CEYLON COCONUT QUARTERLY

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ANNUAL REPORT FOR 1972

CONTENTS

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REPORT OF THE CHEMISTRY DIVISION (1972)

1. STUDY ON DIURNAL AND SEASONAL FLUCTUATIONS OF NUTRIENTS IN FOLIAR TISSUE

Studies on the diurnal and seasonal fluctuations of nutrient concentrations in the leaves of adult *typica* palms (the form grown commercially) was commenced in March 1972.

The study is being conducted on 30 healthy palms from the Botanist's Progeny Trial at Walpita. Samples for analysis are drawn from the leaflets confined to the mid-region of the 14th leaf, as recommended by the IRHO in Paris. For the Study on diurnal variation, leaf sampling commenced at 0600 hours and was repeated at 3 hourly intervals up to 1800 hours (i.e. 5 sampling times per day, totalling 150 samples from the 30 palms on each sampling date).

The seasonal changes were studied by sampling at monthly intervals, covering both the rainy and dry months. Ten samplings were done during the course of 1972, commencing from March, at monthly intervals. Two more samplings in January and February 1973 will be done covering the full one year period.

The object of this study is to determine the ideal times of leaf sampling (diurnal and seasonal) on the basis of minimal variability indications.

Analysis for the macro-nutrients (N, P, K, Ca, and Mg) and also Na are in progress, and will be continued.

2. STUDY ON ANNUAL EXHAUST OF SOIL NUTRIENTS

The 300 Palms Block at Bandirippuwa Estate was chosen for the study of the annual removal of macronutrients by adult *typica* palms.

Commencing from the 3rd (May-June) harvest of 1972, quantitative estimates of the macronutrient reserves in fallen-nuts and nuts from the first and second bunches were made.

Estimates were also made of the amount of nutrients lost through fallen fronds collected at the end of each harvest.

The combined estimates from the nuts and fronds give the total amount of nutrients removed at each harvest. Estimates were also made for the 4th (July-August), 5th (September-October) and 6th (November-December) harvests of 1972. The total amounts of nutrients removed by harvests 3 to 5 of 1972 are tabulated in Tables I to III.

The experiment will be concluded after the 1st (January-February) and 2nd (March-April) harvests for 1973. (Jeganathan, George, Appuhamy and Mendis).

3. TODDY YIELDS FROM (T×D) HYBRID PALMS

Twelve (12) healthy palms from Bandirippuwa Estate were chosen for this study. The palms on an average were about 11 years old.

Tapping work on the palms commenced on 22nd March 1972 and the yield records of toddy were maintained from 20th April to 20th December. i.e.—a tapping period of eight months (240 days).

The yield records of each of the 12 palms were maintained separately and it was observed that the average daily yield per palm during the 8 month period ranged between 1177 ml and 2873 ml . The monthly averages of the daily yields are summarised in Table IV from which the overall average daily yield per palm will be seen to be 1893 ml. (approximately 0.41 gallon or 2.4 bottles) (Jeganathan).

4. SIZE AND WEIGHT CHARACTERISTICS OF HYBRID NUTS (TALL × DWARF)

A random sample of 150 nuts from each of the 6 harvests of 1972 from the Hybrid Palm Block at Bandirippuwa Estate was used for this study.

The *size variability* was studied using a sorting frame with holes ranging from 10.0 cm. to 25.0 cm. in diameter. This corresponds to the short axis of the respective groups. Random samples of 150 nuts representing each of the six harvests of 1972 were passed through the frame after allowing the nuts to season in the heap for a period of one month. The percentage distribution of size groups classified on this basis were done for each of the picks.

The *weight relationships* of the fruit components (whole nut, husked nut, shell, kernel and nut water) based on the different size groups and representing all sizes have been worked out. Correlations between the drupe characters and any characters of the drupe components eg. husk, shell, kernel, copra and nut water) and percentage ratios between the various fruit components are being worked out by the Biometrician.

The *average moisture* content of the drupe components and *optimum sample* size for the study of drupe characters are also being processed from the data collected.

A full account of the findings will be published elsewhere. (Jeganathan, George and Appuhamy).

PERSONNEL

Mr. M. Jeganathan was promoted Research Assistant with effect from 1st January 1972.

Mr. S. Mohanadas was appointed Research Assistant with effect from 1st November, 1972.

Miss S. D. Ramanathan and Miss J. D. Nadarajah were appointed Technical Assistants with effect from 1st July 1972.

Messrs S. A. Peiris and A. Wilson were promoted Field Assistants and transferred to the Engineering Unit and Soil Chemistry Divisions respectively with effect from 1st September 1972.

Mr. M. A. Perera was appointed as an Attendant with effect from 1st January 1972.

Messrs M. H. Dhanasena and W. F. A. Fernando, assumed duties as Attendants with effect from 1st September 1972.

