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COCONUT RESEARCH SCHEME.

ANNUAL REPORT OF THE BOARD OF MANAGEMENT FOR THE YEAR 1946.

(In terms of Section 8 (2) of the Cocount Research Ordinance (Cap. 305)).

Board of Management.

On January 1, 1946, the Board of Management consisted of the following members:—

Chairman: The Director of Agriculture (Mr. L. J. de S. Seneviratne, C.C.S.).
Deputy Financial Secretary: (Col. C. J. Dane Lanktree, O.B.E., E.D., C.C.S.).
The Chairman of the Low-Country Products Association of Ceylon (Mr. S. F. H. Perera).

Members of the State Council nominated by His Excellency the Governor.	Mr. Dudley S. Senanayake, B.A. Vacant
Representatives of the Low-Country Products Association.	Mr. Vernon Rajapakse. Mr. Stanley Dias.
Representatives of the Planters' Association of Ceylon.	Mr. W. P. H. Dias, J.P. Mr. A. Pearson.
Representing the Small-Holders, nominated by His Excellency the Governor.	Mr. Graham Panditteseker, J.P., U.M. Mr. C. A. M. de Silva.

Mr. E. Muttukumaru was nominated by the Planters' Association as one of its representatives in place of Mr. W. P. H. Dias, on the completion of the latter's term of office on February 9.

Mr. J. Tyagaraja, M.S.C. for Mannar, was nominated by His Excellency the Governor as one of the State Council members, with effect from March 12. Mr. Tyagarajah had previously been an *ex-officio* member of the Board as Chairman of the Low-Country Products Association in 1937, 1938 and 1939.

Mr. C. A. M. de Silva was elected Chairman of the Low-Country Products Association from March 30, and so became *an ex-officio* member in place of Mr. S. F. H. Perera.

This left a vacancy among the Smallholders' representatives which was filled by the nomination of Mr. D. D. Karunaratne, J.P., who had previously served on the Board in the same capacity from 1935-1944.

Mr. H. E. Peries, C.C.S., was deputed by the Acting Financal Secretary to be *an ex-officio* member of the Board from April 26, succeeding Col. C. J. Dane Lanktree.

Mr. T. Amarasuriya, M.S.C., was nominated by His Excellency the Governor as one of the State Council members, with effect from May 17, in place of Mr. Dudley S. Senanayake, on the expiry of the latter's term of office.

Mr. A. Pearson, representative of the Planters' Association of Ceylon on the Board, left the Island on 6 months furlough on December 17, and the vacancy was not filled at the end of the year.

Five meetings of the Board were held during the year on February 22, May 27, July 4, September 30, and November 4, 1946.

Committees.

Buildings Sub-Committee.—Personnel at January 1, 1946: Mr. Graham Panditteseker, J.P., U.M. (Chairman), Mr. W. P. H. Dias, J.P., Mr. A. Pearson.

At the 79th meeting of the Board of Management held on February 22, Mr. E. Muttukumaru was elected to fill the vacancy on the Committee, consequent on the retirement of Mr. W. P. H. Dias.

One Meeting, on March 9, was held by the Committee during the year.

Sub-Committee for Staff Matters.—Personnel at January 1, 1946: The Deputy Financial Secretary, Mr. C. A. M. de Silva, Mr. Vernon Rajapakse, Director of Research (Convenor).

At the 81st meeting of the Board held on July 4, Mr. G. Panditteseker was elected to take the place of the Deputy Financial Secretary in the Committee.

One meeting, on August 21, was held by the Committee during the year.

Estates' Sub-Committee.—Personnel at January 1, 1946: Mr. S. F. H. Perera, Mr. A. Pearson, Mr. C. A. M. de Silva, Mr. B. Parker (Visiting Agent) Director of Research, Geneticist, Soil Chemist and Secretary-Accountant (Convenor).

At the 80th meeting of the Board of Management, held on May 27, Mr. E. Muttukumaru was elected to fill the vacancy on the Committee, consequent on the retirement of Mr. S. F. H. Perera. One meeting was held on August 30, 1946.

2. **Staff.**—

Director of Research and Technological Chemist: Dr. R. Child, B.Sc., Ph.D. (Lond.), F.R.I.C. (on leave).

Geneticist and Acting Director of Research: Mr. W. V. D. Peiris, M.A. (Cantab.), B.Sc. (Lond.), Dip. Agric. (Cantab.).

Soil Chemist: Dr. M. L. M. Salgado, B.Sc. (Lond.), Ph.D. (Cantab.), Dip. Agric. (Cantab.).

Secretary-Accountant: Mr. S. C. Kahawita, B.Com. (Lond.).

Research Assistant to Technological Chemist: Mr. W. R. N. Nathanael, B.Sc. (Lond.).

Mechanic: Mr. R. Weerapermall.

Dr. R. Child returned to the Island on January 10, and assumed duties as Director on January 15.

Mr. W. V. D. Pieris, Geneticist since 1930 and the member of the staff with the longest service, resigned his post on June 1 and left the Island in September. The post had not been filled by the end of the year; the work of the Division being carried on by Mr. D. V. Liyanage, Technical Assistant.

Mr. P. J. Nonis, Estate Superintendent since the acquisition of Bandirippuwa Estate in 1931, resigned his post and left at the end of July to take up the post of Superintendent, Ratmalana Estate, Mount Lavinia.

Mr. W. Nanayakkara, Conductor, Bandirippuwa Estate, left the service of the Scheme at the end of October.

Mr. C. S. A. Fernando, Junior Clerk, left at the end of May.

The following new appintments were made during 1946:

Mr. K. A. Salaam was appointed as Secretary to the Chairman of the Boards of the Rubber and Coconut Research Schemes from February 1. He is stationed at the Head Office of the Department of Agriculture, Peradeniya.

Mr. L. A. Fernando was appointed Technical Assistant to the Soil Chemist from April 1.

Mr. W. K. D. Rasiah, temporary Book-keeper, was confirmed in the post of Book-keeper-Clerk, with effect from July 1.

Mr. O. D. J. Wanasinghe was appointed Clerk-Stenographer from September 1, and Mr. F. H. B. Felix Silva, temporary Clerk, was confirmed in the post of Junior Clerk from the same date.

Mr. E. Basnayake was appointed Superintendent, Ratmalagara Estate, from September 14, and Mr. W. D. Frederick as Superintendent, Bandirippuwa Estate, from October 14.

At the Annual General Meeting of the Ceylon Association of Science held on September 21, 1946, Dr. R. Child, Director, was elected President of Section F (Physical Sciences) for the Third Annual Sessions, 1946-47.

3. **Legislation, &c.**—

(i.) The Coconut Research (Amendment) Ordinance, No. 62 of 1946, received the Governor's assent on December 11. It is: "An Ordinance to amend the

Coconut Research Ordinance so as to authorise retrospectively the establishment of a Provident Fund for the benefit of employees of the Coconut Research Scheme and to validate acts done and rules made heretofore in connection with the establishment and maintenance of such fund."

(ii) *Future of the Scheme.*—The Supplement to the Memorandum of the Board of Management on the Future of the Coconut Research Scheme was printed and circulated during the year, and with the original Memorandum was referred to Government for consideration.

