previous year covering an extent of 2,163 acres 2 roods 09 perches for soil conservation works and 2,075 permit areas covering an extent of 3015 acres 3 roods 27 perches for planting holes. 13,073 tappable trees in 251 smallholdings have been marked in demonstrations. 11,308 plants issued by the Rubber Controller at Commodity Purchase Depots to subsidy replanters were checked by the field officers at 78 random visits to these depots. 159 special reports on subsidy replanting and replanted areas have been submitted to the Rubber Controller.

The State-aided sulphur dusting scheme for smallholders was carried out this year too. 99 co-operative sulphur dusting groups covering an acreage of 10,437½ acres were organised and 91 groups covering an acreage of 9,150 acres were successfully dusted. Rubber Instructors personally supervised the first 2 rounds of dusting in all groups and the supervision of subsequent rounds was done as and when their other duties permitted. Most of the dusted groups had 4 rounds of dusting with the quota of 50 lb of sulphur dust per acre. A number of groups had to start dusting as early as 2-00 a.m. in order to complete dusting programme by 8-00 a.m. The dusted and undusted holdings which wintered early generally showed no signs of infection by *Oidium* due to fine climatic conditions which prevailed during refoliation while the late winterers had light attacks although the undusted areas showed more severe attacks. Arrangements have been made to dust 102 groups covering an extent of 10,200 acres in the 1968 dusting season.

The Publicity Unit plays a very prominent part in directing smallholders on correct lines from planting to manufacture of sheet rubber. 126 publicity meetings and film shows, and 16 slide shows were held during the year. In addition to above shows the Unit was sent to 5 agricultural exhibitions. Final arrangements have now been made to produce a film in par with the local conditions.

The crash programme started last year to improve smallholders' sheet culminated this year when an island-wide sheet competition, mass meeting and exhibition were held at the Dharmapala Maha Vidyalaya on 9-3-67. The Hon'ble Ministers of Commerce & Trade and Food and Agriculture along with many distinguished visitors were present. The prizes and certificates to winners of sheet competition were presented by the Hon'ble Minister of Commerce and Trade while the Hon'ble Minister of Food and Agriculture opened the exhibition. All possible assistance and advice were given to smallholders in the manufacture of their sheet rubber, and 19 demonstrations and 116 ordinary smokehouses were commenced by smallholders with the advice and guidance of Instructors and 10 demonstration and 52 ordinary smokehouses were completed during the year. 2,430 aluminium pans and 478 strainers, a balance stock from last year were sold to smallholders at concession rates. The writer submitted to Director his detailed observations on the crash programme carried out in the year 1966.

The officers of this department rendered every assistance to smallholders in lining their holdings, planting, manuring, establishing cover crops, disease control, marking trees for tapping and construction and improvement of demonstration and ordinary smokehouses. A pair of rubber rollers was ordered and 10 cwt. of rubber mixture were purchased through this department at concession rates by 2 smallholders.

The tapping training classes for training smallholders in rubber tapping and manufacture and other allied subjects on rubber were organised this year too. 567 trainees participated in 32 classes and finally 422 trainees successfully completed the course and certificates will be awarded.

The writer was on duty throughout the year. Rubber Instructor, Matugama and the Rubber Instructor, Publicity Unit were promoted to the posts of Divisional Advisory Officers. Applications were called internally for 4 posts of temporary Rubber Instructors. Rubber Instructor, Dodangoda retired from service after 19 years service. The untimely death of Mr D. E. A. Abeywickrama, Deputy Chief Advisory Officer is recorded with deep regret.

4,500 copies of posters were reprinted for issue to smallholders. Smallholdings folders and leaflets which are in short supply will be reprinted.

This department participated in 5 exhibitions while assistance was given to 3 more exhibitions in sending posters and leaflets.

Divisional Advisory Officer, Homagama conducted a course of lectures to teacher-trainees at the School of Agriculture, Horana.

3,368 demonstrations on various aspects of rubber were given by Rubber Instructors during the year.

A sum of Rs. 22,550/- was given on loan to 6 field officers for purchase and/or repair of their motor vehicles.

Four conferences of supervisory staff were held where the Director was present. Another conference presided over by the Director and attended by the writer, two Divisional Advisory Officers and the Building Foreman, R.R.I.C. was held at the Smallholdings Headquarters for designing a streamlined and cheaper plan for smokehouses for smallholders with a view to cutting down costs of construction. The writer attended a rubber seminar, the first meeting of working committee of the technical and economic aspect of the Bureau of Ceylon Standards and a Board meeting by invitation where the departmental estimates and programme of work was considered. 4 Rubber Instructors attended a few rural meetings at the request of respective Divisional Revenue Officers.

The 6 Divisional Advisory Officers' Divisions were re-carved to make 8 Divisions.

The Director inspected the Homagama and Panadura Divisions.

DETAILED REVIEW

Introduction

The field and office staff of this department were kept busy throughout the year with the issue of large numbers of subsidy replanting and new planting permits once again. The weather during the year under review was fair as a whole. A slight increase of the rubber market prices was noticed during the year. The market price of RSS 1 was -/85 cts. per pound and -/88 cts. per pound on 2nd January and 19th December respectively.

The crash programme launched last year to improve the smallholders' sheet rubber was continued this year as well, although the expected financial assistance was not received from the Department of Commodity Purchase under the Ministry of Commerce and Trade. The organisation and supervision of all sulphur dusting groups were undertaken once again. The Publicity Unit functioned in the field throughout the year. Assistance to smallholders was given in the form of advisory visits, lining smallholdings for soil conservation measures and planting holes and demonstrations etc.