M. JEGANATHAN,
Officer-in-Charge,
Chemistry Division.

Table 1

Total Amount of Macro-nutrients removed by the Fruit Components of Fallen Nuts, First Bunch and Second Bunch Nuts at Time of Harvest and by the Components of the Fallen Fronds collected at end of Harvest. (Figures expressed in Grammes on Dry Basis) Harvest Date: (May/June 1972)

(Grammes)

Components	Nitrogen (as N)	Phosphorus (as P)	Potassium (as K)	Calcium (as Ca)	Magnesium (as Mg)
Dead Ripe Fallen Nuts					
Husk	1,089	81	4,094	193	227
Shell	202	6	404	60	5
Kernel	2,379	297	1,362	30	5
Nut Water	25	16	176	13	12
Total	3,695	400	6,036	296	249
First Bunch Nuts					
Husk	2,001	167	8,658	466	444
Shell	269	27	581	95	19
Kernel	3,873	510	2,519	63	61
Nut Water	44	49	449	20	36
Total	6,187	753	12,207	644	560
Second Bunch Nuts					
Husk	1,212	109	5,968	291	295
Shell	202	6	494	73	17
Kernel	3,329	364	1,746	39	60
Nut Water	39	27	329	22	28
Total	4,872	506	8,537	425	400
Fallen Fronds					
Rachis	382	50	242	1,300	420
Mid-rib	203	14	140	155	48
Lamina	1,562	91	286	885	326
Total	2,147	155	668	2,340	794

Table II

Total Amount of Macro-nutrients removed by the Fruit Components of Fallen Nuts. First Bunch and Second Bunch Nuts at Time of Harvest and by the Components of the Fallen Fronds collected at end of Harvest. (Figures expressed in Grammes on Dry Basis)
Harvest Date: (July/August 1972)

(Grammes)

Components	Nitrogen (as N)	Phosphorus (as P)	Potassium (as K)	Calcium (as Ca)	Magnesium (as Mg)
Dead Ripe Fallen Nuts					
Husk	484	68	1,959	224	96
Shell	71	6	210	35	—
Kernel	1,308	122	738	11	62
Nut Water	15	7	149	10	9
Total	1,878	203	3,056	280	167
First Bunch Nuts					
Husk	1,500	179	5,891	554	188
Shell	155	18	546	78	—
Kernel	3,128	278	1,849	28	149
Nut Water	36	32	338	26	19
Total	4,819	507	8,624	686	356
Second Bunch Nuts					
Husk	1,219	127	4,424	432	201
Shell	136	10	378	56	—
Kernel	2,226	195	1,311	23	113
Nut Water	26	12	234	28	17
Total	3,607	344	6,347	539	330
Fallen Fronds					
Rachis	270	26	126	981	207
Mid-rib	139	10	45	119	39
Lamina	854	43	176	553	128
Total	1,263	79	347	1,653	374

Table III

Total Amount of Macro-nutrients removed by the Fruit Components of the Fallen Nuts. First Bunch and Second Bunch Nuts at time of Harvest and by the Components of the Fallen Fronds collected at end of Harvest. (Figures expressed in Grammes on Dry Basis)
Harvest Date: (September/October 1972)

(Grammes)

Components	Nitrogen (as N)	Phosphorus (as P)	Potassium (as K)	Calcium (as Ca)	Magnesium (as Mg)
Dead Ripe Fallen Nuts					
Husk	366	33	1,600	143	93
Shell	27	7	204	32	8
Kernel	1,248	105	661	17	—
Nut Water	14	7	142	9	9
Total	1,655	152	2,607	201	110
First Bunch Nuts					
Husk	680	78	4,765	233	244
Shell	—	7	322	49	20
Kernel	2,124	181	1,165	21	—
Nut Water	21	20	212	17	13
Total	2,825	286	6,464	320	277
Second Bunch Nuts					
Husk	455	51	2,973	127	176
Shell	—	5	229	29	28
Kernel	1,461	120	821	15	8
Nut Water	15	7	140	18	10
Total	1,931	183	4,163	189	222
Fallen Fronds					
Rachis	647	59	171	2,190	553
Mid-rib	231	15	49	207	55
Lamina	2,023	99	245	131	243
Total	2,901	173	465	2,528	831

Table IV

Average Yields of Toddy from 12HYBRID Palms

(Records for 8 months from April-December 1972 kept at Bandirippuwa Estate, Lunuwila.)