4. Summarised Departmental Reports.—

A. *Technological Chemist's Department.*—

(i) *Sugars in Coconut Water.*—(*a*) In amplification of work reported last year, ketoses were determined on samples of nut water by a modification of the Kolthoff —Kruisheer method (Cf. Brown and Zerban, " Sugar Analysis ", 3rd Edition 1941, p.902). Hypoiodite oxidation of aldoses was carried out as in the original method, and residual ketoses estimated by Lane and Eynon's method. This procedure was found satisfactory when checked against inverted sucrose solutions, and after some preliminary experiments, was applied to samples taken from nuts at all stages of ripeness on a single palm. A summary of the results is given in the following table:—

No. of bunch.	No. of nuts on bunch.	Volume of water Av. per nut c.c.	Total solids gms/100 c.c.	Ketoses as fructose. gms/100 c.c.	Glucose by difference gms/100c.c.	Sucrose gms/100 c.c.	Total Sugars gms/100 c.c.	Total sugars as % of total solids.
*I	6	13	3·22	0·53	0·62	0	1·15	35·7
II	6	64	3·45	0·81	0·93	0	1·74	50·4
III	5	142	3·51	1·08	1·28	0	2·36	67·2
IV	4	295	3·96	1·25	1·59	0	2·84	71·7
V	11	375	4·28	1·51	1·68	0	3·19	74·5
VI	12	448	4·51	1·72	1·93	0·05	3·70	82·0
VII	10	414	5·24	2·15	2·14	0·14	4·43	84·5
VIII	8	360	5·74	2·20	2·42	0·25	4·87	84·8
IX	9	299	6·23†	—	4·38	—	0·62	5·00	80·3
X	9	234	6·15†	—	3·58	—	0·89	4·47	72·7
XI	14	229	5·59†	—	2·76	—	0·84	3·60	64·4
XII	4	235	5·34†	—	1·17	—	1·53	2·70	50·6
XIII	10	229	5·34	0·76	1·16	1·03	2·95	47·8
XIV	4	285	5·47	0·77	1·11	1·08	2·96	54·1
XV	7	193	5·37	0·45	0·40	1·36	2·21	41·2
XVI	7	163	5·50	0·36	0·28	1·62	2·26	41·1

* There were three more immature bunches. (i) 4 nuts, average water content 1·2 c.c., (ii) 7 " buttons " with no cavity, (iii) 27 female flowers (just opened spathe.)

† Only total reducing sugars determined.

These results confirm the probability that the sugars of coconut water consist essentially of sucrose and invert sugar.

(*b*) *Mannitol.*—A reference over 100 years old ascribed to Bizio an analysis of coconut water, which was stated to contain 3.8 per cent. of mannitol. Dunstan (*Tropical Agriculturist, Ceylon*, 1906, 26, 377-378) found 1.8 per cent. of mannitol in a sample of coconut water sent from Ceylon to London in a sealed tin, and preserved—as it was thought—by the addition of chloroform. No observer has reported mannitol in fresh coconut water.

From stale coconut water, which contained no remaining fermentable sugar, mannitol, m.p. 164°C, was obtained without difficulty by evaporating to dryness and extracting the residue with 90 per cent. alcohol. The yield was about 2 gm. per litre. It seems likely that mannitol is formed in stale coconut water by bacterial reduction of sugars. At the same time, as the results tabulated above and those published in last year's report show, there is a good deal of organic matter in ripe coconut water other than sugars, and further investigation is desirable.

(ii.) *Composition of Coconut "Apples".*—Nitrogen was determined on the extracts and extracted residues of the samples reported last year. The following table summarises the results:—

Size and approximate time in nursery.	Average weight of apple gms.	Moisture per cent.	Alcoholic Extract.	Residue per cent.	N of Extract		N of Residue		Total N. per cent. of original.
					As per cent. of extract.	As per cent. of original.	As per cent. of residue.	As per cent. of original.	
Small 3½ months..	13·2	82·2	10·9	7·4	0·99	0·11	1·99	0·15	0·26
Medium 5 months	60·6	85·3	10·9	4·7	1·07	0·12	1·66	0·08	0·20
Large 6 months ..	144·8	86·8	9·6	4·1	0·90	0·09	1·50	0·06	0·15

A qualitative examination showed the residue to be largely composed of cellulose.

(iii) *Meat of Immature Nuts.*—Preliminary experiments were made on the soft pulp-like kernel of the immature nut at the drinking stage, known in Ceylon as Kurumbas. Four nuts from the same bunch were examined:—

No.	Volume of water.	Weight of wet kernel, gms.	% moisture of kernel.	% Fat	
				Wet.	Dry.
1	.. 500	.. 142	.. —	.. —	.. —
2	.. 430	.. 125	.. 82	.. 5·3	.. 29·3
3	.. 400	.. 128	.. —	.. 3·3	.. —
4	.. 465	.. 167	.. 82	.. —	.. —

Acetone extraction of the wet pulp was not satisfactory; fat was extracted by mixing the pulp with 80 per cent. of its weight of anhydrous sodium sulphate; the mixture was well ground and extracted in a Soxhlet apparatus with ether.

The fat from sample 3 had Acid value 0.24, Saponification value 248.4 and Iodine value 17.0; and thus differs somewhat from the fat of the ripe nut in containing more unsaturated acids. A study of the amount and composition of the fat as the nut matures would be of considerable theoretical interest.

(iv) *Coconut Oil.* (*a*) *Density of Coconut Oil.*—Enquiries were received from shippers of coconut oil in connection with bulk shipment. It was required to be able to convert volumes to weights at temperatures encountered under tropical conditions. A series of accurate density measurements was carried out on typical samples of commercial coconut oil, from which the following table was constructed:—

Coconut Oil. Volume : Weight Conversion Table.

	Lbs/Gallons.	Gallons/Ton.	Tons/1,000 gallons.				°F
			T	C	Q	L	
70°F	.. ..	9·224 ..	242·8 ..	4	2	1	12 .. 70°
75°	.. ..	9·205 ..	243·4 ..	4	2	0	21 .. 75°
80°	.. ..	9·187 ..	243·8 ..	4	2	0	3 .. 80°
85°	.. ..	9·168 ..	244·3 ..	4	1	3	12 .. 85°
90°	.. ..	9·150 ..	244·8 ..	4	1	2	22 .. 90°
95°	.. ..	9·132 ..	245·3 ..	4	1	2	4 .. 95°
100°	.. ..	9·114 ..	245·8 ..	4	1	1	14 .. 100°
105°	.. ..	9·096 ..	246·3 ..	4	1	0	24 .. 105°
110°	.. ..	9·078 ..	246·75 ..	4	1	0	6 .. 110°

It should perhaps be mentioned here that coconut oil tends to solidify at temperatures around 70°F and that figures extrapolated from the above table for lower temperatures, at which the oil is partially or wholly solid, are unreliable. A method for obtaining sufficiently accurate figures in such cases is given by E. R. Bolton and K. A. Williams (*Analyst*, 1935, *60*, 158–159.)

(*b*) *Sundry Analyses.*—Analytical reports were given on six samples of coconut oil referred to the Scheme from official sources. They presented in themselves no points of interest.

It may be as well to report here that the Scheme does not normally undertake routine analysis of samples which should be referred to a consulting analyst. Not infrequently enquirers consult the Technological Chemist about the potentialities of new processes and products they are trying to develop.

In suitable cases the Scheme is prepared to examine samples and to report whether they are satisfactory. It is obvious, however, that no opinion can be expressed on the possibilities of industrial processes, unless details are furnished. If the inventors are unwilling to trust the Scheme's staff with such information, their procedure should be to take out a provisional patent, after which full particulars could be given and a considered opinion obtained from the Scheme.

(v) *Sundry Coconut Products.*—(*a*) Analytical reports on three soap samples and advice concerning small scale manufacture were provided to one enquirer.

(*b*) A sample of poonac, manufactured by pressing copra in a rotary "ghani" of Indian type, contained moisture 11.0, oil 10.0, oil (dry weight) 11.2 per cent. This indicates that oil expression was quite good with this type of equipment, amounting to approximately 60 per cent. on good estate copra.

