

CEYLON.



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Report and Accounts of the
Coconut Research Scheme
for 1938.

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1939.

COCONUT RESEARCH SCHEME.

ANNUAL REPORT OF THE BOARD OF MANAGEMENT FOR THE YEAR 1938.

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

BOARD OF MANAGEMENT.

ON January 1, 1938, the Board of Management consisted of the following members:—

Chairman: The Acting Director of Agriculture (Mr. E. Rodrigo, C.C.S.).

The Deputy Financial Secretary: (Mr. C. H. Collins, C.C.S.).

The Chairman of the Low-country Products Association of Ceylon: (Mr. J. Tyagarajah, M.A., LL.B.).

Members of the State Council, nominated by His Excellency the Governor:	}	Mr. S. O. Canagaretnam, M.S.C.
Representatives of the Low-country Products Association of Ceylon:		Mr. S. Samarakkody, M.S.C.
Representatives of the Planters' Association of Ceylon:		Mr. L. J. M. Peiris.
Representing the Smallholders, nominated by His Excellency the Governor		Mr. Wace de Niese.
		Mr. O. B. M. Cheyne.
		Mr. Austin Ekanayake.
		Mr. G. Pandittesekera, J.P., U.P.M.
		Mr. D. D. Karunaratne, J.P.

Mr. J. Tyagarajah was re-elected Chairman of the Low-country Products Association in March, 1938, and so remained an *ex officio* member of the Board.

Mr. G. R. Whitby was nominated by the Planters' Association of Ceylon on April 12, 1938, to act for Mr. O. B. M. Cheyne during the latter's absence from Ceylon on leave. Mr. Cheyne returned and resumed his seat on the Board from October 16.

The death of Mr. S. O. Canagaretnam, Member of State Council for Batticaloa, on May 22, 1938, is recorded with regret. Mr. Canagaretnam had been nominated as one of the State Council representatives on August 14, 1936. The vacancy was filled by the nomination by His Excellency the Governor of Mr. E. R. Tambimuttu, M.S.C., for Trincomalee, in July, 1938.

Mr. D. D. Karunaratne, J.P., was renominated as one of the Smallholders' representatives for a further period of three years from September 11, 1938.

Mr. H. W. Peiris was nominated by the Low-country Products Association in November, 1938, in place of Mr. Wace de Niese, who had completed three years of service.

Mr. F. P. Jepson, M.A., as Acting Director of Agriculture becomes *ex officio* Chairman of the Board, during the absence on leave of Mr. E. Rodrigo, C.C.S., from December 1, 1938.

Four meetings of the Board of Management were held during the year, on March 25, June 10, September 9, and October 14, respectively. The Director of Research acted as Secretary to the Board at all meetings.

COMMITTEES.

The Buildings Sub-Committee.—Personnel: Mr. Graham Pandittesekera (Chairman), Mr. O. B. M. Cheyne, and Mr. A. Ekanayake. Secretary-Convenor, Dr. R. Child.

This Committee held four meetings, on January 17, March 21, May 30, and October 10, respectively.

STAFF.

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

Geneticist, Mr. W. V. D. Pieris, 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.).

Mr. P. J. Nonis, while holding the post of Superintendent, Bandirippuwa estate, was transferred on May 16, 1938, as Superintendent, Ratmalagara estate, Madampe, the recently acquired property of the Coconut Research Scheme. Mr. W. Nanayakara, Laboratory Attendant to the Geneticist, was appointed Conductor of Bandirippuwa Estate.

Mr. M. Nadarajah, Field Assistant to the Soil Chemist, left the service of the Scheme on September 5, 1938, having accepted an appointment as Agricultural Instructor in the Department of Agriculture.

The following additions to the staff were sanctioned by the Board of Management:—(a) Messrs. C. W. S. de Silva and A. D. Guilbert as Field Assistants to the Department of Genetics on July 4, and August 1, 1938, respectively. (b) Mr. C. M. Fernando, as Field Assistant to the Department of Soil Chemistry on September 12, 1938, to fill the vacancy created by the resignation of Mr. M. Nadarajah.

Mr. E. Chinnarasa, Technical Assistant to the Soil Chemist, has been successful in the London University B.Sc. Examination held in July, 1938.

Mr. J. Duff-Tytler has held the post of Chief Clerk throughout the year.

The secretarial and accounting work has been carried out as usual at Bandirippuwa Estate, under the supervision of the Director of Research.

TECHNICAL WORK.

Laboratory work has been somewhat hampered during the latter part of the year by shortage of water. Steps were however taken to provide a water cart for bungalow supplies, so that the pipe water available could mostly be used in the laboratories. These and improvisation of apparatus leading to water economy in the laboratories prevented any serious interruption of work.

1. Technological Chemist—

(i) *Copra: Effect of Manuring on the Composition of Copra (a) Oil Content.*—The preliminary results of this study were reported last year. Samples of copra were analysed from all plots receiving double doses of fertilizers (16 plots), for every pick of the second year after manuring. The final results of 96 duplicate analyses which were completed at the beginning of February, 1938, show that in the second year after application, manuring had no effect on the oil content of the copra:—

		Average Oil Per Cent. (Dry Weight)
48 samples from plots receiving	no nitrogen	69.2
48 " " " "	1.0 lb. N. per palm	69.1
48 " " " "	no phosphoric acid	68.1
48 " " " "	2.0 lb. P ₂ O ₅ per palm	69.3
48 " " " "	no potash	69.2
48 " " " "	1.5 lb. K ₂ O per palm	69.2

This series of experiments is not being continued at present.

The mean oil content of the 96 copra samples was 69.2 per cent. (dry weight), a figure slightly but not significantly higher than the general mean of 68.3 per cent. previously found for 52 samples of Ceylon Estate Copra from all over the Island. The average moisture content was 6.35 per cent., which is better than the general Ceylon average found of 6.8 per cent.

(b) *Nitrogen Content (Protein).*—The extracted poonac samples from the foregoing were in the cases of two picks (32 samples in all) analysed for nitrogen content. Here again no significant differences were observed. The poonac had average moisture content 11.68 per cent., nitrogen 3.18 per cent. ($\times 6.25 = 19.9$ per cent. protein), nitrogen (dry weight) 3.60 per cent.

The averages are quoted only for the nitrogen plots:—

		Average Nitrogen Per Cent. (Dry Weight)
16 samples from plots receiving	no nitrogen	3.62
16 " " " "	1.0 lb. N. per palm	3.58

The statement can therefore be made that during the second year following the application of fertilizers no differences were observed in the copra samples from plots receiving different treatment as far as their content of oil and protein is concerned. Nitrogen estimations on the samples were discontinued in March, 1938.

As mentioned in last year's report it is possible that differences may show themselves after several years of differential manuring. For the present, however, it is not proposed to carry out further analyses on these lines.

(c) *Potash*.—Potash analyses have also been carried out on some of the above ponac samples. There is some indication of higher potash content in the samples from potash manured plots, but the results are indefinite. The mean percentage of K_2O (dry weight) was 2.14 per cent. corresponding to 0.62 per cent. on the original copra, or to approximately 0.3 per cent. on the wet coconut kernel. It is perhaps of interest to note that the potash concentrations in the nut water, kernels and shells are all of the same order of 2 to 3 parts per 1,000.

(d) *General*.—Other samples of copra were analysed for moisture, oil content, and acidity of the extracted oil in connection with advisory work for the Coconut Board and others. It cannot be too strongly emphasized that an analysis on a single half or even half a dozen pieces of copra is perfectly useless in indicating the average composition of a bulk. However accurately an analysis may be carried out it is wasted time and effort unless the sample is a representative one.

One sample from Malabar had moisture 5.3 per cent., oil 68.9 per cent., oil (dry weight) 72.6 per cent. A large number of analyses on Ceylon Estate copra in 1935-36, gave figures ranging up to 69.7 with an average of 68.3, against a published average for Straits copra of 65.6 (Georgi: *Malayan Agricultural Journal*, 1929, XVII, p. 335). The highest oil figure recorded for Ceylon copra in the course of hundreds of analyses has been 70.8 per cent. (dry weight). It will be of interest, therefore, to examine a number of samples from Malabar to see whether the average oil content is usually higher than that of Ceylon copra, and arrangements are being made to obtain such samples.

(ii.) *Shell Products*: (a) *Charcoal*.—Exports and prices of this product showed a decline in 1938. Two samples were examined from inquirers during the year and found to pass the usual specifications for moisture, volatile matter, ash content, and chloride (see last year's Report).