Month	*Daily yield (Av. for 12 palms) (ml.)*
April	1,475 (for 10 days only)
May	2,022 (for whole month)
June	2,337 ,,
July	2,200 ,,
August	1,942 ,,
September	1,690 ,,
October	2,051 ,,
November	1,873 ,,
December	1,441 ,,
Average Yield per palm (8 months)	1,893

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ANNUAL REPORT OF THE COCONUT RESEARCH BOARD FOR THE YEAR 1972

GENERAL

The Coconut Research Board established under Coconut Research Ordinance No. 29 of December 1928 was superseded by a new Board with effect from 1st May 1972. This new Coconut Research Board which was established under Section 58 (1) of the Coconut Development Act. No. 46 of 1971 has been assigned the following functions.—

(1) the conducting and furthering of scientific research in respect of the growth and cultivation of coconut palms, the growing of other crops and the engagement in animal husbandry in coconut plantations and the prevention and cure of diseases and pests.

(2) the establishment and maintenance of experimental stations and nurseries.

(3) the conducting and furthering of scientific research in connection with the processing and utilization of coconut products.

(4) the establishment and maintenance of pilot plants for the processing of coconut products and the fabrication of experimental processing equipment.

(5) the training of advisory and extension workers to assist the coconut industry and

(6) the guiding and advising of the coconut industry on all matters of a technical nature.

REPORT OF THE CHAIRMAN

This is the First Annual Report of the Coconut Research Board established under Coconut Development Act. No. 46 of 1971. The following members (all of whom were nominated by the Minister of Plantation Industries) comprised the first Board set up under this Act:—

Dr. J. Sivapragasam (Chairman)
Mr. A. J. W. Balthazaar
Mr. W. Gunasekera*
Mr. J. W. L. Peiris
Dr. O. S. Peiris
Mr. A. Edmund Perera and
Dr. U. Pethiyagoda.

*(Mr. W. Gunasekera resigned from the Board with effect from 1st December 1972 and Mr. P. W. R. de Silva was appointed by the Minister to succeed him).

Meetings

Ten meetings of the Board (including a special one) were held during the year as follows:—

No.	*Date*	*Venue*
1	72-04-11 (10.00 a.m.)	Ceylon Coconut Board, Colombo.
2	72-05-02 (2.30 p.m.)	CRI, Bandirippuwa, Lunuwila.
3	72-05-26 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
4	72-06-23 (3.00 p.m.)	CDA, Y.M.B.A. Building, Colombo.
5	72-07-26 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
6	72-08-25 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
7	72-09-29 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
8	72-10-27 (2.00 p.m.)	CDA, Y.M.B.A. Building, Colombo.
9 (Special)	72-11-09 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
10	72-11-24 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.

Committees

A Research and Estates Committee comprised of the following members was set up by the Board at its meeting held on 2nd May 1972.

Dr. J. Sivapragasam (*ex-officio*, Chairman)
Dr. J. W. L. Peiris
Dr. O. S. Peiris
Dr. U. Pethiyagoda
Mr. A. J. W. Balthazaar and
Dr. W. R. N. Nathanael (co-opted.)

Four meetings of the Research and Estates Committee were held during the year as follows:—

No.	*Date*	*Venue*
1	72-05-26 (9.00 a.m.)	CRI, Bandirippuwa, Lunuwila.
2	72-09-29 (2.00 p.m.)	CRI, Bandirippuwa, Lunuwila.
3	72-10-27 (9.00 a.m.)	CDA, Y.M.B.A. Building, Colombo.
4	72-12-15 (9.30 a.m.)	CDA, Y.M.B.A. Building, Colombo.

After the establishment of the new Board, Dr. Colvin R. de Silva, Minister of Plantation Industries, paid his first visit to the Institute, on 2nd May 1972 in connection with the inauguration of a Refresher Course for Coconut Development Officers attached to the Coconut Cultivation Board. He also conferred with Union officials regarding trade union matters on the day of his visit.

Toddy Tapping Training Scheme

Foundation stones were laid by Dr. N. M. Perera, Minister of Finance and Mr. Albert Kariyawasam, Deputy Minister of Plantation Industries on 8th September 1972 at Bandirippuwa Estate, Lunuwila, for the construction of a new building in connection with a Training Scheme for Toddy Tappers. This ceremony was followed by a public meeting which was attended by a large gathering. The Chairman, and members of the Coconut Development Authority, members of the Coconut Research Board and some members of the National State Assembly were among those who were present.

Funds for this training programme are being provided by the Ministry of Finance, and the facilities for training are being made available by the Coconut Research Board.

J. SIVAPRAGASAM
Chairman
Coconut Research Board.

REPORT OF THE DIRECTOR

I. STAFF

The staff of the Coconut Research Institute as at 1st May 1972 was as follows:—

Administration Division

Director—Dr. W. R. N. Nathanael, M.Sc., Ph.D. (Lond.), F.R.I.C.
Deputy Director (Administration & Finance) & Secretary to the Board—Mr. K. D. J. Wilmot
Assistant Administrative Officer (Acting)—Mr. G. W. M. Wijetunge.