(*c*) A sample of desiccated coconut submitted had moisture 4.2, oil 58.6, oil (dry weight) 61.4 per cent., f. f. a. of oil, 0.09 per cent., (as lauric). Normal desiccated coconut contains 70 per cent. of oil (dry weight), so that over 10 per cent., of the oil had been extracted or expressed from this sample. Under tropical conditions, especially at temperatures over 100°F., desiccated coconut tends to "sweat" oil, causing oil-staining of packing cases. A product from which a proportion of the oil had been removed might have some application under such conditions. It is difficult to see any other purpose in removing oil from desiccated coconut, which is more highly priced than coconut oil.

(vi) *Coconut Shell Products.*—Work commenced in the previous year was continued on alkaline oxidation of shells and on the tar oils from dry distillation. It was still in progress at the end of the year and an account of results is deferred until next year's report.

(vii) *Miscellaneous (Products other than Coconut.).*—(*a*) A sample of commercial linseed oil was examined for the Tea Research Institute and reported as not up to B.S.S.—243/1926.

(*b*) Samples of Trimyristin (from Nutmeg butter) and Oleodistearin (from the fat of *Garcinia echinocarpa* Thwaites—see Annual Report for 1940, Sessional Paper XVI., 1941, page 5) were prepared for exhibition purposes.

(*c*) *Groundnuts.*—A random sample of locally purchased (Indian) groundnuts was examined with reference to the testa or seed-coat. This constituted 3 per cent., of the kernels, and contained 7.0 per cent. of oil of Sap. value 201.0, Iodine Value 70.5, Refractive Index (40°C) 1.4700. These seed coats are removed when groundnut kernels are crushed for oil.

B. *Geneticist's Department.*—

(i) *Bandirippuwa and Ratmalagara Estates.*—

(*a*) *Geneticist's Block "B".*—The detailed recording on this block of 300 (288 bearing) palms, commenced in August, 1931, has been maintained. The average yield of nuts per palm in 1946 was 81.9. Fifty-five of the palms are kept as selected seed-bearers.

The sixteen years' yield figures indicate that the yield characters of palms remain relatively constant in the sense that palms which bore particularly well in 1931 generally continue to do so.

On a hundred of these palms records are kept of female flowers formed, in addition to the usual records of numbers of bunches and of nuts.

(*b*) *Mother Palms.*—Yield recording of the selected seed bearers in other parts of Bandirippuwa Estate was continued.

(*c*) *Latin Square Experiment: (Ratmalagara).*—This field experiment, designed to compare the selected and unselected progeny of high yielding palms,

low yielding palms and seednuts taken at random, completed its seventh year. By the end of 1946, 394 out of a total of 576 palms had flowered, and 102 palms were in bearing. Details of the performance of the six classes are tabulated below:—

A.—Selected seedlings derived from high-yielding palms.
B.—Unselected seedlings derived from high yielding palms.
C.—Selected seedlings derived from low-yielding palms.
D.—Unselected seedlings derived from low-yielding palms.
E.—Selected seedlings derived from nuts of estate heaps.
F.—Unselected seedlings derived from nuts of estate heaps.

	Palms in flower.			Palms in bearing. No. of nuts picked.					Weight of nuts (lbs.)	
	5th.	6th.	7th year.	5th.	6th.	7th year.	6th.	7th. year.	6th.	7th year.
A ..	7..	42..	71..	0..	2..	25..	29..	285..	36·75..	354·50
C ..	8..	43..	69..	0..	3..	21..	25..	278..	39·50..	375·25
E ..	9..	37..	66..	0..	3..	20..	14..	235..	17·00..	294·50
Total ..	24..	122..	206..	0..	8..	66..	68..	798..	93·24..	1,024·25
B ..	0..	19..	51..	0..	0..	10..	0..	55..	0..	66·25
D ..	5..	39..	71..	0..	0..	11..	0..	191..	0..	228·50
F ..	5..	35..	66..	0..	0..	15..	0..	133..	0..	153·25
Total ..	10	93	188..	0..	0..	36..	0..	379..	0	448·00

Pending statistical analysis of the detailed figures, it is only possible to say that the value of seedling selection is definitely indicated in earlier flowering and bearing.

Catch Crops: *Pineapples*.—Reference has been made in the two previous reports to the growing of pineapples in this 12-acre clearing. The crop in 1946 was less satisfactory than in 1945, but 11,524 lbs., were harvested (about 5 tons), and realised Rs. 655.99, or Rs. 54.88 per acre. As the palms are reaching the bearing stage, the pineapples will possibly be removed after 1947.

(*d*) *Dwarf Palm Block* (*Ratmalagara*).—Routine observations on the 992 dwarf palms (about 10 acres) were continued. A number of palms in this area are clearly hybrids, bearing nuts of larger size than true dwarfs and frequently being very prolific.

(ii) *Nurseries and Issue of Planting Material*.—The Bandirippuwa and Ratmalagara nurseries provided about the same number of seedlings in 1946 as in 1944 and 1945.

1944 ..	16,706
1945 ..	16,429
1946 ..	16,299

In addition 69,883 seednuts were issued. A large proportion of this planting material was supplied through Government officers to Colonists, and an arrangement was made with the Department of Agriculture for the better co-ordination of such supplies.

(iii) *Co-operative Activities*.—(*a*) *Yield recording* of selected mother palms on private estates was extended to three more estates, bringing the total to 24. There must be a large increase in this work if the output of planting material is to be increased. The extension of nurseries is by comparison a simple matter.

(*b*) *Experimental Plantation No. 1*.—At the end of 1946, observations on the emergence and opening of spathes were discontinued as the palms were becoming inconveniently tall for such work.

The usual crop records were kept.

Again in 1945 and early 1946 drought conditions were experienced and during 1946 leaf droop was common, and immature nutfall was heavy. Details of crops are given in previous reports; for convenience a full summary is here given for the years 1940 to 1946.

Period after transplantation.	Year.	No. of palms in bearing.	Percent. of total No. (292)	No. of Nuts.	Average per palm.	Average per acre.
6th year	1940	20	6·8	191	9·5	36
7th year	1941	159	54·4	2,440	15·3	460
8th year	1942	247	84·6	11,320	45·8	2136
9th year	1943	288	98·6	14,880	51·7	2807
10th year	1944	291	99·7	15,410	53·0	2908
11th year	1945	291	99·7	11,835	40·7	2233
12th year	1946	291	99·7	12,790	44·0	2413

First bunch Vs. Second bunch nuts.—The 292 palms of this plantation form the progeny of nine high-yielding palms in the same estate (Marandawila Estate, Bingiriya). Besides the aim of studying the segregation of characters in the progeny, the layout is designed to compare the performance of plants from first and second bunch nuts.

The usual practice is to harvest coconuts every two months. As palms bear on an average twelve fruit bunches a year, there will be plucked at each harvest two bunches, one approximately a month more mature than the second. The view has been expressed that nuts of the second or less mature bunch are preferable as seed to those of the first bunch (cf. G. Panditteseker a, "Coconut Nurseries." *Trop. Agric.* (*Ceylon*), 1914. 43, 195-196).

Experiments in the nurseries at Bandirippuwa gave preliminary results in favour of the first bunch and the recommendations of the Coconut Research Scheme Leaflet No. 1, p. 4 are:—

(*a*) Only dead ripe nuts should be used for seed.

(*b*) First bunch nuts are better than second bunch nuts. But if two bunches must be cut, make sure that the husks of the second bunch nuts have turned brown. Do not use third bunch nuts for seed.

In the present trial nuts from first and second bunches are compared, and the following table shows the comparative total yields of the two lots:

	No. of palms.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	Total 1940–1946.	Total 1942–1946.	Average per palm per year 1942–46.
1st bunch	147	41	1089	5616	7623	7671	6012	6440	34492	33362	45·4
2nd bunch	145	150	1351	5704	7257	7739	5823	6350	34374	32873	45·3
Total	292	191	2440	11320	14880	15410	11835	12790	68866	66235	45·4

It will be apparent that any initial differences in performance have evened out as the palms come into full bearing.