(b) *Distillation Products*.—In this Report for 1934 it was mentioned that the distillation of shells gave besides 30 per cent. by weight of charcoal, 40 per cent. of acid liquor, and 5 per cent. of tar. The creosote fraction from the tar has been examined; fractional vacuum distillation gave 48 per cent. of a fraction boiling at 61-65°C/0.3 mm., which was a clear colourless liquid solidifying at 5°C to a mass of colourless crystals. The liquid had S. G. at 30°C, 1.067. Further material is necessary for closer investigation of the phenolic constituents of this creosote and it is hoped to collaborate with the Department of Commerce and Industries in this direction.

(c) A paper on the composition of coconut shells was published during the year.

(iii.) *Coconut Oil*.—A considerable number of samples was examined from different sources during the year. Inquirers showed interest in the preparation of edible oil. In this connection one or two points of interest may be quoted.

A sample of a brand of edible coconut oil well known in India which was opened in May, 1933, had free fatty acid below 0.1 per cent. The opened sample was kept in an ordinary glass stoppered bottle. When examined in August, 1938, the f.f.a. had increased to 0.33 only.

A sample of "artificial ghee" sent by the Department of Commerce and Industries was found to consist of a mixture of coconut oil (about 50 per cent.) with animal fats—mutton tallow and hog fat.

A sample of "white coconut oil" was received from the Commissioner for the Development of Agricultural Marketing stated to be made by a new process from green nuts. The analysis gave no clue to the method of preparation. The sample had characteristics slightly different from ordinary oil, but similar to those of oil made by domestic processes, viz., low iodine value and high saponification value, which usually indicate preparation from the white meat only with parings mostly removed.

Old Samples.—In 1933, samples of oil were received which were then known to be 23 and 30 years old respectively. These oils had been kept in ordinary corked bottles. They have been examined at intervals. These oils which are colourless and of fairly good odour are not strictly speaking rancid, but are characterized by high free fatty acid and low iodine values, the latter figure for the older sample having dropped to 2.1.

Two samples of desiccated coconut which had been placed in the Economic Museum, Peradeniya, in 1906, have been examined. These were characterized by high moisture content and low oil content, the oil furthermore being very acid and rancid. Protein content and cellulose were more or less normal. A short article is being written on these old samples which are of interest in showing the directions in which deterioration of oil and desiccated coconut takes place with age.

(iv.) *Soap and Soap Making Oils.*—The local manufacture of soap increased somewhat in 1938 with the drop in the price of coconut oil to about Rs. 180 a ton. In the previous year when the price reached Rs. 400 it was difficult for local soap makers to compete in the market against imported soaps. Four samples were analysed during the year and advice given in these and other cases.

Margosa Oil.—It was reported from the School of Agriculture, North Wales, that tests had been carried out with Margosa oil as a repellent against blow-fly on sheep, but that its repellency did not persist for very long in comparison with other materials tested.

Seeds Yielding Lauric Acid.—Mention was made last year of an inquiry from the Forest Department on the possible utilization of the seeds of certain Ceylon species of *Lauraceae*. A parcel of the seed of *Neolitsea involucrata* (Lamk.) Merr., was sent to Prof. T. P. Hilditch, Professor of Industrial Chemistry, Liverpool University, who has now published the results of a complete chemical investigation of the seed coat and seed fats (B. Gunde & T. P. Hilditch, *Journal of the Chemical Society*, 1938, pp. 1610-1614). A sample of a hundredweight of the fat has also been sent to an industrial firm in England for technical investigation, whilst inquiries are being prosecuted locally regarding the possible supply and cost of collection of these seeds.

Other Oils.—There continues to be some utilization of Mee oil for local soap making, and information has also been given to inquirers of the use of Kekuna oil in the manufacture of soft soap. Attention was called to these two oils in the Scheme's Bulletin No. 1 in 1934.

(v.) *Toddy Products.*—Regular records of toddy yields continue to be kept. A series of regular analyses of toddy samples was carried out in June, for alcohol, total solids, acetic acid, ash, and potash, each sample being analysed at intervals as fermentation proceeded.

Bottled Toddy.—The question of bottled toddy received much publicity during the year in connection with claims for a local process. This process proved to be no more than the addition of ordinary preservatives in considerable quantity. The Technological Chemist assisted the Excise Commissioner with some analyses of the product.

It seemed desirable, following this, to study the limiting concentrations of various preservatives which will inhibit the fermentation of toddy and experiments on these lines were commenced in October. Already results of interest have been obtained, which will be reported later.

Vinegar.—Some analyses were carried out for the Excise Commissioner during the year. In connection with a proposal to introduce legislation controlling the quality of coconut toddy vinegar, the Director of Research pointed out that it was desirable that a large number of analyses should be carried out before reasonable standards could be arrived at. The Government Analyst supported this statement. The Director of Commerce and Industries then inquired whether the Scheme could undertake further work to what had already been done. At the time of writing (January, 1939), the Board of Management has agreed that such work may be undertaken in 1939.

(vi.) *Miscellaneous*.—Other samples examined in the course of advisory work include poonac, desiccated coconut, fibre, a patent soil fumigant (of which the active principle was naphthalene), gingelly poonac, &c. One or two details out of others, which will be included in the Technical Report for 1938, are worth recording here.

Samples of nuts and desiccated coconut were received from Papua (see Geneticist's section of the Report for planting of Papuan seednuts.) Although the information supplied was that these nuts were ripe and had indeed fallen ripe from the trees, chemical examination as well as inspection showed them to resemble immature Ceylon nuts. Huskers on the Estate made the remark that the nuts were "Kalatis". The desiccated coconut had moisture 1.65 per cent., oil 68.9 per cent.—it was of quite satisfactory quality, though the oil percentage is some 2 per cent. lower than is usual for the Ceylon product.

Chloride in Coir Fibre.—A sample of ordinary bristle fibre was found to contain 16 parts per 100,000 of Cl, a figure close to the determination by Dr. C. A. Mitchell (Analyst, 1928, Vol. 49, pp. 430-431) who found 19 parts per 100,000 for Ceylon fibre. It was found that when dyed by a process involving the addition of common salt to the bath, sodium chloride was taken up, and a sample of dyed fibre contained 72 parts per 100,000 of Cl.

(vii.) The Director of Research paid ten visits to Ratmalagara Estate during the year, and 19 visits to other estates in connection with co-operative experiments and advisory work, including a circuit of six days in the Eastern Province.

2. Geneticist : I.—Bandirippuwa Estate—

(i.) *Yield Records*.—The usual yield recording and selection and study of high yielding palms have been continued. At the end of 1937, 76 palms out of the hundred recorded showed an average yield of over 100 nuts; 40 of these had been proved for three years which is regarded as the minimum required to establish uniformity of performance; the other 36 for only two years. The latter all, however, maintained a yield of over 100 nuts in 1938 and there are now 76 proved high yielding palms on Bandirippuwa Estate. The nuts from these would suffice to replant the whole 150 acres of the estate in three years.

Yield records on Blocks A and B have provided useful information on the relation between rainfall and the yield of high, medium and low yielding palms.

(ii.) *Seednuts and Seedlings*.—1938 was a bad planting year owing to the failure of both monsoons, and possibly also to the contraction of plans for new planting or re-planting due to trade depression. The numbers of seednuts and seedlings ordered and supplied in 1938, with previous years' figures for comparison, were as follows:—

	Seednuts.		Seedlings.	
	Ordered.	Supplied.	Ordered.	Supplied.
1936 ..	17,457	15,432	4,590	3,927
1937 ..	32,159	29,909	4,830	3,721
1938 ..	21,893	20,893	6,106	3,311

Of the 20,893 seed-nuts supplied, 3,893 were derived from selected high yielding palms and sold at Rs. 10 per 100, and 17,000 from high yielding blocks sold at lower prices in keeping with current market rates. Of the latter, 10,000 were supplied to the Department of Agriculture and 5,000 to an Agricultural Society for distribution to peasant colonists. Among the 3,311 seedlings were 1,000 intended for distribution to peasant colonists.

It has been mentioned in previous reports that the supply of planting material from the Scheme's estates cannot meet any greatly increased demand, and is indeed only a fraction of that necessary if estates in Ceylon are to adopt a progressive policy of re-planting. It is again recommended that larger land owners should carry out mother palm selection on their estates, in which work and subsequent seedling selection and transplantation the advice of the Geneticist and his staff will be always available. (See also para. III. (i).)