Soil Chemistry Division

Soil Chemist (Acting)—Mr. T. S. Balakrishnamurti, B.Sc. (Lond.), M.Sc. (Aberdeen)
Research Assistant—Mr. M. A. T. de Silva, B.Sc. (Lond.), M.Sc. (Lond.)

Botany Division

Botanist—Dr. M. A. P. Manthriratne, B.Sc. (Lond.), Ph.D. (Wales)
Research Assistant—Mr. H. I. M. V. Vithanage, B.Sc. (Ceylon)

Agrostology Division

Officer-in-Charge & Senior Technical Assistant—Mr. D. E. F. Ferdinandez, B.Sc. (Lond.)

Chemistry Division

Officer-in-Charge & Senior Technical Assistant—Mr. M. Jeganathan, B.Sc.(Lond.), M.Phil. (Lond.)

Crop Protection Division

Research Assistant in Charge —Mr. R. Mahindapala, B.Sc. (Ceylon)

Biometrics Unit

Biometrician—Mr. V. Abeywardene

Planting Division

Planting Officer—Mr. P. D. L. Fernando
Assistant Planting Officer—Vacant.

Publications Unit & Library

Publications Officer—Mr. A. K. Gunapala, B.A. (Cey.)

II. GENERAL

(1) Mr. S. C. Kahawita, B.Com. (Lond.), F. R. Econ.S., Chief Administrative Officer retired from the service of the Institute with effect from 1st January, 1972. He was succeeded by Mr. K. D. J. Wilmot who was subsequently appointed Deputy Director Administration and Finance with effect from 5th January 1972.

(2) Mr. T. T. A. J. C. Samarasinghe, LL.B. (Cey.), Assistant Administrative Officer resigned from the service of the Institute with effect from 1st January 1972 and Mr. Chandra S. E. Fernando LL.B. (Cey.) was appointed to succeed him with effect from 17th October, 1972.

(3) Mr. M. Jeganathan, B.Sc. (Lond.), M. Phil. (Lond.), was promoted Research Assistant with effect from 1st January, 1972.

(4) Mr. G. W. M. Wijetunge was promoted Accountant with effect from 26th July 1972.

(5) The following were recruited Research Assistants with effect from 1st November 1972.

Mr. A. S. Amarasinghe, B.Sc. (Agric.) (Ceylon)
Mr. P. Kanagaratnam, B.Sc. (Agric.) (Ceylon)
Mr. S. Mohanadas, B.Sc. Hons. (Ceylon)
Mr. B. H. Rohitha, B.Sc. (Ceylon)
Mr. M. P. L. D. Martin, B.Sc. (Agric.) (Ceylon).

(6) Mr. Ananda Senaratne was appointed Engineering Assistant with effect from 16th August, 1972.

(7) Mr. D. E. F. Ferdinandez, B.Sc. (Lond.), Officer-in-Charge, Agrostology Division, left for U.K., on 72.09.26 to follow a course of post-graduate studies in Crop Ecology at the University of Wales.

(8) With the exception of Messrs H. D. M. S. C. Samaranayake, and N. T. M. H. de Silva, Research Assistants, the staff attached to the Advisory Division of the Institute was drafted to function under the Coconut Cultivation Board in Colombo, in conformity with the provisions of the Coconut Development Act No. 46 of 1971.

Mr. Samaranayake was transferred to the Planting Division with effect from 15th May 1972 as Assistant Planting Officer (Advisory), and Mr. de Silva was attached to the Division of Agrostology with effect from 2nd May, 1972.

(9) Dr. M. A. P. Manthriratne, Botanist, was in addition to his duties appointed Acting Agrostologist with effect from 26th September 1972.

(10) Mr. A. K. Gunapala, Publications Officer resigned from the service of the Institute with effect from 1st July 1972 and Mr. M. J. C. Perera was appointed to act in that post.

(11) The post of Library Assistant was re-designated Librarian with effect from 28th August 1972.

III. VISITORS

The visitors to the Institute during the year included the following:—

Dr. M. J. A. Brouwers, FAO/U.N.D.P.
Dr. J. R. Desaunettes, FAO Soils Expert
Dr. Paul Wassermann, I.A.E.A., Vienna
Mr. T. T. Simiki, Department of Agriculture, Tonga
Dr. D. Gamerdinger, Embassy, Federal Republic of Germany, Colombo
Dr. R. J. Soper, I.A.E.A., Vienna
Dr. G. R. Reddy, ECAFE, Bangkok
Dr. J. A. Cornelius, ECAFE Oil Palm Mission
Dr. Colvin R. de Silva, Minister of Plantation & Industries
Dr. N. M. Perera, Minister of Finance
Dr. G. Kemmler, Agro-Scientist, Hannover, Germany
Mr. P. A. Wilde, British High Commission, Colombo
His Excellency, Christopher van Hollen, Ambassador of the U.S.A., Colombo
Dr. E. C. S. Little, FAO Consultant, Tonga.