NEW PLANTING

A sufficient amount of time of the field staff was devoted to the new planting work in spite of the heavy calls made on the Instructors' time by subsidy replanting, sulphur dusting duties and work connected with the continued crash programme for improvement of smallholders' sheet rubber organised last year (1966).

Each new area for which a permit was desired was visited and reported on by a Rubber Instructor in regard to the suitability of new planting before a permit was issued by the Rubber Controller. 952 such preliminary reports have been submitted to the Rubber Controller. 637 new planting permits covering an extent of 1,058 acres 2 roods 00 perches were issued by the Rubber Controller to new planting smallholders during the year. 1630 final inspection reports and 2,222 special reports on new planted areas were submitted to the Rubber Controller.

Rubber Instructors and their assistants have lined a total of 79 new planting permit areas of this year covering an extent of 134 acres 3 roods 14 perches for soil conservation works and 99 permit areas covering an extent of 159 acres 2 roods 17 perches for planting holes.

They have also lined 68 new planting permit areas of 100 acres 1 rood 05 perches and 66 permit areas of 109 acres 0 roods 05 perches of the previous year's permits for soil conservation works and planting holes respectively.

Divisional Advisory Officers have checked lining work done by Rubber Instructors in 25 permit areas covering an extent of 27 acres 1 rood 12 perches.

144 first visits and 277 subsequent visits were made by the field staff to new planting and new planted permit areas of this year and 80 first visits and 1,199 subsequent visits were also made by them to permit areas of previous year. Further a total of 5,796 subsequent visits were made to new rubber planted areas for which permits have been issued prior to 1966.

Rubber Instructors have marked a total of 2,187 tappable trees in 42 new rubber planted areas by way of demonstration.

Soil Conservation

A sum of Rs. 5,364/67 was paid as soil conservation grants as per details given below :—

1st instalment to	62	peasant class permit areas	Rs. 4,341·84
2nd	42	—do—	„ 1,023·83
	<u>104</u>		Rs. <u>5,364·67</u>

80 peasant class new rubber planting permit areas covering an extent of 103 acres 2 roods 25 perches were measured by Rubber Instructors, payment vouchers prepared and submitted during the year. 66 permit areas covering an extent of 73 acres 1 rood 09 perches have been checked in the field by Divisional Advisory Officers.

REPLANTING

A considerable part of the Rubber Instructors' time was expended in assisting replanting smallholders and small estates owners in replanting their smallholdings in accordance with the requirements of the Rubber Replanting Subsidy Scheme.

The following Rubber Replanting Subsidy Scheme permits issued in respect of smallholdings during the year were in force as at 31-12-67.

No. of permits	A.	R.	P.
8916	5453	0	27

Copies of permits issued by the Rubber Controller to smallholders and received by this department from time to time were forwarded to range Rubber Instructors. Everyone of the above 3,916 smallholdings was visited by a Rubber Instructor.

6,778 visits to subsidy replanting permit areas of this year and 23,448 visits to previous years' subsidy permit areas were made by the field staff during the year.

1,252 subsidy permit areas covering an extent of 1,646 acres 0 rood 07 perches and 1,689 permit areas covering an extent of 2,327 acres 0 rood 30 perches of this year's permits were lined by the field staff for soil conservation works and planting holes respectively during the year.

Similarly 306 subsidy permit areas covering an extent of 517 acres 2 roods 02 perches and 386 permit areas covering an extent of 688 acres 2 roods 37 perches of previous year's issues were lined by the field staff for soil conservation works and planting holes respectively.

A total of 13,073 tappable trees in 251 subsidy replanted holdings have been marked for tapping by Rubber Instructors during the year.

Officers of this department continued to carry out random checks on planting material issued by the Rubber Controller at Commodity Purchase Depots to subsidy replanting permit holders. 78 random inspections were carried out by the field staff and a total of 11,308 plants were examined. 159 special reports on subsidy replanting and replanted areas were furnished to the Rubber Controller during the year.

MATURE HOLDINGS

Visits to mature areas are being done only on request from owners or for special reasons such as sulphur dusting.

SULPHUR DUSTING

The State-aided sulphur dusting scheme for smallholders organised by this department was carried out this year too.

Correct procedure of dusting and all requisite instructions such as maintenance of dusting machines, supervision of dusting, submission of the required forms and checking of accounts of incidental expenses of different sulphur dusting groups were given to the staff before the commencement of sulphur dusting. Dusting arrangements were discussed at several conferences of the supervisory staff convened by the Chief Advisory Officer Smallholdings where the Director was present.

Collection of money for incidental expenses normally incurred in the dusting scheme was one of the greatest difficulties which each Rubber Instructor had to face. In many cases the Rubber Instructors and the supervisory staff had to see personally to the collection of this money.

The departmental mechanic and the agents of the dusting machines did servicing and repairing of machines before commencement of dusting. Each accepted co-operative dusting group was issued a dusting machine on loan. Spare machines were made available at central spots to avoid interruption during dusting.

Out of the 103 co-operative dusting groups formed for dusting in 1966, only 98 groups were dusted due to non-availability of sulphur at the required time.

Hence the balance 5 undusted groups were left to be dusted in 1967 season. As some of the members were not interested in joining the scheme, it was not possible to re-organise some of the old groups for 1967 season. Therefore it was possible to form only 99 dusting groups including the 5 dusting groups left behind from the 1966 season. All 99 dusting groups formed comprised of 2,890 holdings covering a total of 10,437½ acres (Table 1).

TABLE 1

District	Acreage		Holdings	
	1966	1967	1966	1967
Kalutara	2,876	2,927½	880	796
Colombo	2,367½	2,431½	809	780
Kegalla	2,341	2,185	640	573
Ratnapura	1,835½	1,441½	554	431
Galle	940½	1,013½	195	236
Matara	331½	359	58	54
Kandy	74	80½	14	20
Total	10,766½	10,437½	3,150	2,890

The distribution of co-operative sulphur dusting groups according to districts is shown in Table 2.