Seed selection of coconuts is now generally adopted in other producing countries on lines similar to those developed by the Scheme and reference may be made to a full resumé of past and present work on the subject by R. E. P. Dwyer in the *New Guinea Agricultural Gazette*, 1938, Vol. 4, No. 3, July, 1938, pp. 24-102.

The Scheme has itself sent seed-nuts abroad, including in 1938, 2,000 sold to Venezuela, and small numbers for experimental purposes to the Plant Physiologist, Gezira Research Farm, Wad Medani, Sudan, and to the Curator (Botany), Government Museum, Madras. Inquiries have also been received from Hawaii and elsewhere.

(iii.) *Seed-nuts from Papua*.—Twenty-four nuts were obtained from Papua by courtesy of a local milling firm having interests in that country. Three were used for a technological examination and 21 were put down in the nursery.

Both the nuts and the seedlings have characteristics markedly different from the local tall varieties and it is proposed to plant out the sixteen surviving seedlings at Ratmalagara Estate for further observation.

(iv.) *Oil Palm Seeds*.—A total of twenty-seven oil palm seeds from Malaya were sent by the Department of Agriculture in June, 1938, for trial. They were put down in the nursery at Bandirippuwa on June 8, and ten duly germinated. Weather conditions in October-November were unfavourable for transplantation, and the young seedlings have been temporarily transferred to large earthenware pots. It is hoped to plant them out at Ratmalagara in May-June, 1939.

II. *Ratmalagara Estate*.—As mentioned elsewhere in this Report (para. 9), Ratmalagara Estate was taken over in March, 1938.

(i.) *Experimental Plantation*.—The first field experiment planned to be carried out on Ratmalagara Estate was designed to compare the following "treatments":—

A.—Seednuts from High Yielding Mother Palms.

- (a) Selected seedlings.
- (b) Unselected seedlings.

B.—Seednuts from Low Yielding Mother Palms.

- (a) Selected seedlings.
- (b) Unselected seedlings.

C.—Seednuts from heaps.

- (a) Selected seedlings.
- (b) Unselected seedlings.

This experiment was to have been commenced in October-November, 1938, but had to be postponed owing to the failure of the monsoon rains. It will be started when weather conditions are favourable in 1939. Apart from the primary objects of comparison of the above "treatments", some information should also be obtained on the inheritance of mother palm characteristics other than yield attendant on normal cross-pollination.

Catch Crops.—Approximately 12 acres of jungle land have been cleared for the above described experiment and have been planted with catch crops in accordance with normal practice on new clearings. Accurate accounts are kept of the cost of clearing and management of new clearings, and of the cost of cultivation and revenue from catch crops.

(ii.) *Coconut Varieties*.—A start has been made with the plantation of the different varieties of the coconut palm on a cleared portion of Ratmalagara Estate. The first planting material has been taken from the green dwarf palms growing on Bandirippuwa Estate. Seedlings have been raised in the Bandirippuwa Estate nurseries and will be planted out at Ratmalagara during the next rainy season.

The seedlings from the Papuan nuts mentioned in section (iii.) above will also be planted in the same block, as well as a batch of Rath Tembili (Golden Yellow King Coconut) seedlings. Other varieties will be added in due course. Oil palm seedlings are also to be planted out (see section I. (iv.)).

III. Co-operative Experiments—

(i.) *Yield Records*.—To the five estates upon which yield records were being kept in 1937, five were added in 1938, four in the Puttalam District and one near Mirigama. The increase in the number of selected palms on the new estates is 155. It is hoped to extend this work to still further estates in 1939.

It will be seen from section I. (ii.) above that the supply of planting material from Bandirippuwa alone cannot meet the demand, which is likely to increase with the extension of new planting with the Peasant and Middle-class Proprietors' Schemes, and the replanting of old estates. In 1938, the Scheme could accept only 50 per cent. of orders for seed-nuts and 30 per cent. for seedlings. It is hoped that more large estate owners will co-operate with the Scheme as ten estates are already doing, and make their estates centres of distribution of proved planting material, with benefit to themselves and to the agriculture of the Island.

(ii.) *Experimental Plantations*. No. 1.—This plantation of five acres to which reference has been made in previous reports is now in the fourth year of life. It is visited monthly and careful records are kept on the progress of the individual palms. In spite of an outbreak of grey blight (*Pestalozzia palmarum*), and the complete failure of the monsoon rains, the young palms have shown no signs of retarded growth or wilt. On the contrary, their performance has been very good and at the time of writing three of them have come into flower.

The *Cenchrus echinatus* grass which, as mentioned in last year's report, was very troublesome in 1937, has been almost replaced by a cover of *Centrosema* and *Calopogonium*.

Manuring, intended for November, 1938, had to be postponed on account of weather conditions, but at the time of writing (January 21, 1939), it may be possible to carry it out.

No. 2.—Of the seedlings (747 in number) planted out on this area in October, 1937, and mentioned in last year's Report, 60 were destroyed or damaged by termites by the beginning of 1938, and a further 110 by black beetle by the end of the year. The vacancies caused by the damage and the remaining plant sites to be filled were intended to be supplied in May-June and October-November, 1938. Unfortunately, owing to the unusual shortage of rainfall from April onwards this could not be done and the seedlings raised from nuts from the April, June, August, and October, 1937, picks of the 44 selected palms on the estate in question had to be discarded.

However at the time of writing (January 21, 1939), it has been possible to plant out 540 seedlings from the December, 1937, and February, 1938 picks, and it should be possible to complete the planting up of the whole area during 1939.

Detailed reports on these plantations will be given in the Geneticist's Technical Report for 1938.

(iii.) *Demonstrations*.—Two private plantations, situated in Kurunegala and Matale Districts, have been opened up with selected seedlings supplied by the Scheme. As mentioned in an earlier report, such plantations may be utilized as local demonstrations of the usefulness or otherwise of seed selection. Both areas are visited periodically.

IV. *Estate Visits*.—One hundred and twenty-three visits to estates were paid by the Geneticist and his assistants during the year mainly in connection with mother palm selection and yield recording. This figure includes five visits to Ratmalagara estate in connection with the field experiments mentioned in section II. (i.).

V. *Issue of Publications*.—Owing to the large increase in correspondence regarding issue of publications, the Director of Research, in February, 1938, delegated the control and supervision of these issues to the Geneticist, as Officer-in-Charge of Publications.

There are on the regular mailing list over two hundred and fifty addresses to which all publications are sent as they appear. In addition there is a regular stream of enquiries for individual leaflets and reports on agricultural and industrial subjects.

Besides direct issue to inquirers, steps are being taken in an endeavour to ensure a wider dissemination of literature through Village Committees and Agricultural Societies. Several thousands of leaflets were distributed in this manner during 1938 and the co-operation of Divisional Agricultural Officers and of Chairmen, Village Committees (particularly in the Chilaw area), is cordially acknowledged.

3. *Soil Chemist*—

(i.) *N. P. K. Experiment*.—With the October, 1938, pick of the nitrogen-phosphate-potash experiment, four years' records were completed, one premanurial year, and three years from the first application of fertilizers in November, 1935. The second application of fertilizers to the plots was made in November, 1937, and the third application is due in November, 1939.

A preliminary analysis of the results shows that phosphoric acid in both single and double doses has so far produced no response. It has been a traditional practice to employ in manurial mixtures for coconut palms a high proportion of phosphoric acid, which is apparently not required. Nitrogen and potash produce an increase in yield and there is an interaction between nitrogen and potash. In all these particulars the results of the 3rd year after the first manuring confirm those of the previous year.

The analytical work commenced during 1937 in connection with the utilization of potash has been continued.

The analyses for oil content of samples of copra from plots receiving double doses of fertilizers, which was completed for the second year after manuring, were discontinued at the beginning of the year (see paragraph I above).

(ii.) *Co-operative Manurial Experiments*.—Considerable progress has been made in connection with the co-operative manurial experiments referred to in last year's Report. Premanurial records on a Negombo estate have been kept since May, 1938, and of that near Gampaha since September, 1938. A third experiment was commenced in the Southern Province, and one premanurial pick has been completed. The manurial treatments of these experiments will be carried out in 1939.

(iii.) *Cover Crop Experiment*.—(a) Owing to the failure of the north-east monsoon the treatments of the cover crop experiment laid down on Bandirippuwa Estate in 1937 had to be postponed and the premanurial records were continued.

(b) The demonstration block of covers on the sandy area was manured in alternate rows by broadcasting the manures on the harrowed cover and subsequently turning over with mamoties.

(iv.) *Fodder Grass Trials*.—Records of cuttings of the Fodder Grass Experiment have been kept, a small amount being sold locally. It is proposed to start a co-operative experiment on a neighbouring estate to study the effect of growing fodder grasses on the yield of coconuts.

