THE

Tea Research Institute

OF

Ceylon

BULLETIN No. 32

Annual Report for the Year 1950

Published by
THE TEA RESEARCH INSTITUTE OF CEYLON
ST. COOMBS, TALAWAKELLE, CEYLON.
1952.

The Tea Research Institute of Ceylon

STAFF

DIRECTOR	..	J. Lamb, M.Sc. (Lond.), F.R.I.C., A.I.C.T.A.
Chemical Division.		
Biochemist	..	J. Lamb, M.Sc., (Lond.), F.R.I.C., A.I.C.T.A.
Agricultural Chemist	..	F. Haworth, B.Sc., PH.D., (Liv.)., Dip. Agric. (Cantab.).
Technologist	..	E. L. Keegel
Research Assistant to Biochemist	..	M. S. Ramaswamy, B.Sc., (Mysore)., A.R.I.C., A.I.I.Sc.
Assistants	..	E. N. Perera, V. Mendis & S. M. Gunaratnam.
Plant Physiology Department.		
Plant Physiologist & Deputy Director	..	G. B. Portsmouth, B.Sc. (Lond.), A.R.C.S., D.I.C.
Research Assistant	..	F. H. Kehl.
Assistants	..	M. Piyasena & E. S. Rajiah.
Pathology Department.		
Pathologist	..	C. A. Loos.
Mycologist	..	B. N. Webster, B.A., (Cantab.), M.Sc., (Nottm.).
Assistant Pathologist	..	G. D. Austin
Assistant	..	D. J. W. Ranaweera.
Engineering Department.		
Engineer	..	J. Landreth, A.M.I.B.A.E., Member A.S.A.E.
St. Coombs Estate.		
Superintendent	..	F. C. Daniel
Low-Country Sub-Station.		
Scientific Officer	..	T. E. Walter, B.Sc., (Edin.).
Assistant	..	F. P. Jayawardana.
Administration.		
Secretary	..	G. A. D. Kehl.
Secretary to the Director	..	A. C. Perera.
Asst. Secretary/Librarian	..	G. Mason, B.A., (Lond.).
Accounts Clerk	..	A. H. B. Dias.
Stenographers	..	F. G. de Sielvie & A. Nugara.
Asst. Clerks	..	K. A. Salaam & R. L. A. Dissanayake.
Small Holdings Advisory Service.		
Officer-in-charge	..	R. L. Illankoon.
Tea Small Holdings Officers	..	W. T. Fonseka, K. P. Abeywickreme, M. V. de Silva & K. de A. Kulasekera.

NOTE

The Laboratories of the Institute are situated at St. Coombs Estate, Talawakelle, and letters and enquiries should be addressed to the Director, Tea Research Institute of Ceylon, St. Coombs, Talawakelle, Telegraphic Address :—Research, Talawakelle, Telephone, Talawakelle 44 (Private Exchange). It is particularly requested that letters should not be addressed to Officers by name.

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CONTENTS

TWENTY-FIFTH ANNUAL REPORT OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON FOR THE YEAR 1950

Foundation. The Tea Research Institute of Ceylon was established by Ordinance No. 12 of 1925, dated 27th October, 1925, and amended by the Tea Research (Amendment) Act No. 24 of 1948, dated 20th December, 1948.

The personnel constituting the Board of Control on the 1st day of January, 1950, were :—

Ex-Officio Members

The Director of Agriculture (Mr. D. Rhind).

The Hon'ble the Minister of Finance (Represented by Mr. C. E. Jones, C.M.G., C.C.S.)

The Chairman, Planters' Association of Ceylon (Mr. E. G. Groves).

The Chairman, Agency Section of the Planters' Association of Ceylon, (Mr. G. K. Newton).

Representatives of the Planters' Association of Ceylon

Mr. R. C. Scott, C.B.E.
Mr. W. L. Ross.
Mr. H. de T. Wilkinson-Kay.

Representatives of the Agency Section, Planters' Association of Ceylon

Mr. R. Singleton Salmon.
Mr. W. H. Attfield.
Mr. E. N. Ewart (Acting for Mr. F. A. Bond).

Representatives of the Low-country Products Association

Mr. W. Neal de Alwis, J.P., U.M.
Mr. Leo B. de Mel, J.P., U.M.
Mr. Errol Jayawickreme.

Representatives of the Small Holders

Mr. V. G. W. Ratnayake, M.P.
Chairman : Mr. R. C. Scott, C.B.E.
Secretary : Mr. J. Lamb, M.Sc., (Acting).
Solicitors : Messrs. Julius & Creasy.
Auditors : Messrs. Ford, Rhodes, Thornton & Company.
Registered Office : St. Coombs, Talawakelle.

The following changes in the personnel of the Board were recorded during the year.

Ex-Officio Members :

Mr. G. K. Newton, Chairman, Agency Section of the Planters' Association of Ceylon, vice Mr. R. J. Hartley, as from 1st January, 1950.

Mr. R. C. L. Notley, Chairman, Planters' Association of Ceylon, vice Mr. E. G. Groves, as from 20th April, 1950.

Mr. T. D. Perera, C.M.G., C.C.S., representing the Hon'ble the Minister of Finance, vice Sir Charles Jones, K.C.M.G., as from 10th July, 1950.

Mr. A. G. Ranasinghe, C.M.G., C.B.E., C.C.S., Acting Secretary to the Treasury, vice Mr. T. D. Perera, C.M.G., C.C.S.

Dr. A. W. R. Joachim, Acting Director of Agriculture, vice Mr. D. Rhind, as from 2nd September, 1950.

Representatives of the Planters' Association of Ceylon

Mr. H. S. Hurst, vice Mr. W. L. Ross as from 20th April, 1950.

Representatives of the Agency Section, Planters' Association of Ceylon

Mr. J. C. Kelly, vice Mr. W. H. Attfield, as from 31st March, 1950.

Mr. F. A. Bond, vice Mr. E. N. Ewart, as from 1st June, 1950.

Mr. W. H. Attfield, vice Mr. F. A. Bond as from 15th November, 1950.

Representatives of the Low-Country Products Association

Messrs. W. Neal de Alwis, J.P., U.M. resigned from the Board as from 13th November, and Messrs. Leo B. de Mel, J.P., U.M., and Errol Jayawickreme as from 17th November. The seats remained vacant for the rest of the year.

Five meetings of the Board were held during the year on 1st April, 23rd June, 26th/27th July, 18th October and 20th December.

Mention must be made of the fact that, after a considerable period of years, the Board met at St. Coombs. The meeting which took place on the 27th and 28th of July was well attended.

During the year two members of the Board, viz. Sir Charles Jones and Mr. R. Singleton-Salmon, were recepients of King's Birthday Honours, the former being conferred the K.C.M.G., and the latter the C.B.E.

Committees.

Finance Sub-Committee : The Chairman, TeaResearch Institute of Ceylon (Mr. R. C. Scott, C.B.E.), The Chairman, Planters' Association of Ceylon (Mr. E. G. Groves), The Chairman, Agency Section, Planters' Association of Ceylon (Mr. G. K. Newton), Messrs. R. Singleton-Salmon, W. L. Ross, W. H. Attfield and the Acting Director and Secretary (Mr. J. Lamb).

The following changes in the membership of the Committee were recorded during the year :—

Mr. J. C. Kelly, vice Mr. W. H. Attfield as from 31-3-1950.

Mr. H. S. Hurst, vice Mr. W. L. Ross, as from 20-4-1950.

Mr. R. C. L. Notley, vice Mr. E. G. Groves, as from 20-4-1950.

Mr. G. K. Newton (Chairman, Agency Section), vice Mr. R. J. Hartley as from 1-1-50.

The Committee met on three occasions, *i.e.*, 19th May, 27th July, and 20th December.

Estate and Experimental Sub-Committee : The Acting Director, Tea Research Institute of Ceylon (Mr. J. Lamb), Chairman ; The Chairman, Tea Research Institute of Ceylon (Mr. R. C. Scott, C.B.E), The Visiting Agent (Mr. A. H. Hall), The Superintendent, St. Coombs Estate (Mr. F. C. Daniel), Messrs. P. B. Cruickshank, S. Bolster (Acting for Mr. H. S. Hurst), C. R. Lawton, G. K. Newton, R. H. Horne.

Changes during the year were :—

Mr. H. S. Hurst, vice Mr. S. Bolster as from 20-4-1950.

Mr. S. P. Vytilingam, vice Mr. C. R. Lawton as from 6th November, 1950.

Mr. Bruce S. Gibbon, Acting Superintendent, vice Mr. F. C. Daniel (on leave) as from 3rd October, 1950.

Meetings of the Sub-Committee were held on 13th May, 14th October, and 9th December.

Low-Country Sub-Station Sub Committee : Messrs. R. C. Scott, C.B.E., (Chairman, T.R.I.), V. G. W. Ratnayake, M.P., Leo B. de Mel, J.P., U.M., W. Neal de Alwis, J.P., U.M., R. C. L. Notley, Dr. A. W. R. Joachim and Mr. J. Lamb (Acting Director).

Trustees—Junior Staff Provident Fund : The Chairman, T.R.I. (Mr. R. C. Scott, C.B.E.), the Acting Director, T.R.I. (Mr. J. Lamb), Mr. R. Singleton-Salmon, representing the Board of the Tea Research Institute of Ceylon, and Mr. E. N. Perera representing the Junior Staff.

Committee of Management, Junior Staff Medical Fund: The Chairman, T.R.I. (Mr. R. C. Scott, C.B.E.), The Acting Director, T.R.I. (Mr. J. Lamb), and Mr. G. D. Austin representing the Junior Staff.

Visiting Agent : Mr. A. H. Hall continued as the Visiting Agent for St. Coombs Estate and paid three visits during the year on 27th February, 5th August and 8th December, 1950.

Finance : Receipts from the Research Cess which amounted to Rs. 743,330 registered an increase of Rs. 4,402 over that for 1949, while interest and miscellaneous receipts showed an appreciable difference. There was, however, a loss of Rs. 13,079 on the St. Coombs Estate Working Account as against a profit of Rs. 83,149 in 1949. Total receipts for the year 1950 were consequently less than that for the previous year by Rs. 79,028.

Total expenditure including the loss on the Estate Working Account, viz., Rs. 13,079, but excluding the reserve of Rs. 50,000 set aside for the Low-Country Sub-Station, was higher than the 1949 figure by Rs. 19,161. Expenditure totalled Rs. 604,871 and comprised Research Revenue Expenditure Rs. 522,965, Interest on Government Loan Rs. 13,684, Depreciation Rs.49,006 Low-Country Sub-Station Rs. 61,738, besides the Loss on the Estate Working Account.

The final result of the working account for the year 1950 showed a surplus of Rs. 145,802 as compared with a surplus of Rs. 199,099 in 1949. Capital expenditure amounted to Rs. 165,486 as compared with Rs. 208,940 in 1949

and Rs. 250,538 in 1948. Items on capital expenditure included Land Development Rs. 14,717, Buildings Rs. 77,559, Machinery & Equipment Rs. 12,414 Repayment of Government Loan Rs. 60,796.

Net liquid assets as at 31st December, 1950, amounted to Rs. 430,980 after allowing for liabilities including Furlough and Passages Reserve and accrued interest on the Government Loan. The liability on depreciation reserve to 31st December, 1950, viz. Rs. 750,351 was, therefore, covered to the extent of 58%.

The balance still outstanding on the Government Loan at the end of 1950 was Rs. 203,199.

The contribution of Rs. 150,000 received from the Tea Controller for the intensification of the blister blight campaign was overspent by Rs. 1,439 at the end of the year.

St. Coombs Estate. Mr. F. C. Daniel continued as Superintendent until the beginning of October when he proceeded on long leave. Mr. Bruce S. Gibbon was appointed to act as Superintendent as from 3rd October, 1950. No other changes of staff took place during the year.

Largely owing to an unusually prolonged drought which inhibited growth even in the normal "rush" period April/June, the year was a quite exceptionally bad one and only 151,291 lbs. of crop were harvested compared with 174,653 lbs. which was also low and similarly affected by severe drought in 1949. The very poor crop harvested, combined with a high cost of production resulted in a loss of Rs. 13,079 compared with a profit of Rs. 83,149 in 1949.

Publications. The position as regards the issue of the Institute's publications improved considerably during the year under review and all parts of the Tea Quarterly, with the exception of the combined number, viz., Parts 2/3 were issued within the year. The Annual Report for 1948, viz., Bulletin No. 30, was also issued in 1950.

Receipts from subscriptions and sales of publications amounted to Rs. 8,245/51 and from advertisements Rs. 3,125. The total cost of printing the publications was Rs. 13,408/38.

The demand for copies of past issues of the Institute's publications was such that during the year several more numbers were added on to the list of those now completely out of print. A very limited number of some of the publications, including Monographs on Tea Production Nos. 1 and 2, are still available. Particulars can be had on application to the Librarian.

Acknowledgments. Again the Board wishes to acknowledge its gratitude to the Ceylon Association in London, the Planters' Association of Ceylon, the Agency Section of the Planters' Association of Ceylon, the Agency Houses, Engineering Firms and other bodies for their ready co-operation and the continued assistance extended by them to the Institute. The Planters' Association of Ceylon also again made their room available for meetings of the Board and its Sub-Committees.

Accounts. The Audited Statement of Accounts and the Balance Sheet for 1950 are attached hereto, together with the report on St. Coombs Estate and those of the Director and the Scientific Staff.

(Sgd.) J. LAMB,
Secretary.