It is a pleasure again to record our appreciation of the courtesy of Messrs. H. L. de Mel & Co. in allowing us full use of this area for field trials.

Experimental Plantation II.—In the Annual Report for 1943 (*Ceylon Government Sessional Paper IV.*—1945, pp. 8-9) an account was given of the difficulties encountered in establishing seed at stake in a soil heavily infested with termites. Termite damage and depredations by wild animals were heavy and frequent supplying of vacancies was necessary every year. As a result the stand was so little uniform as to make the area useless for a statistical experiment. It was therefore abandoned as far as experimental purposes were concerned and taken over by the Estate.

C. Soil Chemist's Department.—

(i) Field Experiments.—(i.) *N. P. K. Experiment—Bandirippuwa Estate.*

(*a*) The yield data for 1946, the eleventh year of the experiment, are as follows:—

	Lbs. copra per acre.	Calculated as percentage.
N_0	1427	100
N_1	1490	104·4
N_2	1400	98·1
P_0	1456	100
P_1	1420	97·5
P_2	1440	98·9
K_0	1186	100
K_1	1498	126·3
K_2	1633	137·7

Significant difference 98 lbs. per acre. NK interaction is significant and is negative.

(*b*) *The Potash Response.*—The progressive increase in yield due to potash manuring is shown below calculated as lbs. copra per acre:

Year.		(K^1–K_0)	(K^2–K_0)
I. 1936	..	26	50
II. 1937	..	47	80
III. 1938	..	47	114*
IV. 1939	..	28	120*
V. 1940	..	190*	249†
VI. 1941	..	122†	196†
VII. 1942	..	352†	470†
VIII. 1943	..	300†	407†
IX. 1944	..	362†	546†
X 1945	..	329†	422†
XI 1946	..	312†	447†
Total 11 years	..	2,115	3,101
Mean per annum		192	282

* Significant P·05
† Significant P·01

(*c*) *The Nitrogen Response.*—In last year's report were recorded the increments of yield due to Nitrogen manuring expressed as lbs. Copra per acre up to 1945, the tenth year of the experiment.

It was noted that at the higher level there has been a rapid fall in the response after the fifth year. In the eleventh year under review a negative (but insignificant) response at the higher level was obtained for the first time as shown by the following figures:—

(N^1–N_0)	(N^2–N_0)
63	−27

(*d*) *Influence of Manuring on Copra Out-turns.*—The following data show that the influence of manuring on copra out-turns for the experimental year under review:—

	Copra out-turn: Number of nuts per candy.	Difference.
N_0 ..	1350	—
N_1 ..	1390	40
N_2 ..	1464	114
P_0 ..	1390	—
P_1 ..	1391	1
P_2 ..	1421	31
K_0 ..	1480	—
K_1 ..	1384	96
K_2 ..	1359	121

As previously recorded in 1944 (Sessional Paper I.—1948, page 11) Nitrogen affected the out-turn adversely, *i.e.*, more nuts were required to produce a candy of copra; for N^2 the difference averages about 114 nuts per candy compared with 75 nuts previously recorded for the 8th year;

On the other hand, potash improves the out-turn to a similar degree.—

(ii) Co-operative Experiments.—(a) Southern Province (Ahangama) and Western Province (Siyane Korale).

The following Table summarises the results of the seventh year of these two experiments:—

Southern Province.

Treatments.	Nuts per acre.	Lbs. copra per acre.	Per cent.	Copra out-turn.
0	958	383	100	1,400
NK	1793	768	200	1,308
NPK	2551	1115	291	1,282

Western Province.

Treatments.	Nuts per acre.	Lbs. copra per acre.	Per cent.	Copra out-turn.
0	556	177	100	1,759
*NK	657	243	137	1,516
†NPK	1291	463	262	1,561

* Originally NK, now NPK since November, 1945.
† Originally NPK, now NK since November, 1945.

Influence of Manuring on Female Flowers and Setting of Nuts.—

The following are the data for 6 picks of the Western Province Experiment:

Totals of 12 Plots of 18 Palms each.

Pick I (12–1–1946.)

Treatments.	Nuts.	Female Flowers.	Per Cent. set.
0	306	974	31·4
NK	370	1087	34·0
NPK	482	2149	22·4

Pick II (23–2–1946.)

Nuts.	Female Flowers.	Per Cent. set.
293	856	34·2
345	973	35·5
727	2217	32·8

Pick III (7–5–1946.)

Treatments.	Nuts.	Female Flowers.	Per Cent. set.
0	703	1254	56·1
NK	777	1503	51·7
NPK	1443	2913	49·5

Pick IV (11–7–1946.)

Nuts.	Female Flowers.	Per cent. set.
660	1225	53·9
780	1399	55·8
1549	2944	52·6

Pick V. (10–9–1946.)

Treatments.	Nuts.	Female Flowers.	Per Cent. set.
0	386	857	45·0
NK	459	964	47·6
NPK	976	2264	43·1

Pick VI (12–11–1946.)

Nuts.	Female Flowers.	Per Cent. set.
93	395	23·5
152	436	34·9
491	1025	47·9

The data for the Southern Province Experiment are given below:—

Totals of 12 Plots of 18 Palms each.

Pick I. (6–6–1945.)

Treatments.	Nuts.	Female Flowers.	Per Cent. set.
0	1069	2151	49·7
NK	2150	4269	50·4
NPK	3599	6789	53·0

Pick II (7–8–1945.)

Nuts.	Female Flowers.	Per Cent. set.
964	2082	46·3
1766	3500	50·5
2322	4852	47·9

Treatments.	Pick III (22-10-1945.) Nuts.	Female Flowers.	Per Cent. set.	Pick IV (15-12-1945.) Nuts.	Female Flowers.	Per Cent. set.
O	558	1387	40·2	309	908	34·0
NK	1054	2498	42·2	678	1753	38·7
NPK	1201	3458	34·7	926	2611	35·5

Treatments.	Pick V. (19-2-1946.) Nuts.	Female Flowers.	Per Cent. set.
O	549	1481	37·1
NK	808	1925	42·0
NPK	1137	3193	35·6

N.B.—Only 5 picks were recorded in this experimental year.

(*b*) *Manurial Experiment on young Palms—Nattandiya.*—Two leaf counts were done during the year in January and June 1946.

The mean number of leaves developed per palm for the periods July 1945 to January 1946, and January 1946 to June 1946 is recorded below for each treatment:—

Number of leaves developed per Palm from July, 1945, to January, 1946.

	O	N.K.	N.P.K.	Mean.
O	4·83	5·24	4·97	5·01
Cover	4·45	4·37	4·88	4·57
Mean	4·64	4·80	4·93	4·79

Number of leaves developed per Palm from January, 1946, to June, 1946.

	O	N.K.	N.P.K.	Mean.
O	3·37	3·58	3·64	3·53
Cover	3·32	3·18	3·62	3·37
Mean	3·35	3·38	3·63	3·46

None of the manurial treatments nor " Cover " Vs. " No Cover " treatments is significant.

In December, 1946, 35 palms were in flower. One palm was in bearing and 12 nuts were picked during two picks in July and September 1946.

The distribution of palms in flower according to treatments is as follows:—

	O	N.K.	N.P.K.	Total.
O	6	13	3	22
Cover	5	2	6	13
Total	11	15	9	35

(iii.) *N. P. K. Cultivation Experiment (Ratmalagara).*—Three years yield recording was completed in June 1946. The data after analysis will be presented in the 1947 Report.

(iv.) *Cover Crop Experiment (Bandirippuwa).*—The mean yields for the treatments expressed as lbs. copra per acre statistically analysed and corrected by the method of covariance are recorded below for the 9th year ending June 1946.