(v.) *Husks*.—Laboratory work on husks was mainly in connection with the potash content of husks of the 16 plots of the N. P. K. experiment receiving double doses of manure.

In the course of husk burying on the estate, a detailed root survey was carried out in the different fields.

(vi.) *Co-operative Work on Analytical Methods*.—In co-operation with the Tea Research Institute a comparative study was made on methods of determining potash, in the course of which an assistant from the Tea Research Institute worked for a short time in the Soil Chemist's Laboratory.

(vii.) *Soils*.—Several soil profiles were taken from the Ratmalagara jungle. An interesting profile from Andigama, where the sub soil consists of hard carbonaceous shale, was studied.

(viii.) *Loss of Ammonia from Manure Mixtures*.—Losses of up to 10 per cent. total nitrogen were observed when manure mixtures containing sulphate of ammonia and mineral phosphates were stored in bags. This loss is particularly occasioned by damp conditions and the presence of hygroscopic salts, such as muriate of potash. Details of this work are to be published shortly.

(ix.) *Advisory*.—There was a slight decrease in advisory correspondence. Visits were paid to 36 estates, compared to 56 during the previous year, and included a circuit of 16 days in the Southern Province in August, 1938.

4. *Paper Pulp from Coconut Husks*.—From April 25, 1938, the Scheme has afforded laboratory facilities to Mr. S. R. K. Menon, M.A., an Indian Chemist, who is carrying out a programme of experiments on the possibility of manufacturing paper pulp from coconut husks. The results of these studies will be reported elsewhere.

5. (a) *Publications*.—

- M. L. M. Salgado : "Goat Manure". *Tropical Agriculturist*, 1938, Vol. XC., No. 1 (January), pp. 30-33.
- Report and Accounts of the Coconut Research Scheme for 1937. Government Sessional Paper IV.—1938. May 24, 1938.
- R. Child and S. Ramanathan : "The Composition of Coconut Shells", *Journal of the American Chemical Society*, 1938, Vol. 60, No. 6 (June), pp. 1506-7.
- J. P. Andrews, V. Appapillai, and R. Subramaniam : "Report on the Illuminating Power of Lamps burning Coconut and Kerosene Oils", *Coconut Research Scheme Bulletin No. 2*, pp. iv and 17 (11 figures in text), August, 1938.
- R. Child : "Coconut Research," Essay Review in *Current Science*, Vol. VII., No. 3 (September), pp. 127-129.

Leaflets.—Leaflet No. 3—"Cover Crops Suitable for Coconut Estates" was reissued with some revisions.

Tamil editions of leaflets No. 1-4 were published in 1938.

(b) *Library*.—On December 31, 1938, the library contained 442 books and 676 bound volumes of periodicals (the latter number including 92 volumes loaned by the Director of Research). Corresponding figures for previous years have been:—

		Books.	Bound Volumes of Periodicals.	Total.
December 31, 1934	..	203	140	352
" 1935	..	244	321	565
" 1936	..	312	503	815
" 1937	..	387	613	1,000
" 1938	..	442	676	1,118

The number of current periodicals received is seventy-seven including those loaned by members of the staff. The additions to this list during the year were "*Paper Trade Journal*" and "*Science Progress*" by purchase, and the "*Bulletin of the Colonial Institute of Amsterdam*" kindly supplied gratis by the Institute. The Library also receives a large number of periodicals, reports, &c., from Government Departments, Research Institutes, and other bodies both in Ceylon and overseas. These are acknowledged individually by post, but this opportunity is taken of making a general acknowledgment to all those who kindly supply their publications gratis.

Reference may be made to the fact that the Scheme's set of "*The Tropical Agriculturist (Ceylon)*" still lacks Vols. VIII. to XVIII. and XX. to XXV. The Director of Research would be glad to hear of copies of these for disposal.

6. *Lectures, Exhibitions, &c.*—The following public lectures were given by members of the staff in 1938:—

- (a) "Some Products of the Coconut Palm" by the Director of Research, given to the Coconut Planters' Joint Committee at Bandirippuwa on March 12, 1938.
- (b) "The Work of the Coconut Research Scheme" by the Director of Research, to the Low-country Products Association in Colombo on June 30, 1938.
- (c) "The Necessity for the Replanting of Coconut Estates" by the Geneticist, to the Coconut Planters' Joint Committee at Bandirippuwa on September 17, 1938.

The Director of Research also gave an informal talk on minor products of the coconut to the Negombo Rotary Club, on March 9, 1938.

Field Days and Exhibitions.—The Scheme participated in an Agricultural Field Day organized by the Department of Agriculture at the Wariyapola Experiment Station on April 2. A large number of village agriculturists attended the Field Day.

The Scheme held two Field Days at Bandirippuwa on April 20 and July 27. The former was attended by the members of a local Agricultural Society and the latter by members of the Kurunegala Planters' Association. On both occasions the visitors made a thorough inspection of work in progress in the laboratories and in the field.

A stall was taken for illustrating the Scheme's work at the All-Ceylon Industrial Rally and Carnival, Jaffna, from May 7 to 15, 1938. By participating in this carnival the Scheme was afforded the opportunity of sending two officers to the Northern Province—a province that had not hitherto been visited by any officer of the Scheme.

The Scheme also participated in the Pitigal Korale South Agri-Horticultural, Industrial, and Health Exhibition in July, which was opened by His Excellency the Governor.

The 2nd year students of the Farm School, Peradeniya, in the company of a lecturer, Mr. J. A. Alles, visited the Scheme on September 27. The party spent the morning at Bandirippuwa Estate and the afternoon at Ratmalagara Estate.

Parties from three schools in the neighbourhood visited the Scheme during the year. It is encouraging to note that these visits are becoming a familiar feature. One party of school children came from as far away as Halugama in Mirigama.

On the whole Field Days, as organized by the Department of Agriculture, seem to have been more useful from the point of view of agricultural propaganda, since they are free from the distractions usually associated with Carnivals, Fairs, Exhibitions and Rallies.

7. *Meetings.*—The Senior Officers of the Scheme have continued to be honorary members of the Chilaw and Kurunegala Planters' Associations and of the Coconut Planters' Joint Committee, and have attended the meetings of these bodies whenever possible.

The Director of Research attended four meetings of the Board of Management as Secretary, four meetings of the Buildings Sub-Committee as Secretary-Convener, three meetings of the Central Board of Agriculture in Peradeniya, one meeting of the Ceylon Coconut Board by special invitation, one meeting of the Soil Conservation Committee, three meetings of the Chilaw Planters' Association, two meetings of the Kurunegala Planters' Association, and three meetings of the Coconut Planters' Joint Committee. He also attended the Rubber Conference organized by the Kalutara Planters' Association at Tebuwana on November 25, 1938.

By permission of the Board of Management, the Coconut Planters' Joint Committee held three meetings in the Library at Bandirippuwa Estate on January 22, March 12, and September 17.

THE ESTATES.

8. *Bandirippuwa Estate.*—As in previous reports from 1935 onwards, the estate finances are presented in two parts, estate management and research management. There has been little alteration from last year's report in the method of presenting these accounts. It may here be noted, however, that whereas all Research expenditure relating to field experiments was previously incurred only on Bandirippuwa Estate, such expenditure is now also incurred on Ratmalagara Estate and outside co-operative experiments. This has been duly allotted in the Estate Working Accounts and collected together in the Statement of Receipts and Payments.

The crops harvested in 1937 were as follows :—

	Nuts from Blocks under Estate Management.	Nuts from Blocks under Research Management.	Total Number of Nuts.
1st Crop	60,431	19,855	80,286
2nd Crop	76,251	22,343	98,594
3rd Crop	100,545	28,940	129,485
4th Crop	82,123	30,830	112,953
5th Crop	57,420	17,498	74,918
6th Crop	76,264	21,132	97,396
	<hr/> 453,034	<hr/> 140,598	<hr/> 593,632

Corresponding totals for previous years have been—

Year.	Number of Nuts.	Per Acre.	Per Palm.
1931 ..	583,155 ..	3,887 ..	59·3
1932 ..	447,191 ..	2,981 ..	45·4
1933 ..	632,106 ..	4,143 ..	64·2
1934 ..	575,755 ..	3,774 ..	58·5
1935 ..	541,699 ..	3,564 ..	55·8
1936 ..	502,137 ..	3,293 ..	51·8
1937 ..	664,742 ..	4,356 ..	68·7
1938 ..	593,632 ..	3,893 ..	61·4
Total 1931-1938 ..	4,540,417	—	—
Average 1931-1938 ..	567,552	3,720 (approx.)	59 (approx.)