TABLE 2

District	Distribution of Groups	
	1966	1967
Kalutara	26	26
Colombo	23	24
Kegalla	27	25
Ratnapura	15	12
Galle	8	8
Matara	3	3
Kandy	1	1
Total	103	99

Rubber Instructors were instructed to supervise personally the first two rounds of dusting in all groups. Subsequent rounds of dusting were to be supervised as their other duties permitted. Most of the dusted groups had four rounds of dusting with the quota of 50 lb of sulphur per acre.

The dusting operations for the season commenced on 26-1-67 in Undugoda Range, and the last date of dusting was on 1-4-67 in Imaduwa Range. It has been reported that a number of groups had to start dusting as early as 2.00 a.m. in order to complete the day's dusting programme by 8.00 a.m.

This season the dusted and undusted holdings which wintered early generally showed no signs of infection by *Oidium* due to the dry climatic conditions prevailing during refoliation. But it has been observed that the late winterers had light attacks while the undusted areas showed more severe attacks.

The details of dusting operations are as follows :—

No. of holdings dusted	...	...	2,465
Acreage dusted	...	...	9,150
No. of groups dusted	...	...	91
Average size of a holding	...	...	3.7 acres
Size of the smallest holding	...	...	$\frac{1}{4}$ acre
Size of the largest holding	...	...	30 acres
Average number of holdings in a group	...	...	27
Average cost of dusting an acre including sulphur	Rs.	11.87	

The subsidised areas were provided with sulphur at the rate of Rs. 6.05 per acre and the non-subsidised areas at Rs. 12.10.

A follow-up questionnaire was distributed to ascertain the results of sulphur dusting after a period of time and the answers reveal that :—

1. Almost all the dusted holdings were free of *Oidium*.
2. In general the incidence of the disease in undusted holdings has been heavier.
3. In dusted holdings, especially in the partial and late winterers infection of *Oidium* appeared on a very small scale.
4. Most of the smallholders who took part in this scheme this year have expressed their willingness to participate in the scheme in the coming year as well.

For the forthcoming 1968 dusting season arrangements have been made to dust 102 groups comprising of 10,200 acres.

Rubber Instructors have made 17,068 visits to sulphur dusting areas during the period.

VILLAGE PROPAGANDA

The Publicity Unit of the department plays a very prominent part in educating the smallholders on correct lines from planting to the manufacture of sheet rubber.

The Rubber Instructor, Publicity Unit 2, who was under training during the early part of the year was sent to field since May this year. He conducted his shows with a slide projector until the promotion of Rubber Instructor, Publicity Unit 1 to the post of Divisional Advisory Officer in July, and from this date he was placed in charge of the Film Unit.

126 publicity meetings and film shows, plus 16 slide shows were held during the year. In addition to above shows the Unit took part in 5 agricultural exhibitions.

A film on rubber in par with the local conditions is very essential to acquaint the smallholders in correct lines of planting, maintenance and manufacture. All arrangements have now been finalised to produce a film to fulfil this requirement.

IMPROVEMENT OF SMALLHOLDERS' SHEET

The crash programme started last year for the improvement of smallholders' sheet rubber was continued this year too. An island-wide sheet competition, a mass meeting of smallholders and an exhibition which were held at the Dharmapala Maha Vidyalaya, Pannipitiya on 9-3-67, culminated this (1966) programme. The Hon'ble Ministers of Commerce & Trade and Agriculture & Food were present in addition to many distinguished visitors. The prizes and certificates to winners in the sheet competition were presented by the Hon'ble Minister of Commerce & Trade, while the Hon'ble Minister of Agriculture & Food opened the exhibition.

The field staff doubled their efforts to improve smallholders' sheet to Grade 1 RSS. All possible assistance and advice were given to smallholders in the manufacture of their sheet. Rubber Instructors persuaded smallholders to commence building 19 demonstration and 116 ordinary smokehouses and 10 demonstration and 52 ordinary ones were completed during the year. They have also paid 1,720 visits to demonstration and 7,856 visits to ordinary smokehouses to advise smallholders on sheet improvement and on construction and improvement of smokehouses. 72 visits to co-operative societies and 438 visits to Commodity Purchase Depots were made to advise smallholders against defects in their sheet.

No aluminium pans or strainers could be issued to smallholders at concession rates as an encouragement to produce Grade 1 RSS as the expected financial assistance (for 1967) was not received from the Department of Commodity Purchase during the year. However a total of 2,430 aluminium pans and 478 strainers (a balance from 1966 stock) were sold to smallholders at concession rates.

The writer submitted to Director his detailed observations on the 1966 "crash programme" carried out for the improvement of smallholders' sheet rubber to RSS 1.

A batch of 12 mini-tanks and double strainers was imported from Malaysia with the idea of introducing them to smallholders for testing as to whether under our local conditions they could be used by smallholders to produce really clean and dirt-free sheet. These mini-tanks have 7 aluminium partitions each so that 8 sheets could be coagulated at one and the same time. They take up very little space in smallholders' curing sheds and can be easily covered during coagulation to prevent the introduction of dirt. Eight tanks were issued to the eight divisions for testing and report. These tanks are also being displayed at exhibitions in the field for popularising their use in our campaign to induce small owners to manufacture clean, top quality sheet.

GENERAL ASSISTANCE

The officers of the department rendered every assistance to smallholders in lining their holdings for soil conservation works and planting holes free of charge, planting budded stumps and clonal seedlings, manuring, planting cover crops, disease control, marking trees for tapping both in new planted and subsidy re-planted areas and construction and improvement of demonstration, and ordinary smokehouses.