Treatment.		Lbs. copra per acre.
No. Cover	N.P.K.	1470
Cover	K.	1475
Cover	N.K.	1442
Cover	P.K.	1442
Cover	N.P.	1239
Cover	N.P.K.	1566
Standard error		119·3
Significant Difference P·05		142·0

As in previous years the only significant difference is shown by N. P., thus confirming the importance of potash.

2. *Laboratory Investigations.*—

Potash Content of Coconut Water of the Nuts of the NPK manurial Experiment.—The main laboratory investigation was a comprehensive study of the potash content of the water of the nuts from the 54 plots of the NPK Manurial experiment, in order to see if there is a correlation between potash content in the water and manurial response.

From 1937 to 1942 the potash content of nut water was determined in the 16 plots receiving no potash and double doses of potash (1.50 lbs. K_2O.) (*vide* Annual Reports 1937 to 1942). As these data could not be subjected to rigid statistical analysis it was decided to determine the potash in all the 54 samples.

The data for five picks of 1946 are recorded below:—

Potash in Coconut Water—Totals of 18 Plots, in GMS.

Date of Pick.	K_0 No. potash.	K_1 0·75 lbs. K_2O per palm.	K_2 1·50 lbs. K_2O per palm.	N_0	N_1	N_2	P_0	P_1	P_2
27/ 2/1946	178·95	371·54	488·07	365·96	374·98	297·62	340·08	355·04	343·44
9/ 7/1946	433·09	854·88	1227·67	901·92	930·00	683·72	915·01	807·73	792·90
29/ 8/1946	256·54	542·61	754·33	514·69	541·37	497·42	554·52	477·95	521·01
15/10/1946	163·20	332·21	438·02	316·67	343·81	272·95	302·07	300·49	330·87
16/12/1946	272·90	479·42	640·01	502·44	483·25	406·64	454·20	442·64	495·49

The corresponding mean yields of copra are given below:—

Mean yields of Copra (lbs.)—Totals of 18 Plots.

Date of Pick.	K_0	K_1	K_2	N_0	N_1	N_2	P_0	P_1	P_2
27/2/1946	1091	1328	1409	1288	1272	1268	1223	1305	1300
9/ 7/1946	1544	1951	2132	1900	1952	1775	1950	1861	1816
29/ 8/1946	1037	1396	1520	1277	1351	1325	1370	1267	1316
15/10/1946	755	957	1033	890	952	903	909	897	939
16/12/1946	941	1142	1172	1076	1124	1055	1063	1070	1122

In the potash manured plots the potash content of the coconut water shows an almost linear increment with increasing doses of potash applied to the soil. This is very similar to the increment of yield (copra) of palms due to the corresponding applications of potash.

The changes in potash content of the water due to nitrogen manuring does not, however, show a similar trend between the 1st (0) and 2nd levels (0.5 lb. Nitrogen per palm), while between these levels an increase of yield of copra is obtained; no such change occurs in the potash content. With the higher level (1 lb. Nitrogen per palm), there is a depression of this yield which, however is reflected in a similar trend in the potash content at the N_2. The mechanism of the fall in yield due to excess nitrogen may be due to reduced potash uptake.

Phosphoric acid at both single and double levels showed no statistically significant differences in yield, and this is similarly reflected in the potash content of the coconut water of the corresponding plots.

The work herein reported appears to be sufficiently promising to be developed for diagnostic purposes as a guide to potash manuring and in further studies on the mechanism of potassium absorption by the coconut palm.

5. (i) **Publications.**—

Supplement to the 1945 Memorandum of the Board of Management on the Future of the Coconut Research Scheme (Ceylon), pp. i. + 3.

R. Child. Review of C. M. Suter's "Organic Chemistry of Sulfur". *Current Science*, 1946, **15**, 55.

The first two parts of Dr. M. L. M. Salgado's "Recent Studies on the Manuring of Coconuts in Ceylon", originally read to the Ceylon Association of Science on May 18, 1945, were published in *The Tropical Agriculturist*, 1946, 102, 149-154; 206-218. The third and concluding part is expected to appear in the first quarter's issue of *The Tropical Agriculturist* for 1947, and the whole paper will later be reprinted as Coconut Research Scheme Bulletin No. 6.

Leaflets.—A revised issue of leaflet No. 12 " Notes on the manuring of Coconut Palms " was published in February, 1946.

M. L. M. Salgado. " The Use of Lime and Salt for Manuring Coconut Palms ", C. R. S. Leaflet No. 13, August, 1946. Also a Sinhalese translation by the author.

Press Articles.—Dr. Salgado's lecture to the Chilaw Planters' Association on March 22, 1946, " New Developments in Coconut Manuring " was reprinted in *The Times of Ceylon* of March 27, 1946. A Sinhalese translation by the author appeared in the April-June 1946, number of *Govikam Sangarawa*, Volume XLI, No. 2, pp. 38-51.

Dr. R. Child, Director, contributed to the Centenary number of *The Times of Ceylon*, July 13, 1946, an article on " The Coconut Industry's Hundred Years ", and his address to the Low Country Products Association on July 18, 1946, was reproduced in *The Times of Ceylon* of July 19, 1946, under the title " The Coconut Industry has a bright Future ".

(ii) *Library.*—On December 31, 1946, the Library contained 660 books and 1,141 bound volumes of periodicals (including 131 loaned by the Director). Purchase of Volumes 8 to 18 (1889-1899) of *The Tropical Agriculturist (Ceylon)* completed the Library's set of this Journal. Considerable progress was made in binding back numbers of journals, among them being volumes of *Chemical Abstracts* (published by the American Chemical Society), the Library set of 83 volumes being complete from Volume 14, 1920.

The usual general acknowledgment is here made to Government Departments and Research Organizations overseas which send exchange publications. It is hoped to renew several pre-war contacts in 1947, and to make particular acknowledgements in next year's report.

Visitors are welcome to use the Library for reference on week-days between 9 a.m. and 12 noon and 2 to 4 p.m. (Saturdays 9 a.m. to 12 noon; not on Sundays and Public Holidays).

6. (i) **Lectures during 1946.—**

The Director gave the following public lectures during 1946:—

18th July—	To	the Low Country Products Association. " The Future Development of the Coconut Industry." (See para 5 (i),).
13th August	...	To the University of Ceylon Chemical Society on " Margarine ".
31st August	...	To the Chemical Society of Ceylon on " Coconut Water ".
15th November	...	To the Ceylon Economic Society on " The Costs of Production of Coconuts and Copra in Ceylon."

(This lecture will be published in the *Ceylon Economic Journal* early in 1947.)

The Soil Chemist addressed the Chilaw Planters' Association at its Annual General Meeting on March 22, on " Some New Developments in Coconut Manuring " (See para 5 (i)), and the Low Country Products Association November 21, on " Some Aspects of Coconut Manuring ".

(ii) *Meetings.*—The Director attended the Annual General Meeting of the Planters Association of Ceylon at Kandy on March 15, and of the Low Country Products' Association in Colombo on March 30, 1946. He also attended two meetings of the Central Board of Agriculture.

The staff officers of the Scheme attended meetings of the Low Country Products' Association, the Chilaw Planters' Association and the Kurunegala Planters' Association during the year. The Scheme's library was made available to the Chilaw-Negombo Planters' Association for their meetings on three occasions.

(iii) *Visitors.*—In August three members of the newly formed Indian Central Coconut Committee—Rao Sahib A. K. Menon, Mr. K. R. Narayan Iyer and Mr. K. Gopalan (Secretary)—visited Ceylon to study the Coconut Industry, particularly the organization of research in this country. A programme of visits

to estates and factories was organized by the Coconut Research Scheme and successfully carried out on August 22 to 25, one full day being spent at Bandirippuwa.