THE TEA RESEARCH INSTITUTE OF CEYLON

ESTATE WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950

1949 Rs.	EXPENDITURE	Rs. Cts.	Rs. Cts.	1949 Rs.	INCOME		Rs. Cts.	Rs. Cts.
	ESTATE EXPENDITURE—REVENUE :—				TEA SALES :—			
82,798	General Charges	92,244.59		383,895	Colombo to Invoice No. 36	142,164 lbs.	328,612.87	
58,604	Upkeep	70,755.07		1,489	Local	1,236 ,,	2,336.49	
33,086	Cultivation	50,075.10		2,446	Broken Mixed	6,297 ,,	3,098.26	
56,900	Harvesting	62,820.99		477	Bio Department	186 ,,	422.22	
68,533	Manufacture	64,538.55	340,434.30		Gratis	1,408 ,,		
				388,307		151,291 ,,		334,469.84
299,921								
5,494	Colombo Brokerage and Handling Charges		4,707.76	250	Motor Road Roller Account			——
—	Motor Road Roller Account—Loss on Working		2,406.66		Balance carried down			13,078.88
83,142	Balance carried down							
Rs. 388,557			Rs. 347,548.72	Rs. 388,557				Rs. 347,548.72

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950

1949 Rs.			Rs. Cts.	Rs. Cts.	1949 Rs.		Rs. Cts.	Rs. Cts.
		ADMINISTRATION OF THE BOARD :—			83,142	Balance from Estate Working Account		
	240	Planters' Association of Ceylon	240.00		738,928	Tea Cess		743,330.49
	3,906	Travelling of the Board	5,559.00		293	Guest House Account		172.75
	15,626	Clerical Staff	19,558.07		705	Rent of Caddy		600.00
	1,596	Telephone Operators	1,699.38		6,633	Interest on Investments and Deposits		6,570.06
	1,331	Office Peon	1,437.07					
	1,219	Postages	1,038.88					
	2,533	Stationery	2,486.71					
	283	Advertising	510.00					
	980	Telegrams, Trunk Calls	1,518.16					
	—	Printing	200.00					
	—	Legal Expenses	292.40					
	1,576	Auditors' Fees	1,679.33					
	222	Contingencies	273.05					
36,745	7,233	Dearness Allowance	10,122,69	46,614.74				
36,745				46,614.74	829,701	Carried forward		Rs. 750,673.30

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950—(*contd.*)

1949 Rs.			Rs. Cts.	Rs. Cts.	1949 Rs.		Rs. Cts.	Rs. Cts.
B/f 36,745		Brought forward		46,614·74	B/f 829,701	Brought forward		Rs. 750,673.30
		PERSONAL EMOLUMENTS OF SCIENTIFIC STAFF :-						
	29,877	Director	27,828.33					
	6,658	Pathologist	10,050.00					
	8,003	Successor	—					
	2,011	Agricultural Chemist	6,128.96					
	20,931	Bio-Chemist	11,466.66					
	17,405	Plant Physiologist	20,564.00					
	2,000	Agricultural Officer	12,100.00					
	25,387	Dearness Allowance	27,065.15					
	4,331	Proportion, 30% Superintendent's pay	4,142.48					
		Dr. C. H. Gadd's Salary January/March	9,314.01					
	—	Allowance — Deputy Director	750.00					
	—	Allowance — T. E. Walter	1,250.00					
		Leave Pay and Allowances to retiring						
	51,534	Staff	—					
176,137	8,000	Mycologist	—	130,659.59				
		EMOLUMENTS — JUNIOR AND SUB-SCIENTIFIC STAFF :—						
	59,856	Junior Scientific Staff	67,259.52					
	8,764	Laboratory Attendants	9,837.15					
90,552	21,932	Dearness Allowance	27,979.17	105,075.84				
c/o 303,434		Carried forward		Rs. 282,350.17	c/o 829,701	Carried forward		Rs. 750,673.30

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950—(*contd.*)

1949 Rs.			Rs. Cts.	Rs. Cts.	1949 Rs.		Rs. Cts.
B/f 303,434		Brought forward		282,350.17	B/f 829,701	Brought forward	750,673·30
		LABORATORY :—					
	10,159	Equipment and General Working Expenses	10,846.61				
	105	Furniture and Office Equipment	74.30				
		Special Provision for Joint Chemistry of Research					
11,247	983	on Tea	—	10,920.91			
		SMALL HOLDINGS :—					
	16,774	Salaries and House Allowances	18,316.83				
	7,838	Travelling and General Expenditure	8,903.88				
	1,144	Working Expenses	2,792.21				
27,927	2,171	Dearness Allowance	3,367.00	33,379.92			
		LIBRARY AND PUBLICATIONS :—					
	4,097	Library	4,661.32				
10,825	6,728	Publications	2,075.57	6,736.89			
		FIELD AND FACTORY EXPERIMENTS :—					
	4,497	Agricultural Chemist	4,761.10				
	7,120	Plant Physiologist	8,193.82				
	1,323	Miscellaneous Field Experiments	895.10				
18,938	5,998	Factory Experiments	6,491.31	20,341.33			
		TRAVELLING OF STAFF :—					
	10,718	Officers' Expenses	7,005.73				
	671	Insurance of Car and Licence	542.28				
	1,351	Drivers Wages	1,931.86				
	583	Drivers Batta	872.00				
	5,876	Running Expenses and Repairs	9,447.52				
20,338	1,139	Dearness Allowance	1,941.93	21,741.32			
c/o 392,709		Carried forward	Rs.	375,470·54	c/o 829,701	Carried forward	Rs. 750,673·30

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950—(*contd.*)

1949 Rs.			Rs. Cts.	Rs. Cts.	1949 Rs.		Rs. Cts.
B/f 392,709		Brought forward		375,470·54	B/f 829,701	Brought forward	750,673·30
		MAINTENANCE OF BUILDINGS :—					
	1,102	Laboratory	1,696.97				
	2,561	Senior Staff Bungalows	4,464.16				
	1,261	Junior Staff Bungalows	2,358.56				
	802	Clerks Bungalows	302.16				
	658	Miscellaneous Lines and Buildings	596.54				
	343	Passara Buildings	219.75				
7,464	737	Guest House	83.06	9,721.20			
		GENERAL SERVICES :—					
	13,358	Electric Power	16,992.40				
	1,560	Mechanic	1,820.00				
	708	Telephones, Rent and Maintenance	841.55				
	750	Roads	1,870.72				
	1,534	Sanitation	2,037.85				
	2,105	Water Supply	2,130.47				
	232	Tappal Lorry and Book Fees	740.39				
	—	Drains	11.61				
	3,033	Upkeep of Grounds	4,197.56				
	936	Guest House	995.23				
	720	Proportion of Storeman's Salary	750,00				
33,193	8,257	Dearness Allowance	9,805.89	42,193.67			
c/o 433,366		Carried forward	Rs.	427,385.41	c/o 829,701	Carried forward	Rs. 750,673·30

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950—(*contd.*)

1949 Rs.			Rs. Cts.	Rs. Cts.	1949 Rs.		Rs. Cts.	Rs. Cts.
B/f 433,366		Brought forward		427,385.41	B/f 829,701	Brought forward		750,673.30
		MISCELLANEOUS :—						
	332	Incidentals	509.74					
	13,953	Provident Fund—Senior Scientific Staff	14,021.39					
	12,036	Provident Fund—Junior Scientific Staff	13,150.26					
	4,438	Provident Fund—Sub. Staff	4,664.78					
	10,000	Passages Provision	15,000.00					
	135	Ceylon Nursing Association and Fraser Nursing Home	775.00					
	997	Medical Fees—Sub. Staff	1,188.39					
	1,272	Medical Scheme—Junior Staff	2,344.00					
	5,786	Insurances	6,437.39					
	1,893	Watchmen and Caretakers	2,173.02					
	1,007	Conference Expenses	4,000.18					
	600	Observatory Allowance	600.00					
	1,040	Proportion of Superintendent's Furlough and Passage	970.00					
	200	Junior Staff Association	200.00					
	1,172	Dearness Allowance	1,945.35					
	22,581	Additional Contribution to Provident Fund	27,600.04					
83,543	6,101	Provident Fund—Retiring Staff	——	95,579.54				
16,897		Government of Ceylon Loan Interest Account	——	13,683.65				
43,988		Depreciation	——	49,005.90				
50,000		Low-Country Proposed Sub-Station	——	6,137.80				
2,898		Field Demonstration Account	——	——				
——		Balance from Estate Working Account	——	13,078.88				
199,009		Balance being Excess of Income over Expenditure for the year ended 31st December, 1950	——	145,802.12				
Rs. 829,701				Rs. 750,673.30	Rs. 829,701			Rs. 750,673.30

THE TEA RESEARCH INSTITUTE OF CEYLON

BALANCE SHEET AS AT 31st DECEMBER, 1950

1949 Rs.				1949 Rs.
	LOAN ACCOUNT :—			
	Loan from Government of Ceylon		1,000,000.00	
263,995	*Less :* Repayments to 31st December, 1950		796,801.13	203,198.87
	CREDITORS AND PROVISIONS :—			
	CREDITORS :			2,606,859
3,630	Accrued Interest on Loan	2,793.98		
50,435	Sundry Creditors—Estate	35,933.16		
23,331	Sundry Creditors—Research	41,620.95		
	Subscriptions for publications received in advance	69.42		21,736
54	Contribution for cart road received in advance	301.00	80,718.51	
301				
77,751				
	PROVISION FOR FURLOUGH PASSAGES :—			
	As at 31st December, 1949	26,712.17		
	Additions during 1950	19,055.00		
		45,767.17		
104,463 26,712	*Less :* Payments in 1950	21,553.78	24,213.39	104,931.90
50,000	**RESERVE FOR LOW-COUNTRY SUB-STATION :—**			
				216,875
	DEPRECIATION PROVISION :—			
	As at 31st December, 1949		704,205.07	
	Additions during 1950		49,005.90	
			753,210.97	
704,205	*Less :* Items scrapped in 1950		2,860.00	750,350.97
	SURPLUS ACCOUNT :—			
	Balance as at 31st December, 1949		1,994,625.50	75,583
	Plus : Reserve for Low-Country Sub-Station written back		50,000.00	
1,994,626	Excess of Income over Expenditure in 1950		145,802.12	2,190,427.62
	Carried forward			2,245

ASSETS			
		Rs. Cts.	Rs. Cts.
FIXED ASSETS :—			
Balance as at 31st December, 1949		2,606,859.15	
Additions in 1950		112,689.20	
		2,719,548.35	
Less : scrapped and sold in 1950		8,000.00	2,711,548.35
BLISTER BLIGHT ACCOUNT :—			
Expenditure to 31st December, 1950, per statement		151,438.81	
Less : Contribution received from Tea Controller		150,000.00	1,438.81
INVESTMENTS AT COST :—			
Rs. 20,000/- 3½% Ceylon Government National Loan1956		20,000.00	
Rs. 30,000/- 3½% Ceylon Government Loan 1957/62		29,512.50	
Rs. 15,000/- 3 % Ceylon Government Defence Bonds 1952		15,000.00	
£. 2,300/- 3½% War Loan		32,434.76	
£. 6,750/- 2½% National War Bonds 1952/54		90,000.00	
£. 2,063.18.1 4% Funding Loan 1960/90		29,928.06	
			216,875.32
(Approximate Market value Rs. 215,500/-)			
CURRENT ASSETS :—			
DEBTORS :			
Principal Collector of Customs	62,519.51		
Advertisement Receipts	3,125.00		
Radella Club	94.93		
Junior Staff Association	16.80		
Shell Co., of Ceylon, Ltd.	1,188.30	66,944.54	
			2,245,368.48

THE TEA RESEARCH INSTITUTE OF CEYLON

BALANCE SHEET AS AT 31st DECEMBER, 1950—*contd.*

1949 Rs.	LOAN ACCOUNT:—	Rs. Cts.	Rs. Cts.	1949 Rs.		ASSETS		Rs. Cts.	Rs. Cts.
	Brought forward		3,248,909.36			Brought forward			2,929,862.48
1,994,626						DEBTORS—RESEARCH :—			
						Ceylon Association in London (£. 113-3-4)	1,508.88		
						Research Staff	2,524.95		
						Sundries	3,361.70		
						Accrued Interest on Investments	1,600.75		
				10,443		Sundries—Estate	3,684.97	12,681.25	
						STOCKS :—			
						Flour	3,232.04		
						Stamps	6.79		
						Manure	12.48		
						Workshop Stores	47.00		
						Rice	2,461.93		
						General Stores	16,757.86		
						Electrical Goods	1,369.62		
						Tea 16,758 lbs. (at prices since realised)	42,501.53	66,389.25	
				94,377					
						CASH :—			
						On Current Account	147,062.99		
						Petty Cash	850.69		
						Imprest Account	39.13		
						Estate — N.B.I. Ltd., Colombo	24,850.57		
				271,819	91,416	Estate — in Hand	228.46	25,079.03	173,031.84	319,046.88
Rs. 3,117,289			Rs. 3,248,909.36	Rs. 3,117.289					Rs. 3,248,909.36

We have examined the above balance sheet with the books of the Tea Research Institute of Ceylon and St. Coombs Estate and have obtained all the information and explanations we have required. The allocations of capital expenditure and of research revenue expenditure as made by the director have been accepted by us. Expenditure on blister blight account, whether capital or revenue, has been charged to the expense account on the instructions of the director. Subject to these remarks, in our opinion the foregoing balance sheet is properly drawn up so as to exhibit a true and correct view of the financial affairs of the Institute as at 31st December, 1950, according to the best of our information and the explanations given to us and as shown by the books.

Colombo, 17th August, 1951.

(Signed) FORD, RHODES, THORNTON & Co.,
Chartered Accountants.