10 cwt. of R.463 Mg. rubber mixture was purchased by a smallholder through this department. A pair of Jinasena's rubber rollers was ordered by a smallholder through this department at concession rate.

TAPPING TRAINING CLASSES

The tapping training classes for training smallholders in rubber tapping, manufacture and other allied subjects on rubber were organised this year too. All applications were received by the end of April 1967 and 40 classes were started. Later 8 classes had to be abandoned due to very poor attendance. 567 trainees participated in these classes and 422 were successful and certificates will be awarded.

SMALLHOLDER TRAINEES SUCCESSFUL IN THE TRAINING SCHEME IN
TAPPING CLASSIFIED ACCORDING TO DIVISION

Division	No. of trainees accepted	No. of trainees participated	No. successful
Kegalla	119	65	52
Avissawella	224	168	90
Homagama	74	43	36
Ratnapura	167	92	69
Matugama	141	70	64
Galle	149	73	70
Pasyala	19	13	8
Panadura	129	43	33
Total	1,022	567	422

SURVEYS

The rainfall survey was being continued.

STAFF

The Chief Advisory Officer Smallholdings was on duty throughout the year.

Messrs. K. P. Siriwardena, Rubber Instructor, Matugama and D. B. Weligodapola, Rubber Instructor, Publicity Unit 1 were promoted to the posts of Divisional Advisory Officers and were posted to Matugama and Galle Divisions respectively.

Applications were called internally for 4 posts of Rubber Instructors.

Mr. E. de Alwis Gunatilake, Rubber Instructor, Dodangoda retired from service as from 1-11-67 after 19 years of faithful service in the department. Mr. Gunatilake was an old New Rubber Planting Scheme Range Officer who came over to this department when the administration of the N.R.P.S. was transferred to the Rubber Research Institute in 1948. The department has lost the services of an honest and hard working officer as a result of his retirement, and we wish him a happy retirement.

The untimely death of Mr. D. E. A. Abeywickrema, Deputy Chief Advisory Officer, on 4-8-67 is recorded with deep regret. The department has lost the valuable and honest services of another hard working officer. Mr. Abeywickrema counts over 18 years continuous service in this department in addition to his services in the N.R.P.S. He too joined this department when in 1948 the administration of the N.R.P.S. was transferred to R.R.I.C. The post of Deputy C.A.O.S. was vacant since the death of Mr. Abeywickrema.

PUBLICATIONS

4500 copies of the posters on the manufacture of good quality sheet were reprinted and distributed among the field staff for issue to smallholders.

Smallholdings folders which are in short supply will be reprinted for issue to smallholders.

GENERAL

(a) Exhibitions

The department participated in the following exhibitions during the year :—

1. Yam exhibition — Panadura Balika Maha Vidyalaya on January 24th and 25th.
2. Pitigala Maha Vidyalaya exhibition — from 12th to 17th March.
3. Ananda Sastralaya exhibition, Matugama, from 6th to 8th April.
4. School exhibition — Omatta Vidyalaya, Ganegoda on 30th and 31st July.
5. Agricultural exhibition — Government Farm, Horana on 2nd and 3rd December.

The department assisted the following exhibitions in sending posters and leaflets etc.

1. Agricultural exhibition — Puwakmote Maha Vidyalaya, Rambukkana.
2. UNESCO exhibition — Sitawaka Vidyalaya, Avissawella.
3. Agricultural exhibition — Dorawaka Maha Vidyalaya.

(b) Correspondence

General

Inward	...	7542
Outward	...	7624

With Rubber Controller

Inward	...	2392 (N.P. applications etc.)
Outward	...	4804 (final inspection reports, preliminary reports and special reports etc.)

From Rubber Instructors to permit-holders

3290 letters.

(c) Special inspections for Rubber Control Department

Visits for preliminary reports	...	952
Visits for final inspection reports	...	1630
Visits for special reports (N.P.)	...	2222
Visits for special reports (subsidy)	...	159

(d) Lectures and Demonstrations

Divisional Advisory Officer, Homagama conducted a course of lectures on rubber cultivation for teacher trainees of the Education Department, who were following a course of training at the School of Agriculture, Horana.

The following demonstrations were given by the Rubber Instructors during the year under review :—

Sheet making	...	1263
Tapping	...	649
Disease control	...	406
Others	...	1050

(e) Loans

The following officers were given loans for the purchase and/or repair of motor vehicles :—

Mr. K. Ekanayake, Rubber Instructor	...	Rs. 3,500.00
„ G. P. G. S. Hapugoda, Rubber Instructor	...	„ 4,250.00
„ U. S. Wijepala, Rubber Instructor, P.U.	...	„ 5,400.00
„ W. D. Jayawardena, Rubber Instructor	...	„ 3,300.00
„ U. D. V. Gunasinghe, Rubber Instructor	...	„ 4,000.00
„ S. D. Athukorala, Rubber Instructor	...	„ 2,100.00
		<hr/>
		22,550.00
		<hr/>

(f) Conferences and Meetings

Four conferences of the supervisory officers were held at the Smallholdings Headquarters during the year, mainly to discuss arrangements for the island-wide sheet competition, sulphur dusting and outstanding reports etc. The Director was present at these conferences.

A conference for designing a streamlined and cheaper plan for smokehouses for smallholders with a view to cutting down costs of construction was held at the Smallholdings Headquarters on 4-8-67 presided over by the Director and attended by the Chief Advisory Officer Smallholdings, Divisional Advisory Officers, Matugama and Galle and the Building Foreman of the R.R.I.C.