THE ESTATES.

7. **Bandirippuwa Estate.** —

Crops harvested in 1946 were as follows:—

Crop No.	Nuts from Estate Blocks.	Nuts from Research Blocks.	Total.	Average 1931–1946.	1946—above or below average.
I	46,758	20,051	66,809	67,826	— 1·5 per cent.
II	116,909	30,017	146,926	111,083	† 32·3 " "
III	97,391	31,204	128,595	132,148	— 2·7 " "
IV	81,976	23,479	105,455	118,177	— 10·8 " "
V	52,936	14,489	67,425	76,891	— 12·3 " "
VI	56,792	14,489	71,281	61,828	† 15·3 " "
	452,762	133,729	586,491	567,953	† 3·3 per cent.

The revenue from Bandirippuwa estate actually accruing in 1946 was—

	Revenue from Estate Management.		*Revenue from Research Management.*	
	Rs. c.	Rs. c.	Rs. c.	Rs. c.
Crops 1945—			*Crops* 1945.	
Sale of nuts	5,177 31			
Sale of copra	920 75		Sale of copra	2,267 67
		6,098 6		2,267 67
Crops 1–5, 1946—			*Crops* 1–5, 1946—	
Sale of copra	3,000 48		Sale of copra	6,579 54
Sale of nuts	21,362 41		Sale of nuts	790 13
		24,362 89		7,369 67
Sale of husks	2,483 89			
Sale of shells	39 40		Seednuts for Nursery	1,211 11
		2,523 29		1,211 11
Seednuts to Nursery	5,759 38			
		5,759 38		
Sale of food crops	69 23			
Sundries	119 39			
		188 62		
		38,932 24		10,848 45

Total gross revenue in 1946 was thus Rs. 49,780·69, which may be summarized as follows :—

	Rs. c.	Average price.
Sale of 364,979 nuts realizing	27,329 85	Rs. 74·89 per 1,000 nuts
Sale of 33 tons 2 cwt. 94 lbs. of copra realizing	12,768 44	Rs. 96·32 per candy
Sale of 75,984 seednuts to nursery realizing	6,970 49	Rs. 91·74 per 1,000 nuts
Sale of 505,112 husks realizing	2,483 89	Rs. 4·92 per 1,000 husks
Sale of 19,700 shells realizing	39 40	
Sale of food crops	188 62	
	49,780 69	

Expenditure for the year totalled Rs. 14,981.09 for the estate area, Rs. 2,340.03 for the research area. Estate receipts, therefore, exceeded expenditure by Rs. 23,951.15 and research receipts exceeded expenditure by Rs. 8,508.42 Cost of production of nuts on the estate area (including copra curing, transport expenses and depreciation on copra kiln) was Rs. 32.59 per 1,000 nuts.

SUNDRY DEBTORS AND CREDITORS ACCOUNT.

Of the income actually accruing in 1946 and included in the above statement, Rs. 6,098.06 (estate) and Rs. 2,267.67 (research) from 1945 crops, had been credited to the Estate Working Account for 1945 through Sundry Debtors Account. The Estate Working Account for 1946 does not, therefore, include these sums.

The following amounts have been credited to the Estate Working Account on account of 1946 crops lying unsold at the end of the year:—

	Rs. c.
1946 5th and 6th crops Estate	7,482 04
1946 5th and 6th crops Research	1,629 92
	9,111 96

The Bandirippuwa Estate Working Account for 1946 thus shows a balance of Rs. 33,205.80 carried forward to Revenue.

Meteorological Observations at Bandirippuwa Estate.—Extra aviation readings were discontinued on February 11, 1946. Thereafter were kept the usual routine observations at 0800 h. and 15.30 h., Ceylon Standard Time (0230 h. and 1000 h., G.M.T.) The morning observations are telegraphed to the Colombo Observatory, the Civil Airport and the R. A. F. Station. Monthly abstracts of all observations are sent to the Colombo Observatory.

During 1946, 97.89 inches of rain fell on 170 rainy days; wet days (0.04 inch or more of rain) numbered 132. The corresponding figures for 1945 were 72.13 inches falling on 127 rainy days (99 wet days).

Drought conditions prevailed at the beginning of the year, only 0.63 inches of rain falling between December 19, 1945, and March 15, 1946, a partial drought of 87 days. During this spell the weather was particularly hot and dry by day, and a maximum temperature of 100.0°F was recorded on March 8, 1946, the highest since records commenced in May 1932. Copious rain (totalling 57.19 inches) fell in the last three months of the year.

8. **Ratmalagara Estate.—**

Crops harvested in 1946 are shown in the following table, with the figures from 1938 to 1945 for comparison.

Crop No.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	Average 1938-1945
1..	30,896*	23,752..	22,302..	29,153..	21,718..	25,504..	33,163..	36,706 ..	44,601..	29,756
2..	28,130 ..	26,413..	16,391..	38,285..	26,478..	37,197..	52,912..	47,987 ..	71,117..	38,223
3..	37,413 ..	30,160..	28,233..	49,339..	39,218..	55,008..	64,634 ..	61,248 ..	52,300..	46,295
4..	44,180 ..	34,278..	25,704..	60,232..	44,584..	56,378..	58,152..	39,175† ..	35,479..	44,240
5..	34,573 ..	32,515..	37,000..	45,606..	39,205..	48,978..	52,719..	35,191† ..	29,548..	39,492
6..	20,945 ..	23,865..	20,800..	29,682..	22,958 ..	36,230..	29,066..	28,473 ..	24,978..	26,333
	196,137	170,983	150,430	252,297	194,161	259,295	290,646	248,780	258,023	224,839

* Harvested by previous proprietor.

† Only five crops were harvested in 1945. The fourth crop taken in October, 1945, and totalling 74,366 nuts really represented the 4th and 5th combined; for comparative purposes the 74,366 have been distributed in the ratio of previous averages for the 4th and 5th crops.

The revenue actually accruing during the year was—

Revenue from Estate Management.

Crops 1945.	Rs. c.	Rs. c.
Sale of nuts ..	1,760 96	
Sale of copra ..	35 68	
		1,796 64
Crops 1–5, 1946—		
Sale of nuts ..	6,996 83	
Sale of copra ..	5,463 84	
		12,460 67
Sale of food crops ..	593 14	
Sundries ..	102 35	
		695 49
		14,952 80

Revenue from Research Management.

Crops 1945.	Rs. c.	Rs. c.
Sale of copra ..	426 66	426 66
Crops 1–5, 1946—		
Sale of copra ..	3,078 64	3,078 64
Sale of pines ..	655 99	655 99
Sundries ..		568 [illegible]
		4,727 29

Total gross revenue in 1946 was thus Rs. 19,680.04 which may be summarised as follows:—

	Rs. c.	Average price.
Sale of 124,479 nuts realizing ..	9,144 11	Rs. 73·46 per 1,000 nuts.
Sale of 21 tons, 16 cwts. 101 lb. of copra realizing	8,618 50	Rs. 98·64 per candy
Sale of 10,933 lb. of pineapples realizing ..	655 99	Rs. 00·06 cents per lb.
Sale of food crops	593 14	
Refund on citrus nursery and rubber seed garden	566 0	
Sundries	102 35	
	19,680 9	

Expenditure for the year totalled Rs. 12,982.75 for estate area and Rs. 2,028.31 for research area.

Cost of production of nuts on Estate area (including copra curing and transport expenses) was Rs. 59.64 per 1000 nuts.

SUNDRY DEBTORS AND CREDITORS ACCOUNT.

Of the income actually accruing in 1946 and included in the above statement, Rs. 1,796.64 (estate) and Rs. 426.66 (research) from 1945 crops, had been credited to the Estate Working Account for 1945 through Sundry Debtors Account. The Estate Working Account for 1945 does not, therefore, include these sums.