It may be noted that from 1928, Bandirippuwa Estate was given only two general applications of fertilizers, in 1938 costing Rs. 4,788·41 and in 1936 costing Rs. 4,447·95. Manuring is now carried out on the estate management portion every two years and was commenced for 1938 in November. It would doubtless be possible by heavier applications of fertilizers to push the yields higher, but it seems that the returns on extra crop would not on average prices during the past few years compensate for the cost of the higher applications of fertilizers. It is clear that the estate has been maintained at a satisfactory level by cultivation and the use of limited doses of inorganic fertilizers, the crop average for the four years 1935-1938 having been 575,555 against 559,552 for 1931-1934. Expenditure for the year totalled Rs. 6,262·07 for the portion under Estate management, and Rs. 3,121·01 for the portion under Research management, cost of superintendence and watchers having been allocated proportionately, viz., of a total of Rs. 2,252·14 under these heads, Rs. 1,718·74 has been charged to estate and Rs. 533·40 to research.

The estate expenditure Rs. 6,262·07 includes Rs. 496·35 for manuring. Corresponding cost of production was Rs. 13·82 per 1,000 nuts (of which Re. 1·10 was due to manuring).

The revenue from Bandirippuwa Estate actually accruing in 1938 similarly in two parts was—

Revenue from Estate Management.			Revenue from Research Management.		
6th Crop, 1937—	Ra. c.	Rs. c.	6th Crop, 1937—	Ra. c.	Rs. c.
Sale of nuts ..	1,824 49		Sale of nuts ..	47 41	
Sale of copra ..	24 52		Copra from experi- ments ..	361 39	
Sale of copra from rejections ..	17 48		Copra from rejections ..	0 62	
Sale of husks ..	100 0		Copra (other) ..	42 90	
		1,966 49	Seednuts and seedlings ..	537 40	
Crops 1-5, 1938—					989 72
Sale of nuts ..	3,971 70		Crops 1-5, 1938—		
Sale of copra ..	3,471 59		Sale of nuts ..	140 35	
Sale of copra from rejections ..	20 56		Copra from experiments ..	1,855 11	
Sale of husks and sundries ..	210 50		Copra from rejections ..	0 96	
Sale of seednuts ..	143 20		Other copra ..	73 12	
		7,817 15	Sundries ..	17 5	
			Seednuts and seedlings ..	1,008 30	
		9,783 64			3,094 89
			Crop 6, 1938—		
			Seednuts ..		45 0
					4,129 61

Total gross revenue in 1938 was thus Rs. 13,913·25, which may be summarized as follows:—

	Ra.	Average price.
Sale of 266,647 nuts realizing	Rs. 5,983·55	Rs. 22·44 per 1,000
Sale of 58 tons 15 cwt. 31 lb. copra realizing	Rs. 5,868·25	Rs. 24·97 per candy
Sale of 259,870 husks realizing	Rs. 263·75	Rs. 1·05 per 1,000
Sale of 28 cwt. charcoal realizing	Rs. 33·60	Rs. 24·00 per ton
Other sundries	Rs. 30·20	
Sale of seednuts and seedlings	Rs. 1,733·90	(Seednuts 10 cents each Seedlings 20 cents each)
	Rs. 13,913·25	

The net income (revenue less expenditure) for the portion under Estate management was Rs. 3,521·57 (Rs. 7·77 per 1,000 nuts) and for the portion under Research management Rs. 1,008·60.

The total net revenue for the whole estate was thus Rs. 4,530·17 or approximately Rs. 30 per acre.

SUNDRY DEBTORS AND CREDITORS ACCOUNT.

Of the income from the 6th crop, 1937, which accrued in 1938, Rs. 1,500 was included in the Estate Working Account for 1937, having been credited through Sundry Debtors and Creditors Account. Similarly, a sum Rs. 4·65 was debited to Research Account.

The Estate Working Account for 1938 does not therefore include these items.

A provisional sum of Rs. 1,560 has been credited in the Estate Working Account on account of the 6th crop, 1938 (unsold at the time of writing) through Sundry Creditors and Debtors Account. The Estate Working Account shows therefore a balance carried forward as net revenue of Rs. 4,590·17.

METEOROLOGICAL OBSERVATIONS AT BANDIRIPPUWA ESTATE.

The usual observations have been made at Bandirippuwa and monthly abstracts of the records have been sent to the Colombo Observatory. Since June 1, 1938, a daily telegram has been sent to the Observatory giving particulars of the weather observations for the previous twenty-four hours. These records are published with those of other official stations in the Observatory's daily report, which appears in the Post Office Daily List and the local press, and are utilized in the daily broadcast weather report from the Colombo Radio Station. In these publications the Scheme's station is referred to as Lunuwila.

The total rainfall during 1938 was 47·81" falling on 153 rainy days; wet days, *i.e.*, those on which 0·04" or more of rain fell, numbered 120. The corresponding figures for 1937 were 87·41" falling on 149 rainy days (wet days 121).

The year was unprecedented for shortage of rainfall, there having been in effect a failure of both monsoons. Rainfall was above the average from January to April, but from May to December, total precipitation was only 20·62", only one month (August) recording over 4 inches. The shortfall from average rainfall for the year may be regarded as about 31 inches.

BUILDINGS, ROADS, &C.

Extensions to the No. 2 Senior Staff and No. 1 Junior Staff bungalows were completed in January. The Superintendent's bungalow was renovated during the year. All roads were maintained in good condition, and reverse slope drains were provided on some sloping roads.

9. *Ratmalagara Estate.*—This estate (see also section 2, II. of this Report) was taken over by the Scheme on March 12, 1938. It comprises 144 acres 36 perches cultivated land, and 111 acres 3 roods 7 perches of jungle.

Superintendence.—From March 12 to May 31 weekly visits were paid to the estate by Mr. P. J. Nonis, Estate Superintendent, from Bandirippuwa. Frequent visits were also paid by the Senior Staff officers. Mr. Nonis has been permanently stationed at Ratmalagara since June 1, 1938.

Condition of the Property and Census.—At the time of acquisition, Block 5, about half of Block 6, and a strip along the boundaries of Blocks 3 and 4 were covered with a rank growth of weeds and scrub. Large areas of "illuk" were widespread in all blocks.

The palms on Blocks 1-4 are the oldest, but probably none is over 30 years. On Blocks 5 and 6 the palms are younger and range from 20 years downwards. There seemed some doubt about the accuracy of the previous census of the estate and accordingly a new census was taken in June, with the following results:—

Field No.	Bearing Palms.	Stems.	Young Palms.	Dud Palms.	Vacancies.	Total.
1	1,207	178	62	90	48	1,585
2	328	30	16	43	10	427
3	458	52	94	29	72	705
4	1,173	147	78	68	209	1,675
5	352	276	116	13	485	1,242
6	621	528	349	5	152	1,655
	4,139	1,211	715	248	976	7,289

The crops harvested in 1938 were as follows:—

Crop No.	Nuts picked.	Nuts sold.	Rejections and shorts.
2	28,130	27,170	960
3	37,413	35,635	1,778
4	44,180	42,336	1,844
5	34,573	33,199	1,374
6	20,945	20,187	758
	165,241	158,527	6,714
1	30,896—harvested by previous owner.		
	196,137		

Crop figures for the years 1924-1937 have been kindly supplied by the former agents. The average crop during this period was 132,736. The previous best crop recorded was 191,876 in 1928. Recent figures are:—

1933	133,065	1936	92,307
1934	145,464	1937	133,012
1935	138,415		

Revenue from estate was as follows:—

		Average price.
Sale of 158,527 nuts	Rs. 3,009·65	Rs. 19 per 1,000
Sale of copra from rejections	Rs. 25·49	
Sale of firewood	Rs. 22·20	
	Rs. 3,057·34	

Expenditure totalled Rs. 5,077·47 or Rs. 30·73 per 1,000 nuts, there being thus a deficit on this year's working of Rs. 2,020·13. It should be noted that much of this expenditure was of a non-recurring type. When the estate was taken over, there existed nothing in the way of tools and implements. Expenditure on estate equipment totalled Rs. 1,240·45, on renovations to the bungalow Rs. 315·04, on building labour lines Rs. 131·36, and on renovating wells Rs. 171·74, these items totalling Rs. 1,858·59. The balance of general expenditure totalled Rs. 3,218·88 or Rs. 19·48 per 1,000 nuts. Research expenditure on Ratmalagara totalled Rs. 116·72.