CAPITAL ACCOUNT AS AT 31st DECEMBER, 1950

	At 31st December 1949	Additions in 1950	Items Scrapped	Total
	Rs. Cts.	Rs. Cts.	Rs. Cts.	Rs. Cts.
To Land Including Development ..	945,101.76	11,808.20	—	956,909.96
„ Buildings and Lines ..	1,272,058.05	77,559.25	—	1,349,617.30
„ Furniture and Equipment ..	102,695.73	12,377.43	140.00	114,933.16
„ Laboratory Equipment ..	50,599.27	4,167.54	—	54,766.81
„ Experimental Machinery ..	34,847.03	682.81	—	35,529.84
„ Motor Road Roller ..	7,386.03	—	—	7,386.03
„ Motor Car ..	8,850.00	—	—	8,850.00
„ Machinery—Estate ..	163,905.90	—	—	163,905.90
„ Motor Lorry ..	7,860.00	—	7,860.00	—
„ Hoist ..	2,055.38	—	—	2,055.38
„ Station Wagon ..	11,500.00	—	—	11,500.00
„ Atco Motor Mower ..	—	650.00	—	650.00
„ Low-Country Sub-Station ..	—	2,909.20	—	2,909.20
„ Grubber ..	—	2,534.77	—	2,534.77
	Rs. 2,606,859.15	Rs. 112,689.20	Rs. 8,000.00	Rs. 2,711,548.35

REPORT ON ST. COOMBS ESTATE FOR THE YEAR 1950

Staff. The Superintendent, Mr. F. C. Daniel, proceeded overseas on leave in October and Mr. Bruce Gibbon was appointed to act for him.

A Field Assistant, Mr. B. Asirwadem, was employed on probation and subsequently confirmed.

Acreage :

	A.	R.	P.
Tea in bearing	286	2	28
New Clearing (replanting)	4	2	00
Green manure clearing	12	0	00
Land fit to open in tea	5	0	00
Buildings and Gardens	46	0	11
Waste land and ravines	32	0	24
Fuel Clearings	36	3	14
TOTAL ..	423	3	37

Weather. (Estate Gauge).

	Rainfall inches	Wet days	Sunshine hours
Registered in 1950 ..	72.86	207	1785.44
„ „ 1949 ..	86.88	207	1914.35
Decennial avg. (1941–1950) ..	89.74	214	1925.45

Following on 1949, rainfall was below the average and badly distributed. In the first six months of the year only 26.50 inches of rain were registered, whereas in 1949—said to be the driest period on record—32.91 inches were registered. The rainfall during the last three months was well below average and below that registered in 1949.

Crop :

	1950 lbs.	1949 lbs.
Estimate	220,000	250,000
Total crop (including Broken Mixed)	151,291	174,653
Yield per acre on 291 acres	——	600
„ „ „ „ 286½ „	528	——

Yield per Acre. The decrease on the low figure of 1949 must be mainly attributed to accumulative unsuitable weather conditions, accentuated by attacks of blister blight. In my report for 1949, I commented on the poor conditions that prevailed at the end of 1948 and actually these carried on until the end of 1950. During 1949 and 1950 climatic conditions were not favourable to the quick growth of tea. The following acreages were rested for the period of the year shown and this accounted for a small loss in crop.

No. 13 .. 14 acres, plucking commenced November
No. 14A .. 11 „ „ „ June

Prices and Total Crop Sold :

Year	Total Crop lbs.	Gr.price cts.	Net price cts.
1950 ..	149,883	223.15	220.01
1949 ..	173,381	223.96	220.79

Teas were reported on rather unfavourably during the year owing to a falling off in quality and lightness of liquor. Teas during September were commented on by prospective buyers as being "sweaty" but there was general all round improvement later in the year. I think it very probable that the poor growth accounted to some extent for the falling off in quality.

Cost of Production :

	1950 Cost per lb.	1949 Cost per lb.
Estimate	159.01	116.15
Actual	225.02	135.75

Dearness Allowance included in the above was :—

	1950	1949
Senior & Subordinate Staff ..	8.87	6.61
Factory Staff	2.45	1.86
Factory labour	4.00	3.20
Other labour	57.03	43.21
	72.35	54.88

Loss on Estate Working :

1950	..	Loss	..	Rs. 13,078/-
1949	..	Profit	..	Rs. 83,142/-

Crop shortage accounted for high costs and hence this regrettable loss during the year.

Capital Expenditure :

1950	..	Rs. 37,089/-	..	24.52 Cts. per lb.
1949	..	Rs. 93,969/-	..	53.80 „ „ „

The expenditure here was :—

(i) Building 12 additional cottage type quarters for labourers.
(ii) Cattle shed to house ten animals.
(iii) Retaining wall and road drain to Nos. 4 and 5 lines.
(iv) Improvements to Midwife's quarters.
(v) Completing Maternity Home surroundings.

The estate lorry was sold for Rs. 5,000/-

Plucking. Constant attacks of blister blight tended to make good plucking difficult and the standard remained static. Mechanical plucking was done on 2¼ acres contour, and this acreage was pruned at the end of the year. The use of the Tarpen Mechanical Plucker which is used horizontally assists bush spread very noticeably.

Pests and Diseases. Due to climatic conditions blister blight attacks were very evident and at times very heavy.

Artificial Manure and Application. Application was made at approximately 4, 12, 20 and 28 monthly intervals, at the rate of 35, 55, 65 and 40 lbs. of Nitrogen respectively, potash being increased and applied at the rate of 20, 30, 36 and 23 respectively. This meant that most fields had two applications during the year. The following are details of the applications to individual fields during the years 1948, 1949 and 1950, which show the increased doses from which future yield increases may be expected :—

		1948			1949			1950	
		Nit.	Pot.		Nit.	Pot.		Nit.	Pot.
No. 1	July	35	13	Septr.	50	27	May	65	36
„ 2	July	35	13	April	45	24	May	40	21
				Decr.	60	36			
„ 3	May	35	13	April	45	24	Jany.	60	36
							June	40	22
„ 4	May	55	20	July	30	16	Mar.	55	30
							Dec.	65	36
„ 5	Oct.	45	16	July	60	32	Apr.	35	19
							Decr.	55	30
„ 6	June	35	13	Apr.	45	24	June	40	22
				Decr.	60	36			
„ 7	June	35	13	Aug.	60	36	May	35	19
	Novr.	45	16				Decr.	55	30
„ 8	Jany.	30	—	July	60	36	Apr.	35	19
	Oct.	45	16				Decr.	55	30
„ 9	Septr.	55	20	Aug.	30	16	Feb.	55	30
							Novr.	65	36
„ 10	Feby.	52	19	Septr.	50	27	May	65	36
„ 11	June	35	13	Apr.	45	17	Jany.	60	36
							June	40	22
„ 12	Feby.	42	—				Mar.	35	19
	Decr.	55	20				Decr.	55	30
„ 13	Feby.	42	—				Feby.	35	19
	Decr.	55	20				Decr.	55	30
„ 14A	Feby.	42	15	May	35	19	Jany.	80	44
							Aug.	60	33
„ 14B	Feby.	42	15	May	35	19	Jany.	95	53
							Aug.	60	33

Soil Improvement. No. 13 field was well thatched with manna grass after it had been pruned and both rows forked.

Green Manures. 1230 Grevillea and 2224 Albizzia Plants were put out in fields No. 2, 3 and 4 and are coming away fairly well. 85583 holes were cut in fields Nos. 2, 3, 4, 5, 6, 7, 8 and 11 (124 acres) and Grahamiana seed was put out in them, but did not do well, and later these plants were attacked by caterpillars and were of very little use.

Pruning. This was done to allow fields to recover into the dry weather and the lighter type of pruning was continued, and will obviously improve the size and spread of the bushes. It has not been noticeable that fields pruned lightly previously have run to banji.

Replanting of Old Tea. The Guatemala grass supplied took root well and lopping of it was done at approximately three monthly intervals. The loppings from it were put into the contour trenches, this being the means of soil resuscitation.

Labour. Resident Indian labour was hardly sufficient, but some Sinhalese were taken on and helped to complete the works.

Lines. Twelve cottage type lines were constructed and further helped to ease congestion.

Factory and Machinery. These were maintained in good order. Re-wiring for lighting and power did not commence as enquiries were made regarding new materials appearing on the market.

Weeding. The growth of Polygonum was prolific, and in low growing tea, was up to the plucking table. It was decided in the last few months of the year that the estate should in future be clean weeded.

F. C. DANIEL,
Superintendent

METEOROLOGICAL OBSERVATIONS, 1950.

ST. COOMBS.

(Laboratory Gauges)

MONTH	TEMPERATURES							RAINFALL		RAIN DAYS		SUNSHINE	
	Mean Maximum	Difference from average (20 years)	Mean Minimum	Difference from average (20 years)	Adopted Mean	Mean on Grass	Mean Relative Humidity	Inches	Difference from average (20 years)	Days	Difference from average (20 years)	Hours	Difference from average (20 years)
January	73.8	− 0.5	52.7	− 2.6	63.2	43.8	67	0.82	− 2.32	8	− 1	219.88	+ 15.49
February	76.6	+0.1	54.5	+ 0.1	65.6	48.9	63	2.07	− 0.07	9	+ 2	196.73	− 22.32
March	77.6	− 0.2	55.5	+ 0.2	66.6	50.0	68	1.83	− 2.62	11	− 1	235.33	+ 0.72
April	77.6	− 0.0	56.2	− 1.6	66.9	52.3	70	2.85	− 3.47	9	− 7	200.75	− 3.58
May	75.0	+ 3.3	59.5	− 0.2	67.2	57.2	80	9.29	− 2.39	14	− 5	162.70	− 2.18
June	68.8	− 2.0	60.0	− 0.4	64.4	59.8	87	9.21	− 2.73	27	+ 1	81.42	− 15.51
July	68.3	− 1.8	59.5	− 1.0	63.9	60.0	88	13.40	+ 1.31	30	+ 4	67.27	− 40.09
August	70.6	− 0.3	59.3	+ 0.1	65.0	60.0	84	7.18	− 2.71	27	+ 2	85.85	− 27.08
September	69.3	− 2.8	58.4	+ 0.1	63.8	59.5	86	12.36	+ 4.11	21	0	106.97	− 31.42
October	71.3	− 2.0	57.0	− 0.7	64.2	56.4	79	5.28	− 4.25	22	0	123.05	− 28.86
November	73.1	− 0.5	56.2	− 1.1	64.6	54.6	79	6.35	− 1.37	17	− 3	149.62	− 9.66
December	72.8	− 0.7	54.4	− 1.7	63.6	51.1	74	2.22	− 3.29	12	− 3	155.87	− 13.16
	72.9	− 7.4	56.9	− 7.8	64.9	54.5	77	72.86	− 19.80	207	− 11	1785.44	− 177.65
	Means							Totals					

REPORT OF THE DIRECTOR OF THE TEA RESEARCH INSTITUTE OF CEYLON FOR 1950

Blister Blight. The main problem confronting the Institute was the economic control of blister blight. Experiments carried out in late 1949 indicated that spraying with a copper fungicide would give good control of the disease but doubts were expressed as to the feasibility of large scale spraying under the more severe conditions of the south west monsoon period.

From May onwards practically the whole of the staff was engaged on some aspect or other of the blister blight problem.

Some 200 acres of tea on Kataboola Estate, Kotmale, were pruned at the beginning of the south west monsoon and were sprayed at weekly intervals under close T. R. I. supervision.

Ten other estates pruned between 25–100 acres each in the same period and sprayed in the same way but under normal estate supervision with periodic visits from one of the T. R. I. staff. Other small trials were carried out at St. Coombs and elsewhere.

The results of this intensive programme were most satisfactory and, at the Ninth Biennial Conference held at Nuwara Eliya in early December, the opening day of which was devoted entirely to papers and discussions on the control of blister blight, it was possible to state that tea recovering from pruning and tea in plucking during the south west monsoon can be effectively and economically protected against blister blight by wet spraying at regular intervals with a copper fungicide.

Experiments on the control of the disease using copper containing dusts were carried out on 200 acres of Kataboola Estate and small areas of St. Coombs but the results are as yet inconclusive.

The necessity of frequent applications of copper fungicides has emphasised the importance of pursuing the quest for a systemic fungicide but as yet this search has not been successful.

In the south west monsoon area, blister blight attacks have been severe and many unprotected areas have continued to deteriorate. It is hoped that this deterioration can now be arrested by the control of the disease. In conjunction with a policy of lighter pruning, now being strongly advocated, and soil improvement measures, many of our now debilitated areas should in a few years recover their former vigour.

A full report of the Institute's work on blister blight appears in the *Tea Quarterly*, Vol. XXI, Part IV.

Physiology. The policy of light pruning, as a means of developing a large bush capable of yielding highly, is strongly advocated and on St. Coombs the beneficial effects of such treatment is becoming apparent.

There is still very considerable cutting out of shade trees without due consideration of the harm which this causes in the long run. The immediate effect is often an increase in crop, but it is feared that this may be followed by a disastrous decline.

The role of green manures in maintaining soil fertility has been pointed out once, again but it is to be regretted that many estates grow far from sufficient of these crops.

Work has continued on the selection of high yielding blister blight resistant clones.

Field Experiments. No experiments completed their cycles during the year under review. Accordingly, only one or two of the more interesting developments are mentioned below.

(1) **The Three Factor (N.P.K.) Manurial Experiment.** This was pruned down and started its 7th cycle in November 1949. On the plots which have received no potash for over 18 years there was a very marked increase in the number of bushes which failed to recover after pruning, while further casualties from lack of potash continued during the year. All such bushes as were examined showed a complete absence of any starch reserves in the roots.

(2) **The Fish Leaf Plucking Experiment.** This was also pruned down and started its 4th cycle in November 1949. The deleterious effect of long continued fish leaf plucking is now becoming increasingly apparent, as is evident from the much better recovery shown by the plots plucked normally in the third cycle as compared with those which were plucked to the fish leaf.

(3) **Pruning Cycle Increment Experiment.** This has now completed the first two years of its 4th cycle. For the first time there is a definite indication that nitrogen applied in the form of nitrate of soda gives a poorer response than nitrogen in the form of sulphate of ammonia.