IV. PUBLICATIONS

Articles entitled "Coconut Industry in 1971" and "Activities of the Coconut Research Institute in 1971" were contributed to the Annual Report of the Planters' Association of Ceylon.

Three issues of the Ceylon Coconut Quarterly (Vol. XXI Nos. 3/4 and Vol. XXII, Nos. 1/2 and 3/4) were published during the year.

Three issues of the Ceylon Coconut Planters' Review (Vol. VI Nos. 2, 3 & 4) were released during the year.

Volume IV No. 4, and Volume V Nos. 1 & 2 of the Sinhala Journal "Pol Pawath" were released during the year.

V. STAFF RESEARCH CONFERENCES

Following the series of staff research conferences started in 1966, three conferences were held during the year as follows:—

Conference	*Date*	*Leader of Discussion*	*Subject*
First	72-04-07	Mr. M. Jeganathan	"Some Aspects of the distribution of Nutrients in plants".
Second	72-08-16	Dr. M. A. P. Manthriratne	"Coconut Research and Extension in Ivory Coast—its aims and objectives, and a comparison of Methods practised in Sri Lanka".
Third	72-10-04	Mr. Y. Elikewala	"Pineapple cultivation and its possibilities as an intercrop under coconut".

VI. NOTES ON REPORTS OF DIVISIONS

The following notes draw attention to points of interest relating to the detailed reports of the research work of the Institute:—

Soil Chemistry Division

(A) Field Experiments

1. The ten long term field experiments were maintained at Bandirippuwa, Ratmalgara, Pothukulama, Bingiriya, Veyangoda, Dankotuwa & Ratgama.
2. *Effect of Magnesium on Seedlings.*—The experimental area was prepared and planted with (i) *tall* × *tall*, (ii) *tall* × *dwarf*, (iii) *dwarf* × *tall* hybrids, and (iv) open pollinated talls.
3. *Effect of Micro-nutrient deficiencies on seedlings and symptomology of micro nutrient deficiencies (Pot Culture Experiment).* Sand was prepared and the seedlings were planted in August 1972, in connection with this experiment. Field experimental results of interest are:
   (i) At Mawatte Estate, Dankotuwa, absence of sulphur has not produced any adverse effects on the quality of copra.
   (ii) Comparison of fertilizer placements (a) in entire area round the palm within a radius of 0.5 meter from base, and (b) 20 cm. × 200 cm. strips parallel to rows of palms at 0.5 meter from base, and (c) 20 cm. × 200 cm. strips parallel to rows of palms at mid-point between adjacent palms showed that the best uptake occurred from placement (a).
   (iii) The two spells of drought experienced during the year have affected the yield of nuts from experimental palms.

(B) Laboratory Investigations

1. Radioactive counts of the samples, from the isotope studies on efficient use of fertilizers by the coconut palms, were concluded.
2. Estimations of nitrogen, phosphorus, potassium, calcium and magnesium in leaf samples from the experiments at Marandawila and Monrovia estates were carried out.
3. Estimations of sulphur in leaf samples from the Boron-Zinc-Sulphur experiment at Monrovia estate were carried out.
4. Estimations of Boron in leaf samples from the Boron-Zinc-Sulphur experiment at Monrovia estate were carried out.
5. Estimation of exchangeable bases, exchangeable potassium, calcium and magnesium, on samples of soil from the experiment on the effect of magnesium on coconut seedlings were carried out. Magnesium extracted by calcium chloride was also determined.
6. Soil samples from model profiles examined during the soil survey of the coconut growing areas were analysed. Total nitrogen and carbon, total exchangeable bases, cation exchange capacity, exchangeable potassium, calcium and magnesium and available phosphorus (sodium bicarbonate extract) were estimated.

Soil Survey

1. Surveys of the Dandagamuwa 1 inch sheet and part of the regional survey of the Kurunegala District were continued.
2. Surveys of an experimental site at Bandirippuwa Estate and portions of the isolation barrier at the Isolated Seed Garden, Ambakelle were conducted.
3. Surveys to determine the suitability of lands for planting coconut were carried out in Agalawatte and Mahiyangana.

Division of Botany and Plant Breeding

1. Controlled Pollination Work:

Pollination projects at Bandirippuwa, Ratmalagara, Marandawila, Walpita, Ambakelle, Kiniyama, Andigedera and Achchitotam estates were maintained. In order to meet the increasing demand for *typica* × *pumila* hybrids, more of this type is being produced in comparison with *typica* × *typica* (prepotent). The number of female flowers pollinated is as follows:—

Typica × *pumila*	111,151
Typica × *typica* (prepotent)	29,018

Hybrid (*pumila* × *typica*) seed is also produced from a 5 acre block of *pumila* palms at the Coconut Seed Garden. 37,076 *typica* × *pumila*, 11,425 *typica* × *typica* seednuts have been harvested from pollinations done in 1971. Eighteen private estates are being assisted to implement their own programmes of controlled pollination and 326 samples of *typica* (prepotent) and 336 samples of *pumila* pollen has been issued to them.