Further, the estate when taken over was in poor condition. Vacancies and poor palms are numerous, the bearing palms only totalling 4,139. The total yield for 1938 corresponds to 47·4 nuts per bearing palm which is not in the circumstances unsatisfactory. It is anticipated that besides its utility for experimental purposes, the real reason for the purchase of the estate, it will also be a source of revenue when brought into good condition in the course of a few years.

METEOROLOGICAL OBSERVATIONS.

Rainfall figures and records of cloud and state of weather have been kept since July 1, 1938. Monthly statements of these are sent to the Colombo Observatory. 15·90 in. of rain fell between July 1 and December 31, 1938, inclusive, on 53 rainy days (44 wet days).

BUILDINGS, ROADS, &C.

A new store room was built. The old mud and wattle bungalow was renovated and colour washed. Two sets of mud and wattle labour lines were built for the use of the resident labour gang and the watchers.

A cart shed and a small mud and wattle copra kiln to cure small lots of copra were also built during the year.

The old well which was in a dilapidated condition was reinforced with a concrete ring and a circular parapet wall of brick in cement was built during the year.

Roads.—The original culvert at the main gate being unsatisfactory and dangerous, a new concrete culvert with brick gate pillars was built in June. The approach road to the bungalow was also occasionally gravelled and repaired.

It will be necessary to build early a new bungalow for the Superintendent, and a field laboratory and circuit bungalow for Field Officers. Plans for these have been prepared.

Fencing.—The estate fencing has been put in order, concrete posts and five strands of barbed wire having been put up along the whole road frontage, and milla posts with five strands of wire along the other boundaries.

FINANCE.

The audited Statement of Accounts will be found attached.

F. P. JEPSON,
Acting Director of Agriculture, and
Chairman, Board of Management,
Coconut Research Scheme.

January 26, 1939.

Audit Office,
Colombo, January 31, 1939.

THE CHAIRMAN, Board of Management, Coconut Research Scheme, Peradeniya.

SIR,—I HAVE the honour to furnish the following report on the audit of the accounts of the Coconut Research Scheme for the year 1938 and to forward the following statements duly certified:—

- (a) Statement of Receipts and Disbursements for 1938.
 - (b) Bandirippuwa Estate Working Account for 1938.
 - (c) Ratmalagara Estate Working Account for 1938.
 - (d) Revenue, Nett Revenue and Surplus and Deficit Account for 1938.
 - (e) Capital Account and General Balance Sheet as at December 31, 1938.
2. The Statement of Receipts and Disbursements based on actual receipts and payments during the year is furnished in compliance with the statutory requirement in section 8 (2) of Ordinance No. 29 of 1928.

I.—INCOME.

3. The total income accrued during the year amounted to Rs. 96,705. It exceeded the estimate of Rs. 74,124 by Rs. 22,581, but fell below the revenue of the previous year by Rs. 9,370.

4. *Grants.*—The annual grant of Rs. 30,000 payable by Government under section 6 (1) (b) of Ordinance No. 29 of 1928 has been duly received.

5. *Cess Collections.*—The amount accrued for the year was Rs. 57,855 inclusive of the collections made by the Principal Collector of Customs during December, 1938, but received in January, 1939.

6. *Interest.*—The amount accrued for the year is Rs. 2,817. This amount includes in addition to the sum of Rs. 2,486 received as interest on the fixed deposit in the National Bank of India, Limited, Colombo, the interest on the investment in the Ceylon Government 3½ per cent. loan and on loans to the staff, a sum of Rs. 331 being the interest accrued on the investments of the Scheme and the fixed deposit in bank up to the close of the year under review.

7. *Profit from Bandirippuwa Estate.*—The total income earned from the estate and research block for the year under review was Rs. 13,973. The expenditure incurred on working the estate amounted to Rs. 9,383 leaving a profit of Rs. 4,590. This profit includes a sum of Rs. 1,500 being an estimate of the amount expected by the sale of the sixth crop of 1938.

II.—EXPENDITURE.

8. The total expenditure on revenue account exclusive of the amounts allowed for depreciation on capital assets and the loss on Ratmalagara estate charged to this account amounted to Rs. 75,441. The details of this expenditure are fully set forth in the Revenue Account. The expenditure charged to capital account amounted to Rs. 34,566. This sum includes Rs. 23,138 spent from the funds of the Scheme on the purchase of the Ratmalagara estate, Rs. 1,409 spent on improvement to the same estate, Rs. 6,881 on buildings, Rs. 1,602 on the laboratory, Rs. 380 on office furniture and equipment, and Rs. 1,155 on the additional electric installation. The whole of this expenditure was checked with supporting vouchers.

9. The following is a comparison between the original estimate and the expenditure incurred:—

Account.	Estimated.	Actual.	Excess.	Supplementary including Revotes.
	Rs. c.	Rs. c.	Rs. c.	Rs. c.
A.—Capital:				
Land Acquisition—				
(a) Purchase of Ratmalagara Estate ..	—	21,000 0	21,000 0	71,000 0
(b) New clearings ..	2,475 0	497 23	—	—
(c) Fencing ..	1,970 0	911 96	—	—
Buildings—				
(a) Battery room ..	810 0	809 50	—	—
(b) Extensions to bungalows ..	—	5,071 57	5,071 57	8,450 0
(c) Store room at Ratmalagara Estate ..	—	1,000 0	1,000 0	1,000 0
Equipment of laboratory ..	1,500 0	1,602 8	102 8	—2,750 0
Office furniture and equipment ..	400 0	380 0	—	—1,250 0
Museum ..	500 0	1 35	—	—
Additional Electric Installation ..	—	1,154 73	1,154 73	1,226 0
Legal expenses for purchase of Ratmalagara Estate ..	—	2,138 0	2,138 0	2,138 0
B.—Personal Emoluments:				
Salaries of senior staff ..	32,092 0	32,091 29	—	—
Salaries of junior staff ..	13,184 0	13,826 28	642 28	521 0
Provident Fund contribution and interest ..	2,750 0	2,731 82	—	—
* Rent allowance ..	334 0	315 77	—	10 17
C.—Other Charges:				
Travelling expenses of staff ..	3,000 0	4,734 30	1,734 30	750 0
Travelling expenses of Board Members ..	750 0	312 75	—	—
D.—Office:				
Stationery ..	1,000 0	747 45	—	—
Postage ..	750 0	646 44	—	—
Printing and advertising ..	1,500 0	1,585 14	85 14	—
Incidental expenses ..	1,000 0	1,034 52	34 52	—
Legal expenses ..	100 0	250 0	150 0	—
Telephone ..	460 0	460 0	—	—
Propaganda ..	500 0	523 32	23 32	50 0
Entertainment allowance ..	—	92 50	92 50	200 0
E.—Laboratory:				
Upkeep, chemicals, &c. ..	1,750 0	2,972 45	1,222 45	1,250 0
Scientific books and periodicals ..	1,750 0	1,855 49	105 49	250
F.—Buildings:				
Upkeep of buildings ..	1,250 0	1,610 91	360 91	388 25
Insurance of buildings ..	452 0	506 78	54 78	57 0
Running expenses of electric plant ..	2,000 0	2,299 81	299 81	100 0
Water supply ..	—	964 79	964 79	850 0
G.—(a) Bandirippuwa Estate:				
General charges ..	2,250 0	2,178 37	—	—
Upkeep ..	1,500 0	1,193 34	—	—
Cultivation ..	4,250 0	1,169 72	—	—
Collection ..	600 0	484 4	—	—

Account.	Estimated.	Actual.	Excess.	Supplementary including Revotes.
	Rs. c.	Rs. c.	Rs. c.	Rs. c.
(b) <i>Ratmalagara Estate</i> :				
General charges ..	1,840 0	2,487 77	647 77	500 0
Upkeep ..	1,550 0	1,243 70	—	—
Cultivation ..	550 0	465 59	—	—
Collection ..	300 0	150 41	—	—
H.— <i>Research Account</i> :				
General ..	1,000 0	104 27	—	—800 0
Genetical work ..	1,000 0	1,031 11	31 11	—100 0
Soil Chemists' work ..	1,000 0	1,613 88	613 88	+100 0
I.— <i>Loan Repayment and Interest</i> ..	7,000 0	7,500 0	500 0	900 0
J.— <i>Reserve for Depreciation</i> ..	14,475 0	14,017 56	—	—

10. The excesses under the different items save the following have been approved by the Board of Management :—

	Rs. c.
B.—Salaries of junior staff ..	121 28
C.—Travelling expenses of staff ..	984 30
D.—Printing and advertising ..	85 14
Incidental expenses ..	34 52
Legal expenses ..	150 0
F.—Running expenses of electric plant ..	199 81
Water supply ..	114 79
G.—(b) <i>Ratmalagara Estate</i> :	
General charges ..	147 77
I.—Loan interest ..	500 0

11. *Purchase of Ratmalagara Estate.*—The amount spent on the purchase of the Ratmalagara estate is Rs. 71,000 of which Rs. 21,000 had been incurred from the Revenue Account and the balance Rs. 50,000 from the loan obtained from the Government of Ceylon for that purpose. A further sum of Rs. 2,138 was spent as legal expenses in this connection.