Pathology. The year was particularly favourable for both pests and disease. After a lapse of over 20 years *Corticium invisium* (black rot of tea) was observed in two up-country districts. Outbreaks of Cercosporella disease, caused by the fungus *Calonectria theae* were severe. The severest attacks were in areas where *Acacia decurrens* was grown as a shade tree.

The spotted locust was active in the Pundaluoya district while *Helopeltis antonii* (mosquito blight) caused considerable damage in the Rakwana area.

Chemistry. The post of Agricultural Chemist was vacant until August and work was necessarily confined to routine analyses. In connection with blister blight control investigations, the determination of copper residues on made tea and on fresh leaves occupied much of the time of the staff of the department.

Work was continued on the biochemistry of tea fermentation and a highly active pectase preparation was isolated.

Small Holdings. A programme of tea seed distribution to small holders was in operation in the latter part of the year.

Discussions were held with the officers of the Department of Agriculture and it was decided to investigate the setting up of demonstration plots in representative areas.

Low-Country Sub-Station. Agreement was reached with the Rubber Research Scheme for the setting up of a Sub-Station at Nivitigalakele Estate. The area will be cleared as and when the rubber experiments mature and will be replanted with tea. Mr. Walter took up his duties on the estate at the end of the year.

Nursery and multiplication plots are already established. It is hoped that this station will be able to investigate problems peculiar to low-country tea and thus fulfil a longfelt need.

General. Following the death of Dr. Norris, whilst on leave in South Africa, Mr. Lamb, Biochemist, was appointed to the post of Director.

The Biochemistry and Agricultural Chemistry Department were merged on the appointment of Dr. F. Haworth as Agricultural Chemist ; Mr. Lamb being in charge of the combined departments. The post of Pathologist remained unfilled and Mr. Loos continued as Acting Pathologist.

Mr. Landreth was appointed to the post of Engineer in February and, with the many types of equipment now being tested, has been invaluable.

The amount of advisory work is increasing rapidly, both with regard to correspondence and requests for estate visits, and it is becoming more and more difficult for the staff to devote sufficient time to the many research problems which are outstanding.

(Sgd.) J. LAMB,
Director.

REPORT OF THE CHEMICAL DIVISION FOR THE YEAR 1950

Staff. The newly appointed Agricultural Chemist, Dr. Haworth, took up duties on August 4th.

No other staff changes took place during the year.

General. Owing to the lack of an Agricultural Chemist during the first half of the year and Mr. Lamb's pre-occupation with his duties as Director, work was necessarily confined to routine determinations for advisory and established field experimental purposes.

The latter part of the year was taken up in investigating the many aspects of copper residues on teas sprayed with copper fungicides as a protection against blister blight.

AGRICULTURAL CHEMISTRY

Dr. Haworth reports as follows :—

Apart from routine analytical work connected with established field experiments, the staff were fully occupied on various aspects of the blister blight problem. Although this work is reported in this section it should be pointed out that the biochemical staff were also involved in much of the work.

Blister Blight Investigations. In the protection of tea against blister blight by using copper fungicides two main questions arise from the chemical aspect :—

(1) Is the fungicide being distributed uniformly over the whole area ?
(2) What fungicidal residues remain on the final manufactured tea ?

Two methods of application of fungicides were in use, namely, wet spraying and drift dusting.

In the case of wet spraying the equipment used was a knapsack and single lance sprayer, each bush being treated separately. Clearly, there could be little lack of uniformity of distribution under these conditions of application.

With drift dusting on the other hand, the application was by means of a large machine which could only operate from roads and paths. Dr. Dike of Universal Crop Protection Ltd., was in charge of the field work in the early stages but the analyses were carried out by Departmental Staff.

A new rapid method of estimating copper deposits on leaves was proposed by Dr. Dike and proved useful. Full details will be published elsewhere. For large numbers of samples, however, the standard method of digestion and colorimetric determination using Sodium diethyldithiocarbamate is probably the best.

The question of dust distribution is considered at length by Dike (*Tea Quarterly* Vol. XXI, Part III, 1950, p. 29,) but in the writer's experience the range of application quoted (up to 300 yards) is very optimistic. This question will be pursued further in 1951.

Of more immediate importance was the problem of residues on the made tea and this was the subject of exhaustive analysis. Full details of this work were published in the *Tea Quarterly*, Vol. XXI, Part IV., 1950, p. 28.

The main conclusions were as follows :—

(1) If tea in plucking is sprayed or dusted immediately after plucking and subjected to normal south west monsoon conditions for from 5 to 7 days, then the copper content of the made tea can be expected to be of the order of 70 parts per million. (p.p.m.)

(2) Under *dry* conditions tea sprayed at the recommended rate of 6 ozs. of fungicide (50% Copper) per acre every ten days gives a figure of up to 100 p.p.m. of copper in the made tea. No comparable figure is available for dusted teas.

With the range of residues to be expected thus determined, the question of how much copper passes into the liquor was investigated. Normal untreated tea contains about 25 p.p.m. of copper, of which some 20% passes into the liquor.

Table IV shows the copper actually in the liquor brewed from teas of varying copper contents.

Table 4. *Amount of Copper in tea liquors from sprayed teas.*

Original copper content.	Solubility Percentage	Milligrams of copper in 1 cup of 174 ml.	Copper present in tea liquors expressed as (1) P.P.M.	(2) Grains/gallon
I. Unsprayed teas.				
1. 25·5 p.p.m.	22·0	0·0206	0·12	0·0083
2. 25·5 ,,	24·3	0·0225	0·13	0·0091
3. 30·0 ,,	21·0	0·020	0·12	0·0081
4. 27·0	24·4	0·020	0·12	0·0081
II. Sprayed teas.				
1. 250 p.p.m.	14·4	0·13	0·76	0·0525
2. 233 ,,	18·8	0·1617	0·94	0·0653
3. 205 ,,				
4. 158 ,,	14·6	0·08	0·47	0·0323
5. 166 ,,	14·6	0·09	0·52	0·0363
6. 106 ,,	20·6	0·08	0·47	0·0323
7. 64 ,,	17·5	0·0415	0·24	0·0167
8. 61·5 ,,	14·8	0·0335	0·19	0·0135
9. 54.5 ,,	16·7	0·0335	0·19	0·0135
10. 34·0 ,,	18·4	0·0234	0·14	0·0094
11. 34·0 ,,	21·5	0·03	0·17	0·0121

The copper content of other beverages and foodstuffs as *consumed* are often much higher than the figures quoted above.

With the analytical work here recorded as a basis, the United Kingdom authorities have granted a temporary tolerance of 150 p.p.m. copper in made tea so that spraying of tea in plucking is possible.

During this work a discrepancy arose between the copper content of dried green leaf and the copper content of the same leaf after manufacture.

This discrepancy was traced to very small contributions from the brass lined rollers used in manufacture. The result of analysis of tea at various stages of manufacture in brass lined and wooden rollers respectively are given in Table V.

Table 5. *Increase of copper content during manufacture in wooden and brass lined rollers*

MATERIAL	COPPER CONTENT	
	Wooden roller.	Brass lined roller.
Withered leaf	— 25·5 p. p. m. —	
1st dhool	24·0 p. p. m.	32·5 p. p. m.
2nd ,,	25·5 ,,	34·0 ,,
3rd ,,	28·3 ,,	36·5 ,,
4th ,,	25·0 ,,	33·5 ,,
Made tea	27·0 ,,	34·0 ,,

MISCELLANEOUS

(1) **Copper Residues in Different Grades.** It was found that the copper contents of the various grades made from leaf sprayed with copper fungicides were slightly different, B. O. P. Fannings having the highest content with about 10 p.p.m. more than the B. O. P. grade.

(2) The possibility of using a leaf print method employing rubeanic acid papers for determining spray residues in the field was examined. The method is not sensitive to less than 100 p.p.m. of copper expressed on dry weight of leaf and is therefore of limited application.

(3) Some 600 samples of tea, mainly from St. Coombs experiments were analysed for copper content using the standard digestion method.

(4) Arsenic determinations were made on a range of fungicides and on tea made from sprayed areas. There was no detectable residue of arsenic after spraying with any of the fungicides tested.

(5) Several drier tray solder samples were received. Analysis revealed that they contained lead. The factories concerned were warned that the tolerance for lead in made tea is very low and the greatest care should be taken to prevent contamination.

(6) Routine analysis of manures used on experimental areas was carried out. A small experiment revealed that coir dust is a satisfactory conditioner for fertiliser mixtures. Some 10 per cent by weight added to a fertilizer mixture approximately doubles the bulk and makes application of small quantities much easier.

(7) Samples of corroded aluminium sheet were examined and a report sent to the Planters' Association who pursued the matter further. Caution

should be exercised in using such sheets for roofing purposes. The instructions of the supplier concerning installation should be followed carefully.

(8) Moisture determinations were carried out on well over 700 samples during the year. A moisture meter, examined in an attempt to find a rapid instrument for use in factories was not satisfactory at the low moisture contents usually encountered in made teas.

BIOCHEMISTRY

Mr. Ramaswamy reports as follows :—

Tea Enzymes.

(1) **Pectase.** To determine whether the purified enzyme preparation could be further divided into co-enzyme and apo-enzyme, experiments were conducted to find out the effect of prolonged dialysis of the enzyme preparation against distilled water. The enzyme preparation showed no fraction dialysable under these conditions (Tables I and II). The experiments were all conducted inside the refrigerator to minimise the loss of activity of the enzyme. Water outside the dialysing bags was replaced once in every 24 hours.

Table I. *Dialysis of pectase against distilled water.*

(Different preparations were used in the 2 experiments).
Activities expressed in terms of methyl alcohol liberated by the pectase from pectin

	Experiment I. Acitivity after 64 hours of dialysis.	Experiment II. Activity after 112 hours of dialysis.
1. Undialysed (control)	26 mg. MeoH	230 mg. MeoH
2. Dialysed	28 ,, ,,	230, ,, ,,

Table II.

	Activity of the Enzyme after	
	16 hours dialysis.	208 hours dialysis
1. Undialysed (control)	45 mg. MeoH	24 mg. MeoH
2. Dialysed	51 ,, ,,	26 ,, ,,

(2) **Tea Pectin vs. Citrus Pectin.** All experiments on pectase activity were conducted using B.D.H. 100-grade citrus pectin. A comparison between Citrus pectin and tea pectin prepared from Clone No. 9 was made. The pectin from this non-fermenting clone was prepared as follows. The aqueous extract of the clonal leaf was precipitated with alcohol, and the pectin obtained purified by repeated precipitations with alcohol. The activity of the same enzyme preparation using the pectins from the two sources is given in Table III.

Table III. *A comparison of the B.D.H. 100-grade citrus pectin and pectin from T. 9.*

		Citrus pectin mg. MeoH	Pectin from T. 9. mg. MeoH
1.	Control	0·0	0·0
2.	Enzyme from T9 (1 ml) 20 mts.	120·0	97·0
3.	,, ,, (2 ml) ,, ,,	228·0	168·0
3.	,, ,, (1 ml) 3 hrs.	328·0	212·0
4.	N. Alkali for complete hydrolysis (20 mts)	856·0	1012·0

Complete hydrolysis with alkali indicates the possibility of the pectin from tea having properties similar to those of citrus pectin. Further work on the preparation and constitution of the tea pectins will be carried out at a later date.

(3) **Pectase & Polyphenol Oxidase.** In the analysis of the material from different clones on St. Coombs (supplied by the Plant Physiology Department) for pectase activity, published in the annual report for 1948, it was recorded that the non-fermenting clone (No. 9) gives the highest activity. In order to ascertain whether this high activity has any role in controlling the degree of tea fermentation, the oxygen absorption of fermenting leaf btoh before and after an initial period of pectase action was determined. In one set rolled leaf was used immediately whilst in the other the material was subjected to high vacuum for given periods before the absorption was conducted. In a few experiments, carbon dioxide was passed through all the flasks before subjecting it to high vacuum. The treatments allow pectase action to proceed whilst inhibiting polyphenol oxidase activity due to lack of oxygen.

Although it appears from the results obtained that the pectase has some effect on the rate of oxygen absorption, the extent appears to be insufficient to account for the very slow fermentation observed in the case of Clone No. 9. Reference may be made here to the earlier work carried out in this laboratory to trace the cause of this non-fermenting nature of this clone. The major factor for this property is the lack of enzymic copper in this bush. A detailed report of the work will be published elswhere.

Plucking Interval Experiment. To determine the effect of frequency of plucking on the chemical composition, leaf from bushes plucked at weekly and fortnightly intervals respectively was analysed at each plucking.

The determinations made were :—

(1) water extract,
(2) total oxidizable material,
(3) non-tannins,
(4) pectin.

No statistical difference between the two treatments have been found. Certain variations with season are evident and this finding is being pursued further. As a matter of interest and for purposes of record the average pectin content of the component parts of flush is given in Table IV.

Table IV. *Pectin content of component parts of the flush.*

	Percentage of dry weight of flush
Buds	4·94
1st leaf	6·09
2nd leaf	4·68
3rd leaf	4·97
Stalks	7·59

Shading Experiment. This experiment was designed to determine the effect of shade on the composition of the tea leaf. Split seedlings were used, one of a pair being shaded by muslin whilst the other was under full sunshine.

The same determinations are being made as in the plucking interval experiment and certain differences are showing up as between shaded and unshaded plants. The average figures for 20 estimations are given in Table V.

Table V. *Pectin content of leaf from shaded and unshaded bushes.*

Average of 20 estimations extending from February 1950 to October 1950.

	Percentage dry weight of flush.
Shaded =	5·64
Unshaded =	5·83

TECHNOLOGY

Mr. Keegel reports :—

(1) Advisory.

(*a*) 42 visits were made to factories.
(*b*) 51 rolling programmes were drawn up for the benefit of factories wishing to organize their manufacture.