The Chief Advisory Officer Smallholdings attended on invitation the rubber seminar at the C.I.S.I.R. organised by the Ministry of Commerce and Trade. He also attended the 1st meeting of the working committee of the technical and economic aspect of the Bureau of Ceylon Standards during the year. He also attended a Board meeting by invitation where departmental estimates and programme of work of this department for 1968 were considered.

The following Rubber Instructors attended meetings of various organisations as given below :—

1. Rubber Instructor, Ruwanwella — A meeting of social services at the Kabulumulla Vidyalaya, convened by the D.R.O., Yatiyantota.
2. Rubber Instructor, Nelundeniya — Rural societies meetings in July and December at the request of the D. R. O., Beligal Korale.
3. Rubber Instructor, Warakapola — A rural board meeting at the request of the D.R.O., Beligal Korale.
4. Rubber Instructor, Hiniduma — A meeting of the Divisional Joint Committee at the request of the D.R.O., Hiniduma Pattu.

(g) Recarving of Divisions

The 6 Divisional Advisory Officers' Divisions which existed from 1957 were recarved to make 8 divisions as from 1-1-67. The two new divisions added are Pasyala and Panadura, and Colombo division was re-organised and named Homagama.

The Director, R.R.I.C. inspected the Homagama and Panadura divisions in May this year.

REVIEW OF THE ESTATE DEPARTMENT

By

L. WIJEYAGUNAWARDENA

Acreage Summary — Dartonfield Group :

<i>Rubber</i>	Dartonfield			Nivitigalakele			Hedigalla			Total		
	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.
Mature ...	72	3	19	76	3	30	662	3	10	812	2	19
Immature ...	43	0	00	67	1	28	48	0	37	158	2	25
Nurseries ...	3	2	00	8	1	07	—	—	—	11	3	07
Total	119	1	19	152	2	25	711	0	07	983	0	11
Abandoned ...	11	2	00	2	3	01	—	—	—	14	1	01
Building sites etc. ...	40	2	36	15	1	33	8	1	18	64	2	07
Pinewood Plantation ...	—	—	—	—	—	—	1	0	34	1	0	34
Roads ...	6	2	22	0	3	27	9	0	04	16	2	13
Swamp Areas ...	—	—	—	0	2	08	0	2	20	1	0	28
Streams & reservations ...	0	0	29	—	—	—	13	0	29	13	1	18
Jungles etc. ...	—	—	—	1	3	38	395	0	00	396	3	38
	178	1	26	174	1	12	1138	1	32	1401	0	30

Visiting Agent :

Mr. M. W. Thompson paid two visits to the Institute's properties, one in April and the other in November 1967.

Weather (Estate Gauge) — Comparative rainfall figures (inches) for 1967 are given :—

<i>Month</i>	Dartonfield		Nivitigalakele		Hedigalla	
	1967	1966	1967	1966	1967	1966
January ...	4.69	7.52	1.81	6.92	4.41	9.75
February ...	6.92	6.61	4.32	5.03	5.93	4.48
March ...	11.37	11.44	14.16	11.01	15.13	14.22
April ...	13.64	21.41	8.40	22.97	9.54	23.54
May ...	23.67	4.82	22.68	8.44	17.31	5.97
June ...	16.11	10.31	16.25	9.59	18.03	10.57
July ...	16.99	8.90	14.20	8.21	12.98	8.45
August ...	15.93	14.80	12.95	11.19	12.93	14.50
September ...	22.05	25.90	19.46	22.31	12.28	29.78
October ...	36.47	25.94	27.71	18.91	32.31	19.62
November ...	13.55	13.23	8.94	15.10	17.48	8.81
December ...	13.11	7.84	9.51	7.58	8.16	11.80
	194.50	158.72	160.39	147.26	166.49	161.58
Average (5-year period) ...	199.28"		174.58"		192.65"	
Total No. of wet days ...	238	219	233	207	249	221

The rainfall for the year at Dartonfield, Nivitigalakele and Hedigalla Divisions amounted to 194.50", 160.39" and 166.49" on 238, 233 and 249 days respectively. The 2nd, 3rd and 4th quarters of the year recorded heavier falls than in 1966, the months of May and October being the wettest of the South West and North East monsoonal periods of the year.

Crop :

Weather conditions during the season under review show an unfavourable skew distribution of rainfall on the three divisions not conducive to both tapping and harvesting of crop and this was experienced particularly in the second and third quarters of the year, resulting in a reduced crop. Although Hedigalla Division has recorded a quantum of rain more or less identical with that of the previous year (1966), its distribution this year was more widespread in the months of May to December 1967, where 131.48 inches fell against 109.59 inches for the same period in 1966. The envisaged number of recovery tappings at Hedigalla could not therefore be achieved, thereby entailing heavy loss of crop, as it is this division which forms the major part of the crop on the Group.

		1967		1966
Estimated	...	692,000 lb		692,000 lb
Harvested	...	622,679 "		719,890 "
Decrease	...	<u>69,321 lb</u>	Increase	<u>27,890 lb</u>

The crop harvested for the year 1967 = 89.98% of the season's estimate.