2. Research Nurseries:

The undermentioned quantities of hand pollinated seednuts were planted at Bandirippuwa Estate and Ambakelle.

Typica × *typica*	*Typica* × *pumila*	*Pumila* × *typica*
19,542	50,764	9,698

Besides the above, 6,200 dwarf yellow (*emburnea*) and dwarf green (*pumila*) seednuts have been planted as material for the Ambakelle Seed Garden Expansion Project.

This year 27,461 hand pollinated seedlings have been issued consisting of 9,540 *typica* × *typica*, 8,450 *typica* × *pumila* and 9,471 *pumila* × *typica*.

Fifty one 5 acre Observation plots (each consisting of 2 acres *typica* × *pumila*, 2 acres *pumila* × *typica* and one acre *typica* × *typica*) were established in the Northern, North Central, Southern and Eastern Provinces as co-operative experiments.

A trial to evaluate two different nursery techniques was initiated in the Research Nurseries at Bandirippuwa and Ambakelle.

3. Mother Palm Seed Supply:

2,268,416 seednuts were suplied to the Planting Division nurseries. Selection work has been made more difficult due to a shortfall in total crop as well as size of nuts consequent on the effects of drought.

4. Field Experiment:

The field experiments and observation trials at Bandirippuwa (13), Ratmalgara (8), Pothukulama (9), and Walpita were maintained during the year.

Two additional field experiments have been laid down this year, namely (i) Study of F2 of *typica* × *pumila* (Bandirippuwa) and (ii) Study of F1 of *typica* × *nana* (using all three colour forms of *nana*) at Pothukulama.

5. Isolated Seed Garden, Ambakelle:

Besides maintaining the 135 acres planted area (Fields 1-9) 50 acres of jungle have been prepared for planting under the Ambakelle Expansion Project for the production of *pumila* × *typica* hybrids. 12 acres have been planted already, and the balance by the end of the year if weather permits. Re-affore station of the Western isolation barrier could not be completed due to unfavourable weather.

6. Issues of variety seednut:

3,314 seednuts consisting mainly of king coconut and dwarf king coconut have been issued during the year.

7. Laboratory Investigation:

(i) An investigation on pollen storage and viability has indicated that pollen stored in an atmosphere of nitrogen maintains viability for periods in excess of those stored at 50% relative humidity. This will be reported in detail elsewhere.

(ii) Investigations on parthenocarpy, particularly in the dwarf (*nana*) variety of coconut are being continued.

Dr. M. A. P. Manthriratne, Botanist, visited Ivory Coast on an FAO Fellowship during April/May 1972 to acquaint himself with methods of breeding and selection that are being practised in that country.

Chemistry Division

(1) Study on Diurnal and Seasonal fluctuations of nutrients in Foliar Tissue:

Ten samplings of foliar tissue at monthly intervals have been carried out during the year in connection with a study on the diurnal and seasonal fluctuations of nutrients in the leaves of *typica* palms that have reached the productive phase.

(2) Study on the Annual Exhaust of Soil Nutrients:

Commencing from the estate pick for June 1972, at bimonthly intervals a study is being made to estimate the annual removal of the macro-nutrients (N.P.K. Ca and Mg.) by the *adult typica* palm. Plant analyses in connection with this study covered the sampling of fallen fronds, fallen nuts, and the drupes in the first and second clusters.

(3) Size and Weight Characteristics of Hybrid Palm nuts:

Employing random samples of 150 nuts from *typica* × *pumila* hybrids (from each of the bimonthly picks for 1972), a study has been made to determine size variability and the weight characteristics of the drupe components.

(4) Toddy yields from (T × D) Hybrid Palms:

Twelve (*typica* × *pumilo*) hybrid palms have been tapped for toddy during the year and systematic records are being kept to assess their yield potentialities. The analytical characteristics of the sap are also being studied.

Agrostology Division

(1) Soil Nutrient Studies:

During the year experiments were set up to study the nutrient status of soils sampled at Kuliyapitiya and Bandirippuwa. The results of these experiments have yet to be analysed.

(2) Pasture Ecology:

(i) All long-term experiments studying pasture and coconut competition have been managed to schedule and the details and results are presented in the Divisional Annual Report for 1972.

(ii) Experiment (P84) set up at Freds Rhue Estate, Baddegama to study the effect of pasture (under cultivated and uncultivated soil conditions) on palms affected by 'leaf scorch', had to be discontinued as the required degree of co-operation was not extended by the owners of the estate.