(2) Epicyclic-pressure Rolling.

Full accounts of our work on this type of rolling have been published in previous annual reports. It only remains to be said that with good standards of leaf, E.P. rolling, if correctly carried out, can hold its own in any market. Unfortunately, it has of late acquired a bad reputation because of a lack of attention to detail, bad plucking and an insufficient knowledge of the process. All our work up to now has indicated that there is very little to choose between E.P. rolling and batten-pressure cap rolling, and this conclusion was confirmed this year by the results obtained in a series of experiments carried out on a commercial scale. The experiments ran for over an year during which time hundreds of samples were examined by buyers and brokers both in Colombo and London. To test further the relative merits of the two processes comparative invoices were sold on the open market throughout this period. Detailed results will be published in a separate article for the *Tea Quarterly*.

Briefly, the tasters could detect no differences whatever except in appearance but the preference towards battens in this respect was not enough to affect values. In the case of the prices realized at the Colombo auctions, at which the B.O.P. and Fannings grades were offered, a difference of 2 cents in favour of battens for the former grade was obtained. There was a similar difference for the Fannings grade but to the advantage of E.P. rolling.

Two aspects of E.P. rolling not previously studied were the effects of motion of table and crank-throw. A series of experiments was designed, using the experimental rollers and carrying out 3×20 minute rolls. The results are set out in Tables I and II.

(a) **Single action versus double action.**

(Same speed, same crank throw, same fittings and equal charges.)

Table I. *Average dhool outturns.*

Roll.	S. A.	D. A.
1	15	11
2	30	28
3	45	46
B. B.	9	14

Table II. *Average valuations.*

Grade	Appearance	Colour	Strength	Quality	Comparatative valuations in cents.
		Standard	Double	Action	
B. O. P.	Equal	Equal	Equal	Equal	+ 2
F. P.	,,	,,	,,	,,	+ 1
Fannings	,,	,,	,,	,,	+ 2

(Percentage grade outturns were more or less the same).

(b) **Effect of crank-throw.** Four sizes of cranks were tested on the experimental rollers (Jacket diameter 18″), the smallest being a 3″ and the largest 6″.

(i) The 3″ crank was found to be quite useless. Even with the largest fitting available and speed increased to 78 r.p.m. it failed to circulate the leaf.

(ii) **4½″ and 5″ cranks.** In relation to the size of the jacket these two cranks were exactly proportionate to those used on commercial rollers. With the same fittings the smaller crank gave less dhool but on decreasing the speed of the roller when the larger crank was used dhool out turns were about equal. (Table III)

Table III. *Average dhool outturns.*

Roll.	4½″ crank (50 r. p. m.)	5″ crank (33 r. p. m.)
1	17	14
2	30	29
3	40	39
B. B.	10	15

(iii) **6″ Crank.** This was exceptionally big for the small roller, as a result of which, circulation of the leaf with the roller running at 50 r.p.m. was beyond all expectations. When compared with a 5″ crank at the same speed the following results (Table IV) were obtained. Sizes of fittings were adjusted to give equal dhool outturns.

Table IV. *Average valuations.*

Grade.	Appearance.	Colour.	Strength	Quality	Comparative valuations in cents.
		Standard	5″ Crank.		
B. O. P.	Equal	Equal	Equal	S. W.	— 3
F. P.	,,	,,	,,	E	— 2
Fannings	,,	,,	,,	S. W.	— 1

Note—S. W = Slightly Worse.
E — Equal.

The effect of increasing the speed of the 5″ crank to 60 r.p.m. to give the same peripheral speed as that of the 6″ crank at 50 r.p.m. was to increase dhool outturns slightly. Otherwise, it had hardly any influence on the characteristics of the teas made. Table V gives the results obtained.

Table V. *Average valuations.*

Grade.	Appearance	Colour	Strength	Quality	Comparative valuation in cents
		Standard	5″ Crank		
B. O. P.	S. W.	E	S. W.	S. W.	— 4
F. P.	S. W.	E	S. W.	E	— 5
Fannings	E	E	S. W.	S. W.	— 4

The results clearly show that no advantage is to be gained by running a roller fitted with an oversize crank at a relatively high speed. It is also shown, as indicated in results obtained from previous experiments, that the pressure gap is an important factor in the degree of squeezing of the leaf that takes place. The poorer appearance and strength of the 6″ crank teas may be due to the very thin fittings used to compensate for the bigger throw. It is now proposed to find out whether any improvement can be effected by using wider fittings but with a shorter vertical face.

(3) Quick Withering Experiments at high Temperatures.

The possibilities of doing away with withering tats by the employment of specially designed machines using hot air are now being investigated by various engineering firms. The method undoubtedly speeds up the manufacturing process but one of the main difficulties to be surmounted before it can be proved a commercial success, is to determine the best combination of temperature and time to produce the desired results.

Early work indicated that no harmful effects resulted from the exposure of leaf to temperatures as high as 220° F for a few seconds but the leaf was still green. Longer periods at high temperatures killed the enzymes and inhibited

fermentation. Lower temperatures were, therefore, investigated, some of which proved effective from the point of view of both fermentation and loss of moisture but the flush was never uniformly withered. Stalk was invariably green. Full results of these investigations are given in Table VI.

Table VI. *Effect of temperature on withering*

Temperature	Time	Percentage moisture	Remarks
230°F	7½ secs	77	Normal fermentation
	15 ,,	76	
	30 ,,	74	Slight fermentation.
220°F	1 minute	73	Very slight fermentation
200°F	1 ,,	75	Very slight fermentation
	2 ,,	69	Hardly any fermentation
180°F	1 ,,	75	Slight fermentation
	2 ,,	73	Very slight fermentation
	4 ,,	66	No fermentation
160°F	2 ,,	74	Slight fermentation
	4 ,,	70	Very slight fermentation
	8 ,,	65	No fermentation
140°F	20 ,,	64	Practically no fermentation
	30 ,, & over	—	Hay nose—leaf turns red and no fermentation
130°F	More or less same results as for 140°F		
100°F	2 hours	59	Wither uneven. Fermentation normal. Infusion inclined to be duller than leaf withered at normal temperatures.

As a matter of interest it may be recorded that at ordinary room temperatures of 75-80°F it took nearly 6½ hours for the flush to reach a condition approaching anything like an uniform wither. Although the leaf and stalk were both flaccid the moisture content was as high as 67%

Spraying and Dusting Experiments. (*a*) In conjunction with the Pathology Department 26 manufactures were carried out to determine the effect of spraying with Perenox. Spray applications were made the day after plucking and the leaf harvested from these plots compared with that from the adjoining area left unsprayed (Plot A). The two plots that were sprayed were treated as follows :—

Plot B—sprayed after the first pluck and continued throughout the year.

Plot C—also sprayed after the first pluck and continued till after the 15th pluck only.

No taint was ever reported on the sprayed teas. The averages of the tasters valuations for all the manufacturers are shown in Table VII.

Table VII. *Average valuations*

Plot	Grade	Comparative value in cents. (A taken as standard)
B	B. O. P.	+ 2
	F. P.	+ 1
	Fannings	+ 1
C	B. O. P.	— 4
	F. P.	— 2
	Fannings	— 3

For some unknown reason Plot C has been valued below the control although no differences were found in the characteristics of the made tea and liquors. One interesting result has, however, emerged from these experiments and that is that the infusion of B from the 18th pluck onwards was consistently considered the brightest and most coppery.

(*b*) Five manufactures of leaf were done for a neighbouring estate where trials were also carried out with Perenox. No taint was reported.

(*c*) Fifteen lots of leaf from plots treated with a fungicidal dust, were manufactured in connection with the possibility of taints. Though the copper content of the made tea in one case was as high as 233 parts per million no taint was observed.

(*d*) Numerous other manufactures were carried out on leaf treated with different types of fungicides.

Miscellaneous Experiments : (a) Leaf from different Fields.— With a view to determining the influence of jat, age, etc., of the different fields at St. Coombs, a number of comparisons were made. The most remarkable feature in the results was that equal dhool outturns were obtained despite the variation in the nature and age of leaf from each field. With regard to the character of the made tea and liquor there was little to choose between the different fields. The results have been so unexpected that it is proposed to repeat the experiment.

(*b*) **Individual Bush Manufacture.** 62 manufactures of clones from St. Coombs and a few estates were done throughout the year.

(*c*) **Stamped Aluminium Sheets for Sifting.** Sheets with various size circular perforations were submitted for test purposes. The sizes of brass mesh to which the various perforations corresponded were determined and lengthy trials were carried out to ascertain their suitability for the sifting of tea. They proved quite satisfactory but owing to the international situation production is held up and it is doubtful whether supplies will be freely available on the market for a long time to come.

(*d*) **Crescent Battens and Fadeaway Cone.** In the light of the satisfactory results obtained with M & S. battens and fadeaway cones, Messrs. Walker Sons & Co., Ltd., have adapted a similar centre for their Crescent battens by extending these to merge into the surface of a plain cone. This arrangement was tried out on an Economic 32" Roller at St. Coombs and

found suitable for all rolls. There is no reason to suppose that it will not prove equally efficient on other types of rollers as well.

(*e*) **Packing Materials.** Tests were carried out on a material called Alkathene, closely resembling Pliofilm and Cellophane. Despite its flimsiness it was found to be completely moisture proof but the absence of scrap value in the material and the prejudice of the trade towards non-metallic linings would be a serious hindrance to its adoption as a packing material for tea.

(*f*) **Tea Cutter-blower.** A machine working on the principle of a disintegrator and actuated by an enlosed fan working at a high speed was tried out for the production of fannings and dusts. Though not at all suitable for the treatment of good teas a machine of this type would meet the requirements of factories wishing to convert their off-grades to dust.

Acknowledgements. To all the tea tasters in Colombo and London who have reported on experimental teas we extend our cordial thanks and wish to express our deep gratitude for the considerable assistance they have ungrudgingly given.

J. LAMB,
Biochemist.

REPORT OF THE PLANT PHYSIOLOGIST FOR THE YEAR 1950

Staff. Mr. F. P. Jayawardene was transferred to the new Low-Country Sub-Station at Nivitigalakele Estate, Matugama, with effect from June 1950.

Advisory Correspondence. 911 letters were received and 793 despatched.

General. Advisory correspondence has continued to increase and is now making heavy demands on the Plant Physiologist's time. During the year there were over 125 visitors, excluding students. The main subjects of interest appeared to be vegetative propagation, and manuring. Some 36 visits were made to estates and seven Planters' Association meetings were attended. In addition, numerous visits were made to Kataboola in connection with the Institute's crop protection experiments. In spite, however, of the general preoccupation with blister blight work it has again proved possible as a result of the enthusiasm and co-operation of the staff to continue with all the normal work of the department.

Soil Samples. Over 500 samples of soil were received, mainly from potential nursery sites, for examination and report. Where necessary the examination of all samples for the presence of parasitic eelworms is now a routine procedure and is carried out in co-operation with the Pathology Department.

Tea Selection and Vegetative Propagation. 27 new blister resistant clones were planted in the test plot (12 from St. Coombs and 15 from outside estates). 9 clones were discarded. 42 new clones (23 from St. Coombs and 19 from outside estates), selected for yield and blister resistance, were propagated. Many possible mother bushes were marked during the latter part of the year and their resistance to blister will be observed during the next south west monsoon prior to final selection.

Present indications are now quite definite that the only satisfactory method of supplying in bad blister blight areas is to use vegetative propagated plants selected for blister resistance. No spraying is done in the nursery and if cuttings from a particular clone are able to establish themselves successfully without protection, then that clone is considered to be satisfactorily blister resistant.

1947 Clonal Area. These clones selected prior to the advent of blister blight were brought into plucking in June. The highest yields for the first six months period (June–December) are as follows :—

	Yield lbs/acre
Clone 2024	445
2022	315
2016	290
2021	290

Clone 2024 has been outstanding. It is a vigorous grower and appears to be highly blister resistant.

Control of Mosses and Lichens. Small scale experiments, in which different methods of controlling mosses and lichens after pruning were compared, were carried out both at St. Coombs and Passara during the year.

In the St. Coombs experiment the treatments were as follows :—

(1)	Copper Sulphate	0.125% in water
(2)	„ „	0.250% „
(3)	Caustic Soda	2% „
(4)	„ „	4% „
(5)	Ovicide	5% „
(6)	„	10% „
(7)	Control	—

All solutions were applied with a knapsack sprayer at a rate of between 50 to 60 gallons per acre. Each unit consisted of a row of 65 bushes and each treatment was replicated three times. Copper sulphate, at the strength used, proved almost completely ineffective. Caustic soda and " Ovicide ", at either of the strengths tested, killed moss and lichen. Ferns were only scorched and not killed.

In the Passara experiment, there were 4 treatments, each replicated 4 times as under :—

(*a*) Caustic soda 2% in water.
(*b*) " Ovicide " 5% in water.
(*c*) Lime wash applied at a rate of 4 cwts. of lime per acre
(*d*) Control.

Here again both caustic soda and "Ovicide" were effective in controlling both moss and lichen. Limewash also proved very good in killing moss but was not so effective as either caustic soda or " Ovicide " in regard to lichen. However, probably one of the most important results from this Passara experiment is the effect of the different treatments on bud growth after pruning. This is illustrated in Table I below.

Table 1. *Effect of different mossing treatments on budbreak after pruning.*

Treatment	No. of new buds produced per bush
(*a*) Caustic soda 2%	69.35
(*b*) " Ovicide " 5%	83.25
(*c*) Limewash	103.05
(*d*) Control	87.95
	S.E. + 11.24

It is evident from these figures that the limewashing treatment has produced a significantly greater number of new buds per bush than has spraying with caustic soda. At Passara the treatments were applied within two days of pruning. At St. Coombs, on the other hand, it was impossible to spray until some weeks after pruning with the consequence that many young buds were damaged by the caustic soda and " Ovicide " treatments. No observations were therefore carried out on budbreak.