Comparative Yield Records of Individual Fields

<i>Dartonfield</i>	<i>Acreage in tapping</i>	<i>Total yield in lb</i>		<i>Yield in lb per acre</i>	
		1967	1966	1967	1966
1950/51 Replanted Area	25½	15,396	17,201	597.9	668.0
1952 " "	27	24,546	27,889	909.1	1,031.1
1953 " "	8	7,178	8,123	897.2	1,015.4
1954 " "	2½	2,248	2,773	899.2	1,109.2
1955 " "	5	3,495	3,422	699.0	684.4
1956 " "	4½	3,497	4,039	736.2	850.3
	<u>73</u>	<u>56,360</u>	<u>63,397</u>	<u>772.1</u>	<u>868.5</u>

Nivitigalakele

1939 Replanted Area	—	—	7,278	—	710.0
1940 " "	9½	6,946	9,865	712.4	1,011.8
1940 Swamp Area	3½	3,184	3,158	979.7	971.6
1941 Clearing	7	8,849	12,229	1,264.1	1,747.0
1942 " "	4½	3,168	4,354	704.0	967.5
1943 " "	7	5,619	5,852	802.8	836.0
1944 " "	4½	4,200	4,936	933.3	1,096.8
1946 " "	21	33,549	28,587	1,597.6	1,361.3
1953 " "	10	11,816	12,106	1,181.6	1,210.6
1954 " "	10	11,008	12,789	1,100.8	1,278.9
	<u>77</u>	<u>88,339</u>	<u>101,154</u>	<u>1,147.3</u>	<u>1,159.4</u>

<i>Hedigalla</i>	Acreage in tapping	Total yield in lb		Yield in lb per acre	
		1967	1966	1967	1966
1943 Clearing	—	—	9,273	—	904.7
1944 "	—	—	9,576	—	815.0
1945 "	22½	16,219	15,591	729.0	700.7
1946 "	12½	8,680	9,205	681.5	722.0
1947 "	45	16,176	28,487	359.5	588.6
1949 "	84½	28,543	37,480	821.4	1,078.6
1950/51 "	18	18,202	20,422	1,011.2	1,134.6
1952 "	79½	62,361	69,479	784.4	874.0
1953 "	132½	107,660	124,107	812.5	936.7
1954 "	171	114,537	120,843	669.8	706.7
1955 "	78	62,059	70,843	795.6	908.2
1956 "	60	37,024	37,432	617.1	680.6
1957 "	9	6,510	4,601	723.3	657.3
	<u>662½</u>	<u>477,980</u>	<u>555,339</u>	<u>721.2</u>	<u>819.4</u>
Total for the Group	<u>812½</u>	<u>622,679</u>	<u>719,890</u>	<u>766.1</u>	<u>859.1</u>
Other sources		868	737		
Total		<u>623,547</u>	<u>720,627</u>		

Tapping

The non-experimental areas were tapped throughout the wintering period. Tapping panels were marked with the appropriate bark consumption. Tapping was resumed in the non-experimental areas after winter rest during refoliation.

Analysis of tapping rounds on Dartonfield Group for 1967 (1966 figures in brackets)

<i>Dartonfield</i>	Early Tapping		Late Tapping		Winter Rest		No Tapping Rain		Holidays	
	1st Quarter	72	(71)	16	(14)	—	—	—	(2)	2
2nd "	40	(55)	24	(19)	—	—	22	(13)	5	(4)
3rd "	45	(47)	22	(21)	—	—	25	(24)	—	—
4th "	49	(51)	27	(33)	—	—	16	(7)	—	(1)
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	206	(224)	89	(87)	—	—	63	(46)	7	(8)
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<i>Nivitigalakele</i>	Early Tapping		Late Tapping		Winter Rest		No Tapping Rain		Holidays	
	1st Quarter	78	(74)	12	(14)	—	—	—	(2)	—
2nd "	45	(43)	23	(32)	—	—	17	(10)	6	(6)
3rd "	46	(42)	22	(26)	—	—	24	(24)	—	—
4th "	50	(48)	26	(31)	—	—	16	(13)	—	—
<hr/>										
	219	(207)	83	(103)	—	—	57	(49)	6	(6)
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<i>Hedigalla</i>	<i>Early Tapping</i>		<i>Late Tapping</i>		<i>Winter Rest</i>		<i>No Tapping Rain</i>		<i>Holidays</i>	
1st Quarter	67	(70)	20	(16)	—	—	3	(4)	—	—
2nd „	50	(44)	18	(27)	—	—	20	(16)	3	(4)
3rd „	49	(46)	18	(21)	—	—	25	(25)	—	—
4th „	50	(46)	27	(32)	—	—	15	(14)	—	—
	216	(206)	83	(96)	—	—	63	(59)	3	(4)

Manufacture

A summary of the various forms of manufacture during the year is given below :—

<i>Latex Grades</i>	<i>Total in lb</i>	<i>Percentage</i>
Pale Crepe No. 1 ...	410,839	65.90
Pale Crepe No. 2 ...	29,886	4.80
Pale Crepe No. 3 ...	94,684	15.20
Latex for experiments ...	5,836	0.94
	540,745	86.84
Scrap Crepe No. 1 ...	50,654	8.13
Scrap Crepe No. 2 ...	24,011	3.86
Scrap Crepe No. 3 ...	7,269	1.17
	81,934	13.16
Total	622,679	100.00
From outside sources ...	868	
Total	623,547	

The production of a high percentage of uniform No. 1 crepe is made increasingly difficult with acreages of experimental areas of numerous clones with different latices in production.

Factory and Machinery

Machinery : (a) In accordance with a programme of progressively replacing all D.C. motors with A.C. motors, two motors of the two smooth mills Nos. 7 and 8 were replaced by A.C. motors during the year.

Factory : (b) Extensive repairs were effected to the dripping loft.

(c) Internal alterations to the factory providing more light, ventilation and space for sorting and packing was carried out.

Miscellaneous

Field and factory experiments : The Rubber Chemistry, Botany, Plant Pathology and Soils Departments were given assistance in carrying out their field and factory experiments.

Estimates : Estimates of capital and revenue expenditure for 1968 in respect of Dartonfield Group were prepared and submitted by the writer to the Rubber Research Board.

Estate Road : All motorable roads and paths were maintained in good order throughout the year.

Manuring : Mature areas of the Group received fertilizers in accordance with the Institute's recommendations.