12. *Loss from Ratmalagara Estate.*—The total income earned from the estate for the year under review was Rs. 3,057. The expenditure incurred on working the estate amounted to Rs. 5,194, thereby causing a loss of Rs. 2,137. This loss of Rs. 2,137 has been charged to the Revenue Account in the Statement of Accounts attached to this Report.

III.—SURPLUS.

13. The accumulated surplus at the beginning of the year was Rs. 85,367. The result of the year's working showed a surplus of Rs. 5,109 but, in view of the fact that a sum of Rs. 36,023 was utilized on capital works, there was a deficit of Rs. 30,914 for the year under review. The sum of Rs. 600 being the appreciation on the investment in the Ceylon Government loan was transferred from the surplus to a new account called "Reserve for Depreciation of investments". The accumulated surplus at the close of the year was therefore reduced to Rs. 53,853.

IV.—BALANCE SHEET.

(a) Liabilities.

14. *Contribution to Capital Outlay* :—Rs. 524,871.—This sum represents the total amount of contributions made from revenue towards the capital outlay of the scheme. The amount contributed during the year was Rs. 36,023.

15. *Loan from Government of Ceylon* :—Rs. 45,000.—This sum represents the amount of loan still payable to the Government of Ceylon out of the loan of Rs. 50,000 obtained in 1937 for the purchase of the Ratmalagara estate. An instalment of Rs. 5,000 was paid to the Government during 1938 and this sum is shown under "Loan Redeemed" Account in the Statement of Liabilities.

16. *Passage Fund Reserve* :—Rs. 3,559.—This amount represents the balance lying to the credit of the fund for meeting the cost of passages to officers. No contributions were made to this fund during the year under review.

17. *Provident Fund* :—Rs. 22,735.—The balance to the credit of this fund at the beginning of the year was Rs. 17,857. The contributions made by the officers during

the year amounted to Rs. 2,216. The contribution made from the funds of the Scheme amounted to Rs. 2,732 inclusive of the interest on the balance of the fund for 1937.

18. *Reserve for Depreciation: Rs. 85,441*.—The balance on December 31, 1937, was Rs. 71,423. A sum of Rs. 14,017 was transferred from revenue to this account during the year under review. This amount has been arrived at as follows:—

	Ra.	c.
Buildings at 5 per cent. on Rs. 155,227·09	7,761	35
Laboratory :		
Structures at 5 per cent. on Rs. 49,752·03	2,487	60
Equipment at 10 per cent. on Rs. 17,671·10	1,767	11
Gas Plant at 10 per cent. on Rs. 2,029·42	202	94
Furniture for bungalows at 10 per cent. on Rs. 2,459·10	245	91
Office furniture and equipment at 10 per cent. on Rs. 1,402·60	140	26
Accumulators at 12½ per cent. on Rs. 11,100·21	1,387	52
Museum at 10 per cent. on Rs. 248·71	24	87
	14,017	56

19. *Creditors: Rs. 3,064*.—Of this amount, a sum of Rs. 1,074 represents the interest and instalment accrued up to the close of the year in respect of the loan of Rs. 50,000 obtained from the Government. The balance sum of Rs. 1,990 represents the outstanding liabilities on December 31, 1938, with the exception of the cost of audit for 1938 amounting to Rs. 351·54.

(b) *Assets.*

20. *Capital Expenditure: Rs. 574,871*.—The details of this expenditure are set forth in the Capital Account. A sum of Rs. 85,441 which is about 14·9 per cent. of the total capital expenditure has been provided for the depreciation of these assets.

21. *Debtors: Rs. 5,099*.—Of this amount the sum of Rs. 3,509 was due from the Deputy Financial Secretary on account of cess collections made during December, 1938. This sum was received from him during January, 1939. Of the balance a sum of Rs. 1,500 represents the estimated amount of the sale of produce collected in 1938 and sold during the current year.

22. *Accrued Interest: Rs. 331*.—This amount represents the interest accrued up to the close of the year on the fixed deposit of Rs. 20,000 and on the investments of Rs. 60,000 and Rs. 25,000 in the Ceylon Government 3½ per cent. loan and the Ceylon State Mortgage Bank respectively.

23. *Loans to Staff: Rs. 1,250*.—This amount represents the balance outstanding out of the loans of Rs. 1,500 and Rs. 113 granted to two members of the staff for the purchase of transport. The loans are being repaid in instalments with interest.

24. *Investments: Rs. 85,825*.—The stock certificates relating to Rs. 60,000 Ceylon Government loan, 1937-62, and the Debenture Bonds in support of the investment of Rs. 25,000 in the Ceylon State Mortgage Bank were seen at the inspection of the office in January, 1939. The investment in the Ceylon Government Loan is shown at the market price on December 31, 1938.

25. *Cash Balances: Rs. 77,572*.—The receipt in support of the fixed deposit of Rs. 20,000 in the National Bank of India, Limited, Colombo, was seen. The balance in the current account at the National Bank of India, Limited, Colombo, was verified by reference to the bank certificate. The cash in hand on December 31, 1938, was not verified but a surprise verification of the cash, &c., on hand with the exception of the petty cash imprest of Rs. 300 with the Superintendent of Ratmalagara estate was made at the inspection of the office on January 25, 1939.

V.—GENERAL.

25. The accounts were received quarterly and examined in this office. The books and accounts kept at the Office of the Coconut Research Scheme at Bandippuwa were inspected and a test verification of the inventory balances in addition to the cash verification was made at the inspection.

I am, Sir,
Your obedient Servant,
O. E. GOONETILLEKE,
Auditor-General.

COCONUT RESEARCH SCHEME.

Statement of Receipts and Disbursements for the year 1938.

RECEIPTS.		Rs. c.	Rs. c.	DISBURSEMENTS.		Rs. c.	Rs. c.
Balance at January 1, 1938			143,044 53	Expenditure Account:			
<i>Revenue Account:</i>				<i>Capital Account—</i>			
Annual grant from Government	30,000 0			Purchase of Ratmalagara			
Cess collections	38,690 44			Estate	21,000 0		
Interest	2,791 99			New clearing	437 24		
Income from Bandirippuwa				Fencing	911 96		
Estate	13,913 25			Buildings:			
Income from Ratmalagara				Battery room	800 50		
Estate	3,057 84			Extension to bungalows	5,971 57		
Charges to Staff for electricity	978 0			Store room at Ratmalagara			
Sale of publications	129 78			Estate	1,000 0		
Charges for telephone	40 0			Equipment of laboratory	1,902 8		
Sundry receipts	283 97			Office furniture and equipment	380 0		
		103,864 77		Museum	1 35		
<i>Advance Account:</i>				Additional Electric Installation	1,154 73		
Repayment of loans to staff		604 99		Legal expenses for purchase of Ratmalagara Estate	2,138 0		
<i>Deposit Account:</i>						24,566 32	
Provident Fund	4,945 34			<i>Personal Emoluments:</i>			
Passage Fund reserve	504 10			Salaries of senior staff	32,001 26		
Depreciation reserve	14,017 56			Salaries of Junior staff	13,826 28		
		19,470 20		Provident Fund contributions for 1937 and interest	2,731 82		
				Rent allowance	315 77		
						48,865 13	
				<i>Other Charges:</i>			
				Travelling expenses of staff	4,734 30		
				Travelling expenses of Board Members	312 75		
						5,047 5	
				<i>Office Expenses:</i>			
				Stationery	747 45		
				Postage	646 44		
				Printing and advertising	1,585 14		
				Incidental expenses	1,034 82		
				Legal expenses	250 0		
				Telephone	460 0		
				Propaganda	523 32		
				Entertainment allowance	92 50		
						5,330 47	
				<i>Laboratory:</i>			
				Upkeep, chemicals, &c.	2,972 45		
				Scientific books, and Periodicals	1,855 40		
						4,827 85	
				<i>Buildings:</i>			
				Upkeep of buildings	1,610 91		
				Insurance of buildings	500 78		
				Running expenses of electric plant	2,209 61		
				Water supply	964 79		
						5,285 29	
				<i>Bandirippuwa Estate Account:</i>			
				General charges	2,178 37		
				Upkeep	1,433 34		
				Cultivation	1,160 72		
				Collection	484 4		
						5,256 87	
				<i>Ratmalagara Estate Account:</i>			
				General charges	2,467 77		
				Upkeep	1,343 70		
				Cultivation	465 19		
				Collection	180 41		
						4,457 87	
				<i>Research Account:</i>			
				General	194 27		
				Genetical work	1,531 11		
				Soil Chemist's work	1,613 88		
						3,339 26	
				<i>Loan repayment and interest</i>		7,500 0	
				<i>Reserve for depreciation</i>		14,017 56	
						137,887 99	
				<i>Advance Account:</i>			
				Loan to staff		1,412 0	
				<i>Deposit Account:</i>			
				Provident Fund	70 68		
				Passage Fund Reserve	930 64		
						1,001 32	
				<i>Loan for purchase of Ratmalagara estate</i>		30,000 0	
				<i>Investment in the Ceylon State Mortgage Bank</i>		25,000 0	
				<i>Balance at December 31, 1938:</i>			
				Cash in current account at bank	56,772 18		
				Cash in hand	800 0		
						57,572 18	
						273,074 49	