In view of the above observations it would appear that lime washing is still one of the best treatments for the control of mosses and lichens after pruning.

Although giving somewhat more effective control than limewash, the use of either caustic soda or " Ovicide " would appear to be undesirable with the lighter styles of pruning now recommended on account of the possible damage to buds and foliage that may occur. Furthermore, caustic soda is a difficult material to handle and may cause damage both to equipment and spraying personnel. Provided therefore that a good grade of lime, suitable for spray application, can be obtained there is no reason why this method of control should not once again be widely used on estates.

Green Manures. During the year a large variety of different green manures were grown experimentally on St. Coombs. The following observations may be of interest :—

Crotalaria agathifolia. A medium sized shade tree which reaches a height of about 10 to 12 feet. It flourishes at higher elevations and may be useful in areas where it is difficult to establish dadaps. On several South Indian estates it is grown and lopped in the same way as the dadap. On St. Coombs it seldom sets seed and is also susceptible to attack by *Argina* caterpillars. A small area of trees was killed by Pink disease caused by the fungus *Corticium salmonicolor* B. & Br.

Crotalaria brownei. Growth on St. Coombs is disappointing and the amount of foliage produced is poor.

Crotalaria Grahamiana. Does well at mid and high elevations. The yield of loppings compares favourably with other green manures but the plants do not usually stand more than 3 loppings. The leaves and pods are attacked by *Argina* caterpillars which is the only obvious disadvantage of this species. Small quantities of seed have been distributed to many estates for trial.

Crotalaria lanata. A quick grower which produces a large quantity of succulent leaf. Stands lopping. Main disadvantage is that the leaves and pods are very susceptible to attack by *Argina* caterpillars. Is also susceptible to *Rosellinia.*

Crotalaria striata. Shows fair growth and provides a reasonable quantity of leaf. Appears to be free of diseases and pests.

Crotalaria spectabilis. Seed was obtained from the Department of Nematology, U. S. Department of Agriculture, Washington. This species appears to be a complete failure under our conditions.

Desmodium gyroides. Now growing well. The plants have a desirable habit and produce a large quantity of green material. So far it has not suffered any obvious damage from pests and diseases.

Tephrosia candida. This species is obviously not suited to higher elevations. The leaves are small and the scanty foliage produced renders it much inferior to *T. vogelii.*

Stylosanthes gracilis. This legume is easy to establish and appears to be a suitable cover for new clearings. It protects the soil efficiently from sun and may be useful in checking erosion. It does not climb.

Weed Killers. Small scale trials were carried out both with "Fernoxone" and sodium chlorate. The former is a selective hormone-type weed killer;

supplied by Messrs. Imperial Chemical Industries (Export) Ltd., whose active principal is the sodium salt of 2,4–dichloro phenoxyacetic acid (2,4–D). The latter is a general purpose non-selective contact type weed killer.

Fernoxone. Trials were carried out using a concentration of 2 ounces of Fernoxone in one gallon of water, applied by means of a knapsack sprayer at an application rate of about 2½ lbs. per acre. The effects were determined by examination 4 weeks after treatment. The species killed are listed in Table 2 below, in which the figures in parenthesis indicate the number of trials in which each species was tested.

Table 2. *Weeds killed after one application of Fernoxone.*

Achyranthes aspera	*Fragaria indica* (3)
Ageratum conyzoides (3)	*Galinsoga parviflora*
Amarantus viridis (2)	*Gnaphalium polycaulon*
Bidens chinensis (3)	*Hedyotis corymbosa*
Cassia mimosoides	*Hydrocotyle manii*
Cardamine hirsuta	*Lantana* sp. (2)
Centella asiatica (2)	*Mitracarpum villosum*
Crepis japonica	*Osbeckia cupularis*
Drymaria cordata	*Polygonum nepalense*
Emilia scabra	*Solanun nigrum* (2)
Erigeron mucronatus	*Sonchus arvensis* (2)
Erigeron sumatransis (2)	*Tephrosia vogelii* (seedlings)

Fernoxone appeared to have almost no action on grasses. Spraying of tea in plucking with Fernoxone results in twisting and distortion of the young shoots, whilst the leaves become thickened and leathery in texture. Although the buds were not killed, no new growth was observed until about 3 months after spraying.

Sodium chlorate. This was sprayed at a concentration of 3/4 lb. in one gallon of water. The action is much faster than with Fernoxone and scorching of leaves was noticeable within 24 hours of application. It is effective against a considerably wider range of weeds than Fernoxone as is evident from Table 3.

Table 3. *Weeds killed after one application of Sodium chlorate.*

All species listed in Table 2 above	
Artemesia dubia	*Eupatorium riparium*
Axonopus compressus	*Imperata cylindrica*, Beauv=
Citrus spp.	*I. arundinacea*, Cyrill
Commelina nudiflora	*Justicia procumbens*
Cyperus rotundus	*Panicum repens*

Spraying of tea in plucking with sodium chlorate produces severe scorching of leaves and tender shoots and results in complete defoliation. Although not completely killed, recovery after 4 months is negligible.

Field Experiments. None of our long term experiments completed a cycle during the year. Accordingly only such points of interest as are immediately evident will be referred to in this report.

(1) **The Three Factor (N.P.K.) Manurial Experiment.** This experiment commenced its 7th pruning cycle in November 1949 and has now completed the first year. The increasing degree of potash deficiency in the KO plots is now starting to exert its influence on recovery after pruning, since a noticeable number of bushes in these plots failed to recover. Further casualties have also continued to occur during the year. All dead bushes examined showed a complete absence of root starch reserves.

(2) **Pruning cycle increment experiment.** In addition to exploring the effects of varying the amounts of nitrogen applied in each year of the cycle, this experiment was also designed to compare sulphate of ammonia with nitrate of soda as a source of nitrogen. This experiment has now completed the 2nd year of its 4th cycle and marked differences in yield are already becoming apparent in respect of the form in which nitrogen is supplied.

Table 4. *Effect of form of nitrogen on yield in lbs. per acre*

Form of nitrogen	1st year	2nd year	Total Yield	Decrease on S/A
Nitrate of soda	604	424	1028	196
Sulphate of ammonia	704	520	1224	—
Mixture of N/S and S/A	689	496	1185	39

The decrease of 19% in yield over the first two years as the result of supplying nitrogen in the form of nitrate of soda instead of sulphate of ammonia is most striking and entirely confirms our previous opinion regarding the unsuitability of nitrate of soda as a manure for tea.

G. B. PORTSMOUTH,
Plant Physiologist.

REPORT OF THE ACTING PATHOLOGIST FOR THE YEAR 1950

Staff. As the posts of Pathologist and Mycologist remained vacant throughout the year I continued to carry out the duties as Acting Pathologist.

Mr. W. T. Fonseka, Field Assistant of the Passara Sub-Station, was transferred to St. Coombs in April. Mr. D. W. Abeygunawardene, B.Sc., was appointed Research Learner on May 15th. He left the Institute on December 4th to join the Plant Pathology Division of the Department of Agriculture Peradeniya.

Dr. J. W. Pfaeltzer of the Koninklijke/Shell Laboratorium, Amsterdam, arrived in Ceylon on 5th April, 1950, to undertake extensive screening tests with a number of different fungicide formulations. Messrs D. J. W. Ranaweera and W. T. Fonseka were released from other duties to assist Dr. Pfaeltzer in his field experiments. Mr. Abeygunawardene, also, was attached to Dr. Pfaeltzer for research work in the laboratory.

Mr. N. M. Lindsay, B.Sc., joined the staff in May, on a temporary appointment, to supervise the 200 acre crop protection experiment on Kataboola Group, Kotmale. Mr. Lindsay received a preliminary training in crop protection on St. Coombs before proceeding to Kotmale.

Mr. S. Murugiah, Field Attendant, was transferred to Kotmale in August. His transfer became necessary owing to Mr. Lindsay's illness in the latter part of the year. Previous to the transfer Mr. Murugiah spent three months as Dr. Pfaeltzer's assistant in the field and laboratory.

This serious depletion in staff personnel caused severe disorganisation in this laboratory. The many experiments in progress on St. Coombs and elswhere and the general laboratory routine were continued under difficulties. In this connection my thanks are due to Messrs. S. N. Vander Wal and P. A. John for their willingness to work long hours at great inconvenience to themselves.

Advisory. The increase in advisory work continued and became almost double that of 1948. 1005 letters were received, and 978 despatched. 424 consignments of specimens were received for report.

Visits to estates for advisory purposes increased considerably. It is regretted that many requests for visits had to be refused owing to pressure of work.

Besides blister blight which was particularly severe during the south west monsoon, fairly widespread damage, in the Dimbula district, was caused by the cercosporella disease (*Calonectria theae*), Black rot (*Corticium invisum*) was reported from three estates but the extent of damage was light. A few estates in the Pundaluoya and Pussellawa districts reported severe damage to dadaps (*Erythrina lithosperma*) by locusts (*Aularches milaris*).

Blister Blight. As in the two previous years the main activity of the department was directed against blister blight. The fairly severe drought in April and the first three weeks of May was responsible for an almost complete

absence of the disease at the commencement of the south west monsoon. Not until eight weeks after the commencement of the monsoonal rains did the loss of crop, following the build up of infection, become evident. The prolonged monsoon which lasted until the end of October was particularly favourable to the disease with the result that, in areas subject to both the south west and north east rains, attacks continued almost to the end of the year. The prolonged monsoon during which the severest blister blight attacks, yet experienced developed, created ideal conditions for the evaluation of fungicidal control on our large scale experiment on Kataboola and on the other co-operating estates.

Loss of Crop Experiments. Full details of the scope and extent of the three experiments (two on St. Coombs and the other on Kataboola Group) have been published in the *Tea Quarterly,* Vol. 21, part 4, December 1950 (Conference Number). In that publication crop returns were given to November only. Tables 1–3, give revised figures up to 31st December.

Table 1. *St. Coombs No.* 9 *Field Crop Protection Experiment. Crop returns for* 1949 *and* 1950.

	Yields expressed as lbs. made tea per acre			Increase in yield over unprotected plots	
	Unprotected	Protected weekly*	Protected fortnightly*	Protected weekly	Protected fortnightly
1st year. (23rd May to 31st December, 1949)	329	414	410	85 (+26%)	81 (+25%)
2nd year. (1st Jany. to 31st December, 1950)	631	815	778	184 (29%)	147 (23%)

*Sprayed with Perenox at a concentration of 4 ozs. in 10 gallons water at an application rate averaging 12 gallons per acre.

Table 2. *No.* 8 *Field Crop Protection Experiment. Crop returns expressed as pounds made tea per acre for the period* 19*th May to* 31*st December* 1950. (*First year field tipped in May* 1950)

	Made tea lbs.	Increase in crop over A	No. of sprayings	Approximate cost of spraying
A. Unprotected	315	—	—	—
*B. Protected every 9 or 10 days both monsoons	524	209 (+66%)	27	Rs. 61.00
*C. Protected every 9 or 10 days up to 9th September	479	164 (+52%)	13	Rs. 38.00

*Sprayed with Perenox at a concentration of 4 ounces in 10 gallons water and an application rate averaging 12 gallons per acre.

Table 3. *Kataboola Loss of Crop Experiment. Crop returns for the period 24th June, 1950 to 31st December, 1950, expressed as lbs. made tea per acre.*

No.	Treatment	Crop as lbs. made tea per acre	Crop returns in comparison with unprotected plot No. 1
1.	*Unprotected.* Normal plucking at 10 day intervals	268	——
*2.	*Protected weekly.* Normal plucking at 10 day intervals	315	+ 47
*3.	*Protected every* 10 *days.* Normal Plucking at 10 day intervals	294	+ 26
**4.	*Unprotected.* Plucked to fish-leaf on 7 day rounds on shoots which formed a bud and two leaves above fish leaf	290	+ 22
5.	*Unprotected.* Normal plucking on 7 day rounds	224	— 44

*Sprayed with Perenox at a concentration of 4 ounces in 10 gallons water at an application rate of 15 gallons per acre.

**Rested 21st November, 1950–24th December, 1950. Sprayed weekly 3 weeks before resting commenced and on weekly rounds during resting to obtain disease free maintenance leaf.

Crop Protection of Tea Recovering from Pruning. Full reference was made by Mr. Portsmouth in his conference address, to the large scale experiments on Kataboola Group and to the estates which co-operated in this venture. This combined effort of the Tea Research Institute and of Messrs. Lane and Scoles of Protection Limited, has proved the effectiveness of copper spraying on tea recovering from pruning during exceptionally heavy rain. Encouraged by the results achieved, it is anticipated that large acreages of tea will again be pruned and brought back into production during the monsoonal months in 1951 as was the practice before the advent of blister blight.

Systemic Fungicides. Priority has now been given to trials with fungicides of systemic action. In this connection we have been in close contact with firms both in the United Kingdom and the U. S. A. as we fully realise that a satisfactory fungicide with systemic action of even a short period of 3 to 4 weeks would reduce considerably the cost of crop protection. We are indebted to Messrs. Ward and Blenkinsop of the United Kingdom for samples of three systemics sent under code Nos. 22/50, 23/50 and 24/50. Although these preparations have proved effective with disease of certain other crops they proved ineffective in the control of blister blight.

Towards the end of the year we were offered test samples of four new systemic fungicides and these will be given field trials during the south west monsoon in 1951.

MISCELLANEOUS DISEASES

Cercosporella. The Cercosporella leaf disease caused by the fungus *Calonectria theae* was fairly widespread in up-country districts during the latter half of the year. The more severe form of the disease in which old maintenance

leaf is attacked was reported as causing severe defoliation specially in areas where *Acacia decurrens* was grown as a shade tree. For many years the Cercosporella disease caused very little damage as *Acacia decurrens* was seldom grown, except in the Nuwara Eliya district, where, probably due to the lower temperatures, the disease was kept in check. *Acacia decurrens* is now being grown extensively again and the reason for their original removal has apparently been forgotten.