(iii) Three experiments on *Brachiaria miliiformis* under coconut were laid down at Kuliyapitiya, Kobeigane and Baddegama representing areas of different rainfall. The dry matter yields and the crude protein contents of the pastures sampled from these experiments are being studied in the laboratory.

(iv) *Subsidiary Crops.*—Preliminary plot trials are in progress to determine the agronomic requirements and performance of Tur dhall, Sunflower, Green gram and Cowpea under mature stands of coconut at Bandirippuwa. The results will be reported elsewhere.

(v) *Microbiological Studies.*—During the year some strains of *Rhizobia* were isolated from the root nodules of the legumes *Calapagonium mucunoides* and *Centrosema pubescens*. Studies on the effectiveness of these organisms on the aforementioned legumes are being pursued.

(vi) *Animal Husbandry.*—The new rotational cross breeding programme of Sinhala with Jersey, Sindhi and Friesian initiated last year is in good progress. The F 1 progeny of (Sinhala × Jersey) has been crossed with Sindhi and so far 24 calves (F2) have been produced.

A total of 75,839 pints of milk were produced from the herds at Bandirippuwa and Ratmalagara Estates.

Crop Protection Division

1. Biological Control of *Promecotheca cumingi:*

The Biological Control Laboratory established at Havelock Terrace, Havelock Town, Colombo 5, was maintained throughout the year. Mr. Y. Elikewala, Research Officer, Central Agricultural Research Institute continued to function as Officer-in-Charge of the laboratory and Dr. H. E. Fernando, Entomologist, C.A.R.I., as Leader of the Scientific Team for *Promecotheca* control.

Surveys conducted from October-December 1971 before the liberation of parasites introduced from abroad indicated that apart from a pocket of disease affecting *Promecotheca* larvae in the Kalubowila area, a very low degree of natural parasitization was taking place by the egg parasite *Achrysocaris promecothecae* in certain areas. In the bulk of the 15,000 acres infested survival of *Promecotheca* however was 100%.

The larval and egg parasites *Dimmockia javanica* and *Achrysocaris promecothecae* respectively were introduced from Singapore while the larval and pupal parasite *Pediobius parvulus* was introduced from Fiji. These were bred and multiplied in the Biological Control Laboratory, and releases in the infested areas commenced in December 1971. Since then a total of 130,525 *Dimmockia*, 33,250 *Pediobius* and 1,250 *Achrysocaris* have been liberated in all areas.

Evaluation of the results adhieved have shown that *Dimmockia* establised rapidly and gave excellent control of the pest. *Pediobius* has consistently failed to establish in Sri Lanka although it had proved to be the most effective control for the pest in other parts of the world. *Achrysocaris* continued to give only a low degree of control. Our data prove that *Dimmockia* alone has generally been responsible for over 50% to 75% control of the pest in most areas here. Furthermore there was a rapid increase of naturally (viral, fungal or bacterial disease) occurring control factors following the introduction of *Dimmockia*. We therefore cannot exclude the possibility that probing of *Promecotheca* larval bodies by the swordlike ovipositors of egg-laying *Dimmockia* females caused wounds through which these diseases entered and killed the pest larvae. *Dimmockia* would then be responsible not only for a very high degree of direct control but also indirectly for a portion of the control by natural factors.

A few examples to illustrate the dominant part in control played by *Dimmockia* are mentioned below:—

(1) Negombo 100% total control of which 80.6% was by *Dimmockia*
(2) Panagoda 91.3% total control of which 59.8% was by *Dimmockia*
(3) Bangadeniya 100% total control of which 62.5% was by *Dimmockia*
(4) Kandana 88.2% total control of which 52.3% was by *Dimmockia*
(5) Weligama 100% total control of which 77.0% was by *Dimmockia*

The overall control of *Promecotheca* achieved to date is near complete so much so that it has become difficult to collect *Promecotheca* larvae to maintain even nucleus cultures of *Dimmockia* in the laboratory.

2. The Coconut Caterpillar:

The parasite breeding programme for the biological control of the coconut caterpillar—*Nephantis serinopa* Meyr., was continued at the Bandirippuwa and Mylambavelly Insectaries.

The breeding of *Nythobia*, *Perisierola* and *Brachymeria* has been stepped up whilst only nuclei cultures of the less effective parasites have been maintained. Very few new infestations of the pest were recorded during the year, and successful control was achieved by the release of parasites in almost all foci of infestation.

Data on the fluctuations of pest densities were collected from five estates in the Eastern Province, six estates in the North Western Province and one estate in the Western Province. An experiment to study the effect of caterpillar attack on coconut yields was started in the Puttalam district during the year.

3. The Red Weevil:

Following the long drought that prevailed during the first half of the year, the incidence of this pest has been somewhat on the increase, though no major out-breaks as such have been evident. Some young plantations in the Mahiyangana, Bibile, Moneragala and Udawalawe areas associated with Colonization schemes have been found to be attacked by this pest.