Audited and found correct:
 O. E. GOONETILLEKE,
 Auditor-General.
 Audit Office,
 Colombo, January 3, 1939.

F. P. JEPSON,
 Chairman, Board of Management, Coconut Research Scheme.
 Peradeniya, January 31, 1939.

COCONUT RESEARCH SCHEME.

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Bandirippuwa Estate Working Account for the year ended December 31, 1938.

Dr.		EXPENDITURE		Rs. c.		Rs. c.		INCOME		Rs. c.		Cr.	
To Estate Expenditure:								By Sale of Produce:					
General Expenses:								(a) Estate:					
Salaries of Superintendent, Conductor and watchmen				1,715 74				Nuts		5,995 79			
General charges		1,606 23						Copra		3,496 11			
Upkeep		1,193 34						Seednuts		143 20			
Cultivation		1,169 72								9,835 10			
Collection		484 4						Copra from rejections		38 4			
				4,543 33				Husks and sundries		310 50			
Research Expenses:										0,983 64			
Salaries of Superintendent, Conductor and watchmen				533 40				(b) Research:					
General work		188 20						Nuts		187 76		0	
Genetical work		921 27						Copra from experiments		2,216 50			
Soil Chemist's work		1,478 14						Other copra		116 2			
				2,587 61				Seednuts and seedlings		1,450 70			
Balance carried forward to Revenue Account				4,590 17				Copra from rejections		1 68			
								Sundries		17 5			
				13,973 25						3,989 61			
										13,973 25			

Ratmalagara Estate Working Account for the year ended December 31, 1938.

Dr.		EXPENDITURE		Rs. c.		Rs. c.		INCOME		Rs. c.		Cr.	
To Estate Expenditure:								By Sale of Produce:					
General Expenses:								Nuts		3,000 65			
Salaries of Superintendent and watchmen				1,284 0				Copra from rejections		25 49			
General charges		1,903 77						Sale of firewood		22 20			
Upkeep		1,243 70						Loss on working carried forward to Revenue Account				2,116 85	
Cultivation		465 59											
Collection		180 41				3,793 47							
Research Expenses:													
General		1 42											
Genetical work		109 84											
Soil Chemist's work		5 46				116 72							
				5,194 19								5,194 19	

Revenue Account as at December 31, 1938.

Dr.		Rs. c.		Rs. c.		Cr.	
						Rs. c.	
To Personal Emoluments:						By Grant from Government	
Salaries of senior staff		32,091 29				30,000 0	
Salaries of junior staff		11,336 28				57,855 39	
Provident Fund contribution and interest for 1937		2,731 82				2,817 27	
Rent allowance		315 77		46,495 16		978 0	
Other Charges:						Charges to staff for electricity	
Travelling expenses of staff		4,879 31				129 78	
Travelling expenses of Board Members		312 75		5,192 6		40 0	
Office:						Sundry receipts	
Stationery		747 45				293 97	
Postage		637 79				Balance from Bandirippuwa Estate working Account	
Printing and advertising		1,585 14				4,590 17	
Incidental expenses		1,040 95					
Telephone charges		460 0					
Legal expenses		250 0					
Propaganda		523 32		5,337 15			
Entertainment allowance		92 50					
Laboratory:							
Upkeep, chemicals, &c.		2,970 11					
Scientific books and periodicals		1,952 39		4,922 50			
Buildings:							
Upkeep		1,610 91					
Insurance		506 78					
Running expenses of electric plant		2,145 76					
Water supply		964 79		5,228 24			
Repayment of loan and interest				8,135 02			
Research-Co-operative experiments				130 28			
Depreciation				14,017 56			
Loss on Ratmalagara Estate transferred to Revenue Account				2,136 85			
Balance carried forward to Revenue Account				5,109 16			
				96,704 58		96,704 58	

Net Revenue Account.

Dr.	Rs. c.	Cr.
To Contribution to Capital Outlay	36,022 64	By Balance brought forward from Revenue Account
		Deficit for the year carried forward to Surplus and Deficit Account
	36,022 64	36,022 64

Surplus and Deficit Account for 1938.

Dr.	Rs. c.	Cr.
To Deficit brought forward from Net Revenue Account	30,913 48	By Balance on December 31, 1937
Amount transferred to Reserve for Depreciation on Investments	600 0	
Balance	53,553 41	
	85,366 89	85,366 89

Capital Account as at December 31, 1938.

EXPENDITURE.			RECEIPTS.	
To December 31, 1937.	Additions 1938.	Total.		
Rs. c.	Rs. c.	Rs. c.		Rs. c.
To Land Acquisition:			By Revenue contributions to Capital Outlay	524,871 45
Purchase of Bandirippuwa estate	187,554 68	187,554 68	Loan from Government of Ceylon	50,000 0
Purchase of Katmalagara estate	—	73,138 0		
Improvement of Katmalagara estate	—	1,409 13		
Buildings	185,471 45	6,881 7		
Laboratory	88,577 97	3,023 80		
Gas Plant	3,436 83	—		
Furniture for hushlows	4,164 49	—		
Office furniture and equipment	1,620 17	350 0		
Accumulators	14,748 37	1,189 23		
Museum	274 85	1 35		
	488,548 81	86,022 64		574,871 45

General Balance Sheet as at December 31, 1938.

LIABILITIES.		Rs. c.	ASSETS.		Rs. c.
Contribution to Capital Outlay		524,871 45	Capital expenditure		574,871 45
Loan from Government of Ceylon on December 31, 1937	50,000 0		Debtors:	Rs. c.	
Less repayment in 1938	5,000 0	45,000 0	Cess collection for December 1938	3,599 37	
Loan redeemed in 1938	—	5,000 0	Estate account	1,560 0	
Passage Fund reserve	—	3,559 32	Revenue Account	30 0	3,699 37
Provident Fund:	Rs. c.		Accrued interest:		
At December 31, 1937	17,857 44		On fixed deposit at bank	45 7	
Receipts during 1938	4,948 54		On Ceylon Government 3½ per cent. loan	202 50	
	22,805 98		On Mortgage Bank investment	23 97	331 34
Less refunds during 1938	70 68	22,735 30	Loans to staff for purchase of transport	—	1,230 1
Reserve for Depreciation on Investments	1,425 0		Investments—Ceylon Government loan	60,825 0	
Depreciation Reserve:	Rs. c.		Ceylon State Mortgage Bank	25,000 0	85,825 0
At December 31, 1937	71,423 10		Cash:		
Reserved in 1938	14,017 56	85,440 66	At bank in fixed deposit	30,000 0	
Creditors:			At bank in current account	56,772 18	
Accrued interest and instalment of loan from Government	1,073 97		In hand	800 0	77,572 18
Sundry	1,990 44	3,064 41			
Surplus	—	53,553 41			
		744,949 55			744,949 55

I hereby certify that subject to my report dated January 31, 1939, the above Balance Sheet correctly sets forth the position of the affairs of the Coconut Research Scheme, Ceylon, as shown by the books on December 31, 1938.

Audit Office,
Colombo, January 31, 1939.

O. R. GOONETILLEKE
Auditor-General