The fungus *Calonectria theae* finds a very suitable host in *A. decurrens* and in areas where prolonged mist, rain and *Acacia decurrens* exist together the disease cannot be ignored. The very small leaflets of *A. decurrens* when infected with the *Calonectria* fungus are shed, and fall on to and adhere to the leaves of tea bushes. There the fungus invades the tea leaves, and as the acacia leaflets act as food bases extensive areas of leaf are involved. The tea bush reacts to the disease by shedding the infected tea leaves causing in some cases, complete defoliation. The combined attack of *Calonectria* and blister blight, both of which flourish under similar weather conditions, may have serious consequences.

Black rot of Tea. The fungus *Corticium invisum*, the cause of black rot of tea, made its appearance this year after a period of over 20 years. Attacks on a very small scale were confined to three estates in the Dimbula district. Black rot causes fairly considerable damage in North India where routine spraying with copper fungicides are often undertaken to keep the disease in check.

The fungus causes damage to tea leaves. A tea bush attacked by black rot shows a number of leaves hanging on the stems by means of small pinkish white fungus strands formed in the axil of the leaf with the stem. During very wet weather the diseased patches on the leaves become black and water-soaked giving the appearance of a black rot from which the disease derives its name.

The situation will be watched in 1951. There is every likelihood that conditions were favourable to the disease this year and that the same conditions may not arise again for many years to come. In the meantime, Superintendents are requested to send specimens to the laboratory for examination should they suspect that the disease exists on their estates. The fungus forms its fruiting bodies on the under surface of apparently healthy leaves, where it appears as a greyish white film.

Poria. For some considerable period poria on some estates has been allowed to grow and extend its activity unchecked. The many deaths caused by this root disease fungus have again begun to cause concern. On one estate where only dead bushes were removed over a number of years, attempts to clean up the diseased areas at this late stage have caused considerable decrease in the tea area. For the last five years removals on that estate have been as follows :—

	Bushes removed
1946 ..	10,359
1947 ..	7,079
1948 ..	30,693
1949 ..	42,530
1950 ..	48,454
	139,115

The importance of controlling the progress of this disease at the earliest opportunity cannot be too strongly emphasised.

PESTS

Spotted Locusts. The spotted locust (*Aularches miliaris*) appeared in the Pussellawa and Pundaluoya districts. The most attractive source of food was the dadap (*Erythrina lithosperma*).

On one estate the collection of locusts was estimated to total 350,000.

The most effective means of control is to locate the breeding grounds as both females and eggs may then be destroyed in large numbers. In the very young hopper stage, which usually appears in March-April, spraying the hoppers with a soap solution is stated to give fair control. The older stages are best destroyed after hand collection.

Hellopeltis. (Mosquito blight). This pest is endemic in the Rakwana district where up to now it has caused only limited damage. In December somewhat widespread and extensive damage was reported from one estate. Indications to date are that the damage through this pest is gradually assuming importance necessitating the adoption of control measures.

Mr. Austin collected adult bugs which have been identified at the British Museum as *Helopeltis theivora Waterh.* Previous to this identification the Ceylon species was accepted as *H. antonii Sign.* Commenting on their identification the British Museum officials state there is a possibility that *Helopeltis antonii* is a synonym of *H. theivora* but find it ' impossible to give a definite opinion on the point until a full revision of the Asiatic species of this very difficult genus is undertaken '.

The report of the Assistant Pathologist in charge of the Passara Sub-Station follows.

C. A. LOOS,
Acting Pathologist.

REPORT OF THE ASSISTANT PATHOLOGIST, PASSARA SUB-STATION, FOR THE YEAR 1950

Staff. Mr. W. T. Fonseka, Field Assistant since 1931, was transferred to the St. Coombs laboratories in April for work in the Pathological Division.

Advisory. The total number of letters dealt with during the year numbered 1,679 of which 682 were received and 997 despatched. The number is 405 in excess of last year's total.

Forty-six consignments of insect pests of tea and green manures, dead tea bushes and weeds were received for examination and report. Mycological specimens, difficult to diagnose, were forwarded to the Pathological Division at St. Coombs. Estate visits in the Uva district were chiefly in connection with nettle grubs, shot-hole borer, pests of green manure and shade trees and vegetative propagation of tea. Outside Uva, three visits were made in connection with Helopeltis (Rakwana), shot-hole borer (Nawalapitiya) and termites in a tea factory (Matale).

Demonstrations. Two 3-day demonstrations were held in February and September, the maximum attendance being 30. Messrs. F. H. Kehl and E. S. Rajiah of the Physiological Division conducted the demonstrations on vegetative propagation of tea. As on previous occasions the morning sessions were set apart for Superintendents and Assistant Superindtendents while the afternoon sessions, which were conducted in both Tamil and English, were for estate subordinate staffs. Identification features for the more important insect pests and diseases of tea, green manures and shade trees were demonstrated. Plots of green manures suitable for the Uva district were inspected. Spraying and dusting apparatus were on view. Each demonstration lasted 3 hours, the total attendance being over 150.

Rainfall. 53.03 inches fell over 164 days. This is the lowest record on Gonakelle Estate (where the T. R. I. Sub-Station is situated) since 1912. The previous lowest record was 73.00 inches of rain which fell over 162 days during 1947. The annual rainfall average for the estate is 100 inches.

Tea Pests. The following insect pests which caused fairly extensive damage to tea were the subject of enquiries, inspections and reports during the year :—

Nettle Grub. Twelve estates, eight in the Badulla and four in the Passara districts reported outbreaks of the fringed nettle grub (*Natada nararia*) during the year. The majority of attacks were sporadic and lasted a couple of months only, but on four estates attacks continued for 6 to 9 months. Control measures adopted were the collection and destruction of cocoons. On one estate the saddle-backed nettle grub (*Thosea cervina*) was also present in large numbers, but the attack was not as severe as with *Natada nararia*. The usual parasites on the larval stages of the nettle grub together with the wilt disease caused a natural control of the attacks.

No additional parasites to those already known were observed, nor were Tachinid parasites obtained from the hundreds of *Natada* cocoons brought to the laboratory for examination. Observations indicate that the wilt disease

which is the primary factor in controlling *Natada* attacks is specific in action as it does not affect *Thosea cervina*. In a field infested with both *Natada* and *Thosea* wilt disease was observed in over 80% of the *Natada* caterpillars while *Thosea cervina* was unaffected.

Red slug (*Heterusia cingala*). This caterpillar which resembles nettle grubs in appearance and in its damage to tea, often escapes detection until a bush is severely defoliated. Attacks are effectively controlled by parasites and a bacterial wilt disease.

Green Bug (*Coccus viridis*). This scale insect is found chiefly in the Bandarawella and Haputale districts during dry weather months. The scale insects excrete a sugary liquid on which a sooty mould (*Meliola sp.*) grows profusely. With the advent of rain the scales are naturally infected with a predatory fungus *Cephalosporium lecanii*.

Termites. On the few occasions during which termites were reported in Uva, the species responsible for damage was *Odontotermes redemanii*—a species of the common mound-building termites in Ceylon and also frequently observed in buildings. These termites work their way through floors and feed on susceptible timber. Fumigating the termite nests by introducing petrol through a piece of piping has been found an effective means of destroying the termite colonies. Gammexane dust (D. 025) blown into runways is recommended as a control measure.

Extensive damage to wood work by *Cryptotermes* sp., a dry wood nesting termite, was reported from a tea factory in the Matale district where tats, over 50 years old, were attacked.

An address on the subject of termites associated with the tea industry was read at a meeting of the Badulla and Passara Sub-District Planters' Associations.

Shot-Hole Borer. The testing of the efficacy of insecticides in the control of the shot-hole borer beetle was continued during the year. In 1949 it was reported that spraying with Gammexane P. 520 at a dilution of one pound in 5 gallons of water resulted in 31% damage reduction. The same plots in the Passara Manurial Experiment No. 2 were again utilised for test. Two blocks were sprayed with Gammexane P. 520 and two remained untreated in an area pruned at the end of March 1950. The first spray application was given immediately after pruning and the second eight weeks later. Branch breakages following shot-hole borer attack will be summarised every quarter commencing at the end of the first year in the cycle, *i.e.*, March 1951.

A similar experiment was carried out on Ury Group in the Passara district where the estate very generously placed a block of tea and other facilities at my disposal. The opportunity was taken to test the efficiency of two additional insecticides, T.P. 726 and Arkotine D. 15 which were kindly supplied through Dr. Swarbrick of the Shell Company from their Amsterdam laboratories. The experiment comprises the following treatments :—

(1) Untreated.
(2) Arkotine 1%
(3) Arkotine 0.5%
(4) T. P. 726 1%
(5) T. P. 726 0.5%
(6) Gammexane P. 520 1 lb. in 5 gallons water.

Each treatment is replicated 4 times, each replication consisting of 50 bushes. Sprays were applied twice, the first immediately after pruning (June 1950) and the second 8 weeks later. Examinations on the efficiency of control with the insecticides will be made in 1951.

Tea Mites. Red spider (*Paratetranychus bioculatus* W.M.), scarlet mite (*Brevipalpus australis* Tucker), and purple mite (*Eriophyes carinatus* Green) attacks were observed during the long spell of dry weather. Cases of defoliation due to mite attacks were reported from the Bandarawella-Haputale area.

G. D. AUSTIN,

Assistant Pathologist Passara Sub-Station.

REPORT OF THE ENGINEERING DEPARTMENT FOR THE YEAR 1950

Staff. This department was established in February 1950. The Engineer proceeded to the United Kingdom on a short term of leave and on his return a Mechanic (Grade 1 Fitter & Turner) previously employed in the R. N. Torpedo Depot, Colombo, was engaged. Additional staff will be required next year when the new workshop is completed.

Study Leave. Visits were made by the writer to a number of manufacturers of fungicides, spraying and dusting equipment, research stations and machine tool suppliers.

Crop Protection Work. When the Engineer returned to Ceylon on the 29th May, a small temporary workshop was established in the Institute. Welding equipment was purchased and a lathe was hired locally which enabled us to carry out alterations and modifications to spraying and dusting equipment to suit conditions in this country. Nozzle testing apparatus was rigged up using existing materials available in the laboratory and useful figures relating to wear, output, spray angles, and filter size of all nozzles available were compiled. Testing equipment to give greater accuracy will be installed, in the new workshop.

On completion of the spraying experiment at Kataboola Estate, Mr. Scoles of Messrs. Plant Protection, Ltd., was attached to the Department for a short time and a list of modifications which we considered would improve the spraying equipment was drawn up and sent to the manufacturers concerned.

A considerable amount of time was spent in the field with spraying and dusting machines during the latter part of the year and necessary modifications to the Micron sprayer brought out by Mr. Bals of Clean Crops Ltd., were undertaken in the workshop.

Workshop. The machinery and tools for the workshop arrived in December with the exception of two lathes, which we hope to receive before the middle of next year.

The new workshop, stores and office building situated near the factory, are under construction and should be completed early in 1951.

Our endeavours to obtain supplies of stores materials direct from the United Kingdom have so far proved unsuccessful due to restrictions imposed on the manufacturers by the Board of Trade. Enquiries are now being made to ascertain whether we can obtain our requirements through the Government Factory.

Electrical Installation. The existing power plant is running almost at full load which makes maintenance work extremely difficult since the three engines and generators are in daily use.

Particulars and plans of the present installation have been submitted to the Department of Government Electrical Undertakings, and we now await their recommendations.

Water Supply. Plans are being prepared with a view to improving the existing water supply layout throughout the estate and a Hydram is on order to augment the supply to the factory, engine room and labourers' lines.

Buildings. Work is going ahead on the extensions to the laboratory and the new Junior Staff Recreation Club.

J. LANDRETH,
Engineer.

REPORT OF THE SCIENTIFIC OFFICER LOW-COUNTRY SUB-STATION FOR THE YEAR 1950

Staff. Mr. T. E. Walter, the Scientific Officer appointed to take charge of the proposed Low-Country Sub-Station, was stationed at St. Coombs throughout the year, pending the establishment of the station.

Mr. F. P. Jayawardene, Field Assistant, was stationed at Matugama from June onwards, and supervised the preliminary work at Nivitigalakelle.

General. Plans for the establishment of a Low-Country Sub-Station of the Tea Research Institute on the Nivitigalakelle sub-station of the Rubber Research Scheme began to take shape early in the year ; by June negotiations between the respective Boards were sufficiently far advanced to enable us to start work on the proposed site, and a block of 50 acres of old rubber, with staff quarters and office, was put at our disposal.

Later in the year an agreement was drawn up between the respective Boards covering the gradual transfer of the whole estate to the Tea Research Institute in stages over a period of 15 years, corresponding with the time required for the Rubber Research Scheme experiments originally planned in the various blocks to reach maturity ; this agreement was, however, subject to ratification, which was not forthcoming by the end of the year. Accordingly, development work during the period under review was of necessity restricted to work in connection with our immediate requirements.

Vegetative Propagation. It had been decided that the proposed sub-station should be planted up almost exclusively with (selected) clonal material, and that V. P. experiments should receive first priority ; a nursery site was, therefore, prepared under the supervision of Mr. F. P. Jayawardene.