The following amounts have been credited to the Estate Working Account on account of 1946 crops lying unsold at the end of the year:-

	Rs. c.
1946 crops Estate (copra)	3,921 14
1946 crops Research (copra)	951 4
	4,872 18

The Ratmalagara Estate Working Account for 1946 thus shows a balance carried forward to Revenue of Rs. 7,317.91.

Weather Records.—The usual records were kept of rainfall and of hours of bright sunshine (on the Campbell-Stokes recorder installed in January, 1941). Rainfall in 1946 totalled 69.67 inches falling on 136 rain days. The corresponding figures in 1945 were 57.15 inches on 93 rain days. January and February were very dry (0.41 inch.), as were July and August (0.74 inch.); otherwise rainfall was reasonably well distributed. 42.72 inches fell in the last three months of the year.

Hours of bright sunshine averaged daily 7.0. Previous figures were 1943—6.7; 1944—6.9; 1945—7.7.

9. **Visiting.**—

Mr. B. Parker, Visiting Agent, inspected the estates on 12/13th March and 22/24th August 1946. His reports were circulated to the members of the Board of Management.

10. **Finance.**—

The audited statements of accounts for 1946 are appended.

D. RHIND,
Director of Agriculture and Chairman,
Board of Management, Coconut
Research Scheme.

May 19, 1948.

3—J. N. A 80407 (6/48)

Statement of Receipts and Disbursements for the Year ended December 31, 1946.

(In Compliance of Section 8 (2) of Ordinance No. 29 of 1928.)

RECEIPTS.	Rs. c.	Rs. c.
Balance at January 1, 1946	.. 22,970 29	
A.—Revenue Account :		
Annual grant from Government	.. 30,000 0	
Cess collections for 1946 ..	.. 27,965 15	
Interest ..	.. 3,672 53	
Income from Bandirippuwa estate—		
Estate area ..	.. 32,491 18	
Research area ..	.. 8,589 78	
Income from Ratmalagara estate—		
Estate area ..	.. 14,139 72	
Research area ..	.. 4,020 70	
Sale of publications ..	.. 74 30	
Sale of planting material ..	.. 31,092 45	
Charges to staff for electricity	.. 904 50	
Sundry receipts ..	.. 205 54	
Rental telephone ..	.. 81 64	
B.—Advance account :		
Repayments of loan by staff	.. 3,579 11	
Rice, sugar and chillies ..	.. 3,188 85	
Kerosene oil ..	.. 93 61	
Bulbs	.. 116 0	
General stores ..	.. 743 25	
Fertiliser's advance account	.. 1,731 87	
C.—Reserve accounts :		
Staff contributions to provident fund	.. 4,709 3	
Scheme's bonus and interest	.. 8,018 92	
D.—Sundries :		
Sundry debtors ..	.. 21,126 94	

Bank reconciliation as at December 31, 1946:	No. 1 Ac.	No. 2 Ac.
Balance as per cash book (O/D) ..	3,152 9	6,000 0
Add, value of unc'shed cheque ..	8,541 60	3,558 71
	5,389 51	9,558 71
Less Crs not credited	6,760 53	8,234 60
(O/D) ..	1,371 2	1,324 11
Shortage ..	2,393 44	—
(O/D) ..	3,764 46	1,324 11

DISBURSEMENTS.	Rs. c.	Rs. c.
Capital account :		
New clearing ..	.. 298 69	
Laboratory equipment ..	.. 2,429 7	
Depreciation reserve ..	.. 1,903 39	
Office furniture ..	.. 52 0	
Estate draught animals ..	.. 499 0	
Personal emoluments :		
Salaries to senior staff ..	.. 45,628 50	
Salaries to junior staff ..	.. 19,277 65	
Rent allowance ..	.. 1,275 54	
War allowance ..	.. 17,542 74	
Provident fund bonus and interest for 1946	8,018 92	
Other charges:		
Travelling expenses to staff	6,103 75	
Travelling expenses to board members ..	1,945 25	
Office :		
Entertainment allowance	68 14	
Stationery ..	1,034 94	
Postages ..	861 22	
Printing and advertising	2,547 46	
Legal expenses ..	256 75	
Incidental expenses ..	869 50	
Telephone rental ..	395 0	
Workmen's compensation insurance	85 85	
Maintenance of office equipment	579 0	
Laboratories :		
Upkeep, chemicals, &c. ..	3,550 86	
Scientific books and periodicals	3,706 2	
Buildings :		
Upkeep	6,118 61	
Insurance ..	539 44	
Running expenses of electrical plant	2,423 32	
Estates—Bandirippuwa :		
General charges ..	3,798 27	
Upkeep	1,271 86	
Food crops ..	249 70	
Cultivation and manuring	2,621 51	
Collection	2,072 32	
Ratmalagara estate :		
General charges ..	4,311 67	
Upkeep	1,549 17	
Food crops ..	1,327 32	
Cultivation ..	2,545 91	
Collection ..	1,299 47	
Research :		
General	561 92	
Genetical work ..	3,227 61	
Soil chemist's work ..	6,104 49	
Purchase of planting materials	18,211 3	
Advance Accounts :		
Rice, sugar and chillies ..	3,062 45	
Kerosene oil ..	77 37	
General stores ..	1,824 68	
Fertilizers ..	2,371 83	
Bulbs	12 0	
Investments :		
Ceylon Savings Bank ..	4,614 78	
Ceylon Savings Certificates	663 87	
Sundries :		
Suspense creditors ..	12 41	
Loans to staff ..	6,217 0	
Sundry creditors ..	2,569 0	
Refund of provident fund contributions ..	13,964 0	
		214,264 43

	Rs. c.		
Balance at December 31, 1946, No. 1 a/c ..	5,545 53	(O/D)	
Add shortage ..	2,393 44		
	3,152 9	(O/D)	
No. 2 account ..	6,000 0		
Petty cash imprest ..	2,000 0		4,847 91
			219,112 34

219,112 36

S. C. KARAWITA,
Secretary-Accountant.
Coconut Research Scheme, Lunuwila.

January 23, 1947.

Ratmalagora Estate Working Account for 1946.

To Estate expenses:	Rs. c.	Rs. c.	By income:	Rs. c.	Rs. c.
Superintendent and watchers	2,716 67		Estate area:		
General charges ..	2,776 75		Sale/nuts ..	6,996 83	
Upkeep	1,540 17		Sale of copra ..	9,384 98	
Food crops	1,363 14				16,381 81
Cultivation and manuring ..	2,975 21		Research area:		
Picking and collection ..	1,467 52		Sale/nuts ..	566 0	
		12,839 46	Sale of copra ..	4,029 68	
					4,595 68
Research expenses on Estate account:			Others:		
General-O-Research I ..	526 0		Food crops ..	593 14	
Genetical work: Research II..	505 31		Sundries ..	102 35	
Soil Chemist's work: Research III	997 0		Pine apples ..	655 99	
		2,028 31			1,351 48
Reserve:					
Depreciation on H. A. Drier ..	143 29	143 29			
To balance carried forward to revenue account		7,317 91			
		22,328 97			22,328 97

Bandirippuwa Estate Working Account for 1946.