Pests and Diseases

Oidium heveae : The wintering of trees was late this year, rainfall being one of the contributing factors. The very uneven wintering was marked by the unusual defoliation confined to the upper sector of the canopy of leaves of trees. The late refoliating branches were open to a fairly severe attack of *Oidium*. Due to the multiplicity of clones, and numerous clones on a per acre basis planted in close proximity to each other, a protracted spell of 'spot' sulphur dusting was necessitated. Dusting commenced in February and continued throughout March and April particularly on Hedigalla Division. Due to the protracted *Oidium* season, heavy flower fall was observed, resulting in poor pod set. A satisfactory control was however achieved, although the refoliated canopy of leaf was not as satisfactory as in the previous year.

Gloeosporium alborubrum : The incidence of *Gloeosporium* was negligible.

Phytophthora palmivora : The leaf fall due to *Phytophthora* which was mild last year was more pronounced this year and confined to the very susceptible clone of LCB 870 (crown budded), and a few non-recommended clones under test. Satisfactory control was however achieved by spot dusting with copper based fungicidal dust.

Bark Rot : The incidence of Bark Rot was negligible.

Wind damage : This was rather marked this season with Dartonfield, Niviti-galakele and Hedigalla having 40, 143 and 1307 trees respectively wind-damaged.

Capital Account — Agricultural Development

Dartonfield Division — Immature Areas

1960/61 Replanted Area	...	31½	
1965 " "	...	11½	... 43 acres

Niviti-galakele Division — Immature Areas

1962 Replanted Area	...	16¾	
1963 " "	...	14	
1964 " "	...	8	
1965 " "	...	10	
1966 " "	...	5¾	
1967 " "	...	8¾	... 63½ acres

Hedigalla Division — Immature Areas

1965 Replanted Area	...	11½	
1967 " "	...	21½	... 32¾ acres

Routine weeding, cultivation and other agricultural operations were carried out. The immature areas are in good condition and were maintained up to the required standards of sound agricultural practice.

1960/61 *Replanted Area* (31½ acres) at *Dartonfield* : This area carries two tapping tasks of each of the clones RRIC 7, RRIC 45, RRIC 52, RRIC 88, RRIC 89, PB 28/59, PB 86 and RRIM 513. Growth is good. The area was well weeded and manured and attention given to root diseases. This will be brought into tapping in 1968.

1962 *Replanted Area* (16¾ acres) at *Nivitigalakele* : This area is planted with the following clones : RRIC 5, RRIC 39, RRIC 51, RRIC 86, RRIC 90, RRIC 91, RRIC 92, RRIC 93, RRIC 94, RRIC 95, RRIC 96, RRIC 97, PB 86, IAN 45-717, RRIM 623, RRIM 628, RRIM 701 and 17 ten-tree clones. Growth was quite satisfactory, but as reported earlier fairly uneven due to the variability of the growth characteristics of each clone. Weeding, manuring and attention of root diseases were carried out.

1963 *Replanted Area* (14 acres) at *Nivitigalakele* : This is planted with five plots of 300 points each of clones RRIC 59, RRIC 60, RRIC 64, RRIC 75 and PB 86 and four plots of 150 points each of clones RRIC 6, RRIC 39, RRIC 41 and RRIC 98. A further 150 points of PB 86 were planted uneven growth. Routine agricultural operations were carried out with special attention given to root diseases.

1964 *Replanted Area* (8 acres) at *Nivitigalakele* — This is planted with four clones : RRIC 41, RRIC 45, RRIC 52 and RRIC 86. The growth of plants is very satisfactory. Routine agricultural operations were carried out.

1965 Replanting

- (a) 11½ acres at *Dartonfield* : This is planted with 5-point buddings of H.P. seedlings, RRIC 45, RRIC 88, RRIC 89, RRIC 90, RRIC 91 and RRIM 600. Growth though uneven is good. Close attention was paid to weeding, manuring and root diseases.
- (b) 10 acres at *Nivitigalakele* : This area consists of a monoclonal block of RRIC 45. Growth is satisfactory. Routine agricultural operations were carried out.
- (c) 11½ acres at *Hedigalla* : This area is made up of sixteen small plots scattered over different fields and sandwiched among planted rubber. The originally planted material consisted of LCB 870 buddings. This carries plants of RRIC 52. Growth is satisfactory.

1966 Replanting

5¾ acres at *Nivitigalakele* : This was replanted during the South West monsoon of 1966, in keeping with the requirements of the Plant Breeding and Botanical Departments. Details of materials used are as follows : RRIC 45 — 265 plants ; clone No. 451 — 384 plants ; clone No. 1000 — 296 plants and another 102 plants made up of the following : J 1, *Hevea sp.*, RRIC 5, 7, 41, 45, 52, 58, 59 and 86. The plants are coming on well.

1967 Replanting

- (a) $8\frac{1}{2}$ acres at *Nivitigalakele*: This area was replanted in the South West monsoon of 1967 and carries 1601 plants of clones 1174, 815, 1103 in three randomised replications with RRIM 623 as an observational plot. The plants are growing satisfactorily.
- (b) $21\frac{1}{2}$ acres at *Hedigalla*: Approximately 10 acres of this area was planted during the North East planting season by the Botany and Genetics and Plant Breeding Departments. The planting material being:

Botany Department	...	RRIC 41, 45, 86, 88 and 89
Genetics and Plant Breeding Department	...	Three 150-tree replications of RRIC 45 and 1108, and one 150-tree observational plot each of clones 1174, 1010 and 1004.

Nurseries

Budwood Nurseries — Dartonfield

- (a) Routine weeding and clearing of drains were carried out in the nurseries. Plants were manured in accordance with the Institute's recommendations.
- (b) Plants bearing over-matured budwood were lopped.