Collection and Planting of Clonal Material. An appeal for clonal material was circulated through the Planters' Association of Ceylon to all low-country estates, and a generous contribution was made by 5 estates ; this amounted to about 5,000 cuttings of which 3,000 were fresh and 2,000 rooted or callussed, from over 100 clones. No difficulty was experienced in

transporting the freshly cut material fairly long distances, for which purpose the whole cuttings were wrapped in wet sacking and put into water on arrival. Most of these were from selected clones which had already received preliminary trials in the estate nurseries from which they came, but about 2,000 cuttings were from bushes which had only been selected by eye in the field. A fairly wide range of rooting percentage was therefore, expected, but the actual range obtained from counts at the end of the year was surprising and varied between the very wide limits of 10% and 100% success, with an overall average of 65% success. These results serve to emphasise the importance that should be attached in clonal selection to the characteristic rooting percentage of any particular clone before large scale propagation with it is undertaken, since it is obviously useless to attempt propagation of a clone with other characteristics, however highly desirable, if it is a poor rooter.

Multiplication Plots. About 1,000 of the biggest plants were put out in the field in multiplication plots during the N.E. Monsoon, at which time they were nearly a year old.

T. E. WALTER,
Scientific-Officer Low-Country Sub-Station.

REPORT OF THE SMALL HOLDINGS ADVISORY OFFICER, GAMPOLA, FOR THE YEAR 1950

As I pointed out in my previous report, the immediate task facing the advisory service is that of keeping alive the keenness awakened among owners of small holdings in the development of their properties on modern agricultural lines. At the moment the best efforts towards this end are severely handicapped by the absence of adequate credit facilities to enable the small holder to tide over periods of seasonal economic stress. Small scale agriculture throughout the country is beset with the same difficulty and while paddy cultivators are generally in the grip of village money lenders, the owner of a small tea holding is often at the mercy of the middleman and the agent of the bought leaf factory.

What is urgently required by the village agriculturist is some easy form of obtaining short term loans to meet immediate commitments until his crops are harvested. I suggest that some form of Agricultural Bank should be established in every town to meet this need. The conditions of obtaining these short term loans should be simple, with legal formalities involving expenditure and delays cut to the minimum. The mortgaging of crops should be sufficient security for the grant of such loans. Information necessary to test the genuineness of an application could, in almost every case, be obtained from the Village Headman.

Co-operative Movements. The scheme to put up a Co-operative Tea Factory referred to in my last report has not materialised, despite the enthusiasm with which it was received by the Divisional Revenue Officer of the Uda Palata and several small holders. The Co-operative Movement has done much to encourage trade and other village enterprises but it has so far failed to extend the benefits of co-operation to small holders of tea.

A small holders' society has been formed in the Kotmale area, the first of its kind on co-operative lines, for the manufacture of small holders' green leaf. I have been present at several of their meetings and great keenness in this venture has been evident. It is too early to say whether this project will eventually provide a solution to the small holders' problems. The main object of the society at present is to manufacture the leaf of its members and to pay them better prices and also to obtain their requirements of artificial manures, planting material, etc., at the correct time on easy terms of payment. It is also hoped that if this venture proves a success, the society will ultimately have its own tea factory. At present the society manufactures its leaf in a factory taken on lease.

Competitions. A competition in Uda Palata was attempted, but it did not receive the support of the Village Committee in the area and it had to be abandoned. Several appeals were made to the V. C. Chairman in this area to support this scheme but these met with little response.

Propaganda Literature. Articles on various aspects of tea planting have been published in Sinhalese and distributed to small holders. The scheme has proved useful and we have had numerous requests for these articles.

Village Welfare Societies. These continue to function in nearly every village and some of them are doing very useful service.

The Tea Small Holdings Advisory Service. This service, as at present constituted, can hardly be described as adequate to cope with some 60,000 acres of small holdings in tea, scattered throughout the Island's tea growing areas. Tea remains one of the major sources of income for the village agriculturist, and it is important that the village tea garden should be maintained in a good agricultural condition. The value of the Advisory Service in relation to Village life has continued to earn recognition.

Advisory Work and Meetings. Advisory work was carried out in the chief headman's areas of Uda Palata—Udu Nuwara and Yati Nuwara, during the year.

Dr. R. M. Gorrie, the Govt. Soil Conservation Officer, visited the areas on several occasions. His advice has been most useful to small holders for whom the conservation of soil must remain a matter of major importance.

Mr. Gamble of the Dept. of Agriculture, Kenya, paid a visit to the area. He spent a morning visiting small holdings and studying local conditions.

Tea Seed. The Institute imported tea seed from the BOH Plantations in Malaya for distribution amongst the small holders. The scheme was a great success and the demand far exceeded the supplies that we were able to obtain from Malaya. It was found more economical to import tea seed rather than to make local purchases. Another reason for making tea seed available at a reasonable price was the hope that it would reduce the widespread thefts of valuable vegetative propagation material from estates.

What really matters to the small holder is the best means of growing tea on his lands. He is not very particular about jat as long as it is tea, stolen or otherwise. I would suggest that estates, in order to minimise these thefts, if not to eradicate them, should pass on a certain percentage of their seed crops to the Institute for sale among the small holders at reasonable prices. If seed were made available to them by this means, thefts of planting material would inevitably be minimised.

With regard to vegetative propagation material, the Institute has established nurseries at Gampola, Baddegama and Morawaka, tea plants from these nurseries are being issued free to small holders.

I must thank Dr. Paul, the Principal of the School of Agriculture, for his assistance to me in establishing the tea seed germination beds at Gannoruwa, and later in the sale of seedlings. I must also thank Mr. Ponniah, the Divisional Agricultural Officers, Sabaragamuwa, for the assistance I received from him in establishing the nurseries at Balangoda.

Green Manure and Shade. The value of growing and using green manures is now generally well known to small holders. Although there no longer exists any difficulty about convincing them as to the usefulness of such green manures, as Dadaps, Gliricidias, Crotalarias and Albizzias, small holders have yet to learn the use of such green manures to the best possible advantage. It is intended to make available supplies of green manure seeds to small holders in the near future.

Plucking and Pruning. The former is still very bad and can never improve as long as the plucker is paid on weight and bought leaf factories continue to accept course leaf. Pruning has improved considerably and the

majority of small holders have adopted the rim lung method but what happens now is that the pruning cycles are carried over long periods—30–40 months—due entirely to the good prices paid for green leaf. This result in a large percentage of deaths after pruning for when the tea is ultimately pruned after this long cycle, it has hardly any foliage.

Planting and Treatment of Young Tea. Legislation to enforce the contour system of tea planting has now been passed by Parliament but very few small holders seem yet aware of these regulations and few among them have adopted this method of planting. If the contour system is accepted in all tea growing areas, the problem of soil erosion would to a large extent, be reduced. Every endeavour should be made to teach small holders to start a bush without cutting back but by bending over young plants at the point they would normally centre, creating what may be termed a ' bean stick fracture ' for the development of early laterals.

Labour. The labour situation is far from satisfactory in these areas and although good prices have been realised from the sale of green leaf, the high cost of labour leaves the small holders with very small profits. Wages fixed by ordinance are based on the turn over of large, high yielding and well managed estates, and when these rates are applied to small holdings where yields are poor by comparison, they can, at best, allow a very narrow margin of profit. This is true not only of tea but of every major crop, and one feels that the case of the small producer should receive consideration from those Committees set with the duty of fixing minimum rates.

Weather. The weather conditions during the year were fairly satisfactory and beneficial to planting.

General. Conditions are still far from satisfactory. The cost of living continues to be very high and small holders need nearly all of their earnings to obtain the bare necessities of life.

My sincere thanks are due to all Village Headmen, Chief and Minor, for their willing co-operation in my work, in spite of the many duties they are called upon to perform. I must also thank the Village Committee Chairmen and members for the constant assistance I have received from them.

R. L. ILLANKOON,
Small Holdings Officer, Gampola.

REPORT OF THE SMALL HOLDINGS ADVISORY OFFICER, MORAWAKA, FOR THE YEAR 1950.

Weather. Rainfall for the past 3 years, recorded at Waralla, which is centrally situated in the chief tea district of the area is as follows :—

1948	..	158.35 ins.
1949	..	125.38 „
1950	..	93.28 „

Although the rainfall in 1950 was far below that of former years, except in the month of January, the distribution was remarkably good, and good yields were maintained during the year.

Advisory Work. The Demand for my services has considerably increased and 373 visits were made during the year as against 176 in 1949.

My services, were particularly useful to those who opened up new tea clearings. Contour planting is now compulsory, but by and large small holders are not yet aware of this fact.

Rim lung pruning is now the accepted system, and it is very rarely that anyone resorts to drastic clean pruning. I was able to induce a few small holders to use artificial manure for the first time on their holdings, and in such instances manure had to be ordered and transported on my own responsibility.

Union Activities. In January 1950 a small holders' association was formed at Baddegama at the request of the people there. Now they have their own officer to see to their needs, and it is gratifying to hear that they have made very good progress during the year. The Morawaka association did not show much activity due to lack of leadership and keenness among members.

Propaganda. Group meetings were held at Pallegama, Kolawenigama, Opata and Morawaka to impress on the tea growers the need to keep in touch with technical advice, and demonstrations were given on vegetative propagation.

Other Activities. My services were extended to a number of larger estates in the district and outside on matters relating to soil conservation, contour planting, vegetative propagation and manuring.

Competition. A competition was attempted in this area during the year but it met with little enthusiasm and had, therefore, to be put off.

Leaf Prices. Green leaf prices remained very saitsfactory during the year. Prices varied between 30–41 cents per pound during the year according to price fluctuations in manufactured tea. The average price remained well over the previous year—34.8 cents per pound in 1950 as compared with 31.8 cents per pound in 1949.

Seed Distribution. Most small holders find it difficult to get good seed in small quantities at reasonable rates for filling up vacancies. To assist them

the Tea Research Institute obtained some Malayan seed through the Department of Agriculture, and 10½ maunds of this seed were distributed in my area at a very nominal rate. I also obtained a further 9½ maunds from local estates for distribution.

Remarks. In spite of representations made through the Institute and Morawak Korale Planters' Association, the Tea Controller has not yet decided to keep us informed when permits are issued for new planting. Most small holders do not understand the system of contour planting that is now compulsory, and tea is still being planted on the old pattern. Unless supplied with this information, advisory officers cannot be expected to make available in time, the guidance a small-holder will need in planning his roads, drains, etc., for it is still rarely that the villager approaches us for advice on his own initiative. If further loss of valuable top soil as a result of improper cultivation is to be prevented in tea holdings, advisory officers should be informed when permits are issued.

General.—I extend my sincere thanks to Messrs. Victor Ratnayake, (Chairman, Morawak Korale P.A., and M.P., Deniyaya); R. Brodie, D. S. T. Abeygunawardena, (Secretary, Morawak Korale P.A.,) and Lal Jayatunga, (D.R.O., Morawak Korale,) for the very active co-operation I have always received from them in my work.

K. P. ABEYWICKREMA,
Small Holdings Advisory Officer, Morawaka.

REPORT OF THE SMALL HOLDINGS ADVISORY OFFICER, BADDEGAMA FOR THE YEAR 1950

I assumed duties as Advisory Officer in charge of the Galle district in the middle of April.

Over 700 visits were made to small holdings and the small holders were instructed in the correct methods of tea cultivation. On these occasions the instructional leaflets issued by the Institute were distributed to small holders after practical demonstrations had been given.

Soil Conservation. The importance of soil conservation and the preservation of top soil was stressed ; the establishment of earth banks and tea hedges was advocated where stone terracing is difficult. Several new clearings were opened under my supervision, the tea being grown on the contour at $1\frac{1}{2}' \times 5'$.

Supplying.—As the small holders found it difficult to obtain good planting material to supply vacancies, the Institute issued germinated Malayan seed to them. As the demand for these far exceeded the supply, most of the small holders were unable to get their full requirements.

The value of vegetatively propagated plants has been explained to small holders and several nurseries have been opened up on small holdings. The small holders are taking a keen interest in these nurseries and more will be opened up in the different village committee areas.

Lung Pruning. In the low country where starch deficiency results from clean pruning, rim-lung pruning was advocated ; however, there were instances where small holders who usually employ contractors for pruning, had their holdings clean pruned. Some consider clean pruning necessary especially after their holdings have been cut across for a number of years. It is at times difficult to convince the conservative small holders, and in fact only practical results will persuade them.

Plucking. The importance of careful plucking was explained and demonstrated, but there are many small holdings which have been stripped. This is due to high prices fetched by green leaf at the moment, and the piece rate system of payment to pluckers, who are rarely supervised. When there are large estates in the neighbourhood the small holders experience a shortage of labour.

Blister Blight.—This fungus disease was observed on most of the big estates as well as on small holdings during the latter part of the year, when unusually heavy rains were experienced. I am now propagating a clone which has an unusually large variety of leaf which was found on a small holding, and which appears to be resistant to blister blight.

Co-operative Tea Small Holders' Society. Economic conditions combined with insufficient attention to their holdings have been the chief causes of the backwardness of the small holder. A Small Holder's Co-operative Society was formed at Kottawa to provide small holders with facilities for

obtaining loans on easy terms and to ensure an organised approach to the problems of soil conservation and manure supply in the area. This Society is based on the C.A.P.S. societies and is being registered by the Co-operative Department. In this work we have received the unstinted co-operation of Mr. Neal de Alwis and the V. C. Chairman of Kottawa.

Gangabodda Pattu Tea Small Holders' Society. This society, organised by Mr. Henry Abeywickrema, the V.C. Chairman of Baddegama, has helped to keep alive the enthusiasm and keenness of small holders in the development of their properties. Monthly propaganda meetings of this society are held regularly in different villages.

With the favourable markets prevailing at the moment, and the unprecedented prices paid for rubber, more than ordinary persuasion is often necessary to induce the small holder to pay more attention to his tea lands.

M. V. DE SILVA,
Small Holdings Advisory Officer, Baddegama.

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(12) The Director of Agriculture.
(13) The Chairman, Planters' Association of Ceylon.
(14) The Chairman, Agency Section, Planters' Association of Ceylon.

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