The trap for the red weevil has been used on some estates and subjected to further tests. The breeding of the predator *Platymeris levicollis* was resumed after a lapse of some months and field releases were carried out to study its predatory action under natural conditions.

4. The Coconut Scale:

Fresh reports of the coconut scale, *Aspidiotus destructor* were received during the latter part of the year, and in particular infestations were evident in the North Western and Southern provinces.

Research on the breeding of the predator—*Chilochorus nigritus* in the laboratory was continued, and the first stage of this programme concluded successfully.

5. Rhinoceros Beetle:

No fresh reports of *Oryctes rhinoceros* were received during the year, and research on this pest was temporarily suspended.

6. Other Coconut Pests:

There were no fresh out-breaks of the nettle grub—*Parasa lepida*, the bag worm—*Psyche albipes* or *Sophrops eurystoma.*

Xyleborus similis.—This insect was found to attack coconut plantations in the Northern Province and a certain amount of control was affected with systemic insecticides. Further research is being carried out.

7. Diseases:

Very few reports of Bud Rot and Stem Bleeding were received during the year. Research on *Ganoderma* has been initiated, as this has been found in association with coconut palms.

Steps have been taken to despatch samples of plant tissue from palms showing symptoms of 'Leaf Scorch' disorder to Berlin for electron microscopy to detect the presence of mycoplasma in the phloem elements.

Biometrics Unit

1. Statistical Work:

The routine statistical work of the Research Divisions was attended to.

Advice was given regarding designs for new experiments.

2. Agro-Meteorology:

The three Meteorological Stations at Bandirippuwa Estate, Ratmalagara Estate and Isolated Seed Garden were maintained satisfactorily.

3. Research:

(i) *Calibration Trial*—The Calibration Trial was maintained without interruption. Arrangements have been made to commence an Irrigation experiment on the Calibration Trial in 1973.

(ii) *High & Low Yielding Palms*—The study of the distinguishing characters of high and low yielding palms was continued.

(iii) *Optimum Fertilizer Dosage*—The study on the "Evaluation of Optimum Fertilizer Dosages for coconut in the context of a foreign exchange crisis" was continued.

(iv) *Crop-Forecasting Index:*

(i) A study was made of the relationship between an interim drought index and the production of coconuts in Ceylon. A report giving the crop forecasting function was submitted to the Coconut Development Authority.

(ii) *Drought Index*—Work was continued towards evolving a more efficient "drought index", because it is felt strongly that a drought index will reflect the reaction of the palm to lack of moisture much better than any precipitation index.
This work will receive attention on a more permanent footing in 1973, when new staff will be recruited for the purpose.

4. General:

(i) The Biometrician continued to act as Consultant Biometrician to the Rubber Research Institute of Ceylon.

(ii) The Biometrician gave a course of 20 lectures on "Applied Statistics" to the final year Science Students of the University of Sri Lanka, Vidyodaya Campus.

Planting Division

1. Seed-nuts:

The Planting Division maintained 14 nurseries during the year. A total 1,893,436 seed-nuts were laid in the nurseries for seedling issues during the May/June and October/November 1972 seasons as follows:—

Season	*Seed-nuts*
May/June 1972	301,950
October/November 1972	1,591,486
	1,893,436

2. Seedlings:

Payments were received and orders were issued for the undermentioned quantities of seedlings during the period 1st January to 30th November 1972:—

Season	*Seedlings*
October/November 1971	76,006
May/June 1972	204,883
October/November 1972	806,620
Total	1,087,509

The position regarding actual issues of seedlings from the fourteen nurseries during the period 1st January to 30th November 1972 was as follows:—

Season	*Seedlings*
October/November 1971	314,019
May/June 1972	168,289
October/November 1972	495,468
Total	977,776

Publications Unit and Library

1. Journals:

The following issues of the C.R.I. Journals were published during the year:—

Ceylon Coconut Quarterly

Vol. XXI, Nos. 3/4
Vol. XXII, Nos. 1/2 and 3/4

Ceylon Coconut Planters' Review

Vol. VI, Nos. 2, 3 & 4

Pol Pawath

Vol. IV, No. 4
Vol. V. Nos. 1 & 2.

2. Advisory Leaflets:

Wherever necessary, the CRI leaflets were revised and/or reprinted in order to up-date the nformation and to maintain the stock position.

Leaflets No. 49 and 50 were published in Sinhala during the year.

A Special leaflet on *Promecotheca cumingi* was issued, and this has now been revised to be published as Advisory Leaflet No. 52 in all three languages.

3. Library:

120 new books have been added to the library making a total of 3,100. Subscriptions have been paid for 7 new Journals making a total of 152. In addition to these 190 Journals are being