To Estate expenses:	Rs. c.	Rs. c.	By Income:	Rs. c.	Rs. c.
Superintendent, conductor and watchers	3,691 89		Estate area:		
General charges ..	2,601 78		Sale of nuts ..	27,470 53	
Upkeep	1,271 46		Sale of copra ..	10,133 78	
Food crops	254 60				37,604 31
Manuring and cultivation ..	4,185 11		Research area:		
Collecting and picking ..	2,610 32		Sale of nuts ..	2,001 24	
		14,565 16	Sale of copra ..	8,209 46	
					10,210 70
Research expenses on Estates account:			Others:		
General: Research I ..	36 94		Food crops.. ..	69 23	
Gentical work: Research II ..	696 76		Sundries	2,642 68	
Soil chemists work: Research III	1,606 33				2,711 91
		2,340 3			
Reserves:					
Depreciation on pat. drier ..	327 8				
Workmen's insurance ..	88 85				
		415 93			
To balance carried forward to revenue account		33,205 80			
		50,526 92			50,526 92

Nursery Working Account for 1946.

To Purchase of seednuts ..	Rs. c.	Rs. c.	By sale of planting material:	Rs. c.	Rs. c.
Husk of seednuts ..	13,157 8		Seelings sold in 1946 ..	6,915 20	
Transport of seednuts ..	133 70		Booked and paid in advance ..	2,536 50	
	1,759 25			9,451 70	
		15,050 3	Less refunds in 1946 ..	260 0	
Nurseries:					9,191 70
To Prepr. selec. and Ma. ..	1,543 98		Seednuts sold in 1946 ..	11,624 5	
Rep. and pump ..	22 50		Booked and paid in advance ..	9,300 0	
Incidentals ..	17 7				20,924 5
		1,583 55			
Nursery Attendants:			Trans. charges:		
To Salaries ..	1,241 37		Recovery in 1946 ..	869 45	
D.A.	1,235 40		Paid in advance ..	447 25	
Travelling allowances ..	922 25				1,316 70
Rent allowances ..	70 50				
		3,469 52			
Miscellaneous:					
To Harbour dues ..	56 7				
Gunnies	339 13				
		395 20			
To Balance carried forward to revenue account		10,934 15			
		31,432 45			31,432 45

Capital Expenditure Account for 1946.

		Rs. c.	Rs. c.		Rs. c.	Rs. c.
To New Clear Research	..	298 69		By balance transferred to revenue account	3,236 76	
Laboratory equipment	..	2,426 7				
Draught animals	..	460 0				
Office furniture	..	52 0				
			3,236 76			3,236 76

Revenue Account for 1946.

EXPENDITURE.		Rs. c.	Rs. c.	INCOME.	Rs. c.	Rs. c.
To Personal emoluments:				By Government grant for 1946 ..	30,000 0	
				Cess collections for 1946 ..	29,870 23	
Salaries senior staff	..	45,628 50		Interest on Investments ..	4,785 58	
Salaries junior staff	..	14,744 58		Charges to staff for electricity	897 84	
Provident Fund bonus and interest	..	8,018 92		Sale of publications ..	74 39	
Rent allowance	..	1,029 6		Sundries	295 54	
Dearness allowance	..	14,893 25		Credit balance bulb advance account	7 39	
			84,314 40			65,840 89
				Nursery working account brought forward ..	19,934 15	
				Pandiripuwa estate working account brought forward .	33,205 89	
To Other charges:				Research work account brought forward ..	7,317 91	
						51,457 86
Staff travelling	..	6,186 65		Deficit carried forward to balance sheet		21,334 7
Board travelling	..	1,945 25				
			8,131 90			
To Office:						
Stationery ..	..	1,034 94				
Postage ..	..	881 62				
Printing and advertising	..	2,547 46				
Legal expenses	..	286 75				
Incidentals	..	809 50				
Telephone ..	..	313 36				
Entertainment allowance	..	68 14				
Maintenance of office equipment ..	..	579 0				
Cost of audit	..	1,053 76				
			7,634 53			
To Laboratory and Library:						
Upkeep, chemicals, &c.	..	5,566 88				
Books and periodicals	..	3,706 5				
			9,272 93			
To Buildings:						
Upkeep ..	..	6,398 59				
Insurance ..	..	539 44				
Running expenses of electrical plant	..	2,427 32				
			9,365 35			
To Research:						
Research I	..	263 48				
Research II	..	3,817 54				
Research III	..	4,076 60				
			8,157 62			
To Research Fund Pass	..	1,000 0				
Depreciation on buildings	..	7,519 32				
			8,519 32			
To Capital expenditure brought forward		3,236 76				
			3,236 76			
			138,632 81			138,632 81

Balance Sheet as at December 31, 1946.

Liabilities.	Rs. c.	Rs. c.	Assets.	Rs. c.	Rs. c.
Capital outlay:			Buildings		203,574 3
Previously ..	.. 606,105 87		Bandirippuwa estate	.. 187,554 68	
In 1946 ..	.. 3,236 76		Ratmalagara estate	.. 73,138 0	
		609,342 63			260,692 68
Passage fund:			**Animals:**		
Previously ..	.. 2,695 11			Rs. c.	
In 1946 ..	.. 1,000 0		Previously	1,800 0	
		3,695 11	1946 ..	460 0	
Provident fund:				2,260 0	
At December 31, 1945	.. 55,328 3				2,260 0
In 1946 ..	.. 12,727 95		Improvments to estates previously	8,942 13	
	68,055 98		In 1946 ..	.. 298 69	
Less refunds in 1946	.. 13,964 8				9,240 82
		54,091 90	Bandirippuwa kiln.	.. 4,067 26	
Depreciation reserve:			Ratmalagara kiln.	.. 1,432 91	
At December 31, 1945	.. 108,927 52				5,500 17
Less contribution from revenue in 1946 ..	.. 1,603 79		Buildings—Laboratory		64,297 31
	107,323 73		Equipment previously	.. 32,244 75	
Transferred in 1946 ..	7,989 69		In 1946 ..	.. 2,426 7	
		115,313 42			34,670 82
Sundry creditors:			Gas plant:		3,436 83
Sundries ..	.. 2,344 68		Furniture: Bungalows	.. 5,398 44	
Suspense account	.. 871 29		Office previously	.. 2,139 72	
		3,215 97	In 1946 ..	.. 52 0	7,590 16
		785,659 3	Accumulators:		17,503 61
			Museum ..		.. 276 20
			Sundry debtors:		
			Cess collections	.. 1,905 8	
			Interest accrued	.. 684 25	
			R.E. working account	.. 9,454 96	
			R.E. working account	.. 5,168 55	
					17,212 84
			Advance accounts:		
			Fertilisers ..	.. 100 80	
			Rice, sugar, &c.	.. 305 40	
			Transport loans	.. 2,863 84	
			General stores	.. 971 83	
					4,241 87
			Investments:		
			Ceylon Government 3½ per cent. loan ..	.. 59,400 0	
			Home Defence loan	.. 15,000 0	
			New Government loan	.. 20,000 0	
					94,400 0
			P. F. Investments:		
			Bank of Ceylon S.D.	.. 10,000 0	
			Savings Certificates	.. 19,475 79	
			Ceylon Savings Bank	.. 19,979 24	
			Home Defence loan	.. 5,000 0	
					54,455 3
			Cash in hand:		
			Bank of Ceylon No. 1 account	5,545 53 (O. D.)	
			Less shortage ..	2,393 44	
				3,152 9 (O. D.)	
				Rs.	
			Bank No. 2 account	6,000	
			PC. imprest ..	2,000	
				8,000 0	
					4,847 91
			Deficit for 1946 brought forward from revenue account ..	21,334 7	
			Surplus from previous balance sheet	20,175 32	
					1,158 75
		785,659 3			785,659 3

S. C. KAHAWITA,
Secretary-Accountant,
Coconut Research Scheme.

The accounts of the Coconut Research Scheme above set forth have been audited under my direction. I have obtained all the information and explanations that I have required and I certify as a result of this audit that, in my opinion, the balance sheet is properly drawn up so as to exhibit a correct view of the affairs of the Scheme.

Audit Office,
Colombo, April 23, 1948.

Sgd. P. W. KAULE,
for Auditor-General.