Seedling and Budwood Nurseries — Nivitigalakele

- (a) Weeding, clearing of drains and manuring were done.
- (b) Vigorous-growing stocks in these nurseries were budded to meet requirements.

Budwood Issues

Outside estates	...	610 yards
Botany Department Experiments	...	830 „
Hedigalla Nursery Plantings	...	638 „
Nivitigalakele Budgrafting	...	4 „
		<hr/>
		2082 „
		<hr/>

Budwood Multiplication Nursery, Hedigalla

The Rubber Replanting Subsidy Scheme nursery at Hedigalla was taken over by the Rubber Research Institute in January 1967. Appropriate steps were taken in accordance with the estimates prepared by the writer in 1966 for the conversion of the existing nursery to a budwood multiplication nursery in 1967 and accordingly 7 acres of budwood nursery was laid out in May/June with $2\frac{1}{2}$ acres of seedling stock nursery in August 1967. An additional 1 acre was also laid out in August for use of the Estate and Botany Departments at the same time.

The budwood multiplication nursery carries the following material: RRIC 36, 37, 41, 45, 86, 88, 89, 90, 91 and RRIM 600 totalling 9388 plants.

Labour and Health

- (a) *Labour force* : The regular labour force was adequate and generally settled.
- (b) *Line rooms* : Line room accommodation was satisfactory.
- (c) *Wages* : Wages were paid during the year in accordance with the Wages Boards Ordinance in force.

Dartonfield Group

<u>Working Ceylonese</u>	<u>Resident</u>	<u>Non-resident</u>	<u>Total</u>
Men ...	110	200	310
Women ...	92	152	244
Children ...	—	—	—
<u>Working Immigrants</u>			
Men ...	36	—	36
Women ...	21	—	21
Children ...	—	—	—
	<u>259</u>	<u>352</u>	<u>611</u>

- (d) *Annual holidays* : Annual holidays with pay were given to all labourers who were entitled to these in accordance with the Ordinance.
- (e) *Maternity Benefits* : Forty-two full maternity benefits and four medical wants benefit payments were made.
- (f) *Feeding Children* : Free rations and $\frac{1}{4}$ lb bread were issued to each non-working child.
- (g) *Health* : The health of the members of the Institute's staff and of the estate labourers was satisfactory during the year.
- (h) *Anti-mosquito measures* — DDT/Gammexane spraying was carried out throughout the year, at regular intervals, in and around the bungalows and lines under the supervision of the Apothecary.
- (i) *Births* : Thirty-seven children were born during the year on the Group.
- (j) *Deaths* : There were two deaths on the Group this year.

A list of diseases treated by the Institute's Apothecary is given below :—

Influenza ...	...	2,241
Ulcers ...	...	621
Roundworms ...	...	1,286
Diarrhoea and Enteritis ...	...	817
Eye and Ear Diseases ...	...	229
Other Diseases ...	...	5,982
		<u>1,1176</u>

REVIEW OF THE R.R.I.C. SUB-STATION, KURUWITA

By

W. L. SCOTT*

Acreage

			A	R	P
Mature policlonal	...	...	10	1	23
Replanted 1961 — 1967	...	...	202	1	12
Uprooted for replanting in 1968	...	...	10	0	00
Nurseries	...	...	2	0	00
Roads, deniya and buildings	...	...	22	3	35
Total			247	2	30

During the year 1967, a further 10 acres have been replanted in hand-pollinated clones by the Plant Breeding and Genetics Department and a further 10 acres have been uprooted for replanting in 1968 in the S.W. monsoon period, leaving A10 R1 P23 of old policlonal rubber to be undertaken in 1969. An extension of $\frac{1}{4}$ acre has been carried out to the nurseries in 1967. In the 64 acres of the 1961 clearing some more trees, which have attained a girth of 20" and above, have been brought into tapping.

Staff

The post of Rubbermaker/K.P. still remains vacant, and Mr. M. C. Perera has continued to undertake these additional duties.

Weather

The weather has been generally wet throughout the year, with a higher total rainfall as compared to last year, culminating in floods in October.

Crop

		<u>1966</u>	<u>1967</u>
Estimated	...	19,500 lb	45,600 lb.
Secured	...	33,796 ,,	36,772 ,,

There has been a shortfall in estimated crop for the year, during which weather conditions have not been favourable for rubber harvests. The mature areas, were reduced in extent by 10 acres and have now been intensively tapped for the past nearly 4 years, with the consequent reduction in crop. The harvests from the 64 acres were included in the estimate.

Tapping and Manufacture

The actual final cost of tapping is not available. Intake per tapper was 11.6 lb. A good standard of tapping continued to be maintained in the 1961 clearing.

* Mr. B. Cocking functioned as Visiting Superintendent of the Kuruwita Sub-station in 1967.

Latex crop has continued to be manufactured as smoked sheet. Sales average for 1967 was 65 cts. per lb. Outturn of No. 1 sheet was 89%. Machinery and factory are in good order.

General

Repairs and maintenance, as necessary, were carried out to the factory and smokehouse. The twelve labourers' cottages were whitewashed and roofs tarred. The construction of the new office block was completed and handed over by the contractor. Roads have been well maintained. All suitable deniya areas, in extent 10 acres approximately, have been given out to resident labourers for paddy cultivation.

The labour force has generally worked well during the year.

The Sub-station continues to be maintained in good order, and once again we wish to place on record our appreciation for the useful advice and assistance rendered by Mr. M. W. Thompson, our Visiting Agent.

Without the assistance of a Rubbermaker /K.P. throughout the whole year, Mr. M. C. Perera, our Senior Field Assistant, has continued cheerfully to carry the heavy burden of responsibility.

It has not been possible to give the annual expenditure figures since the final memo has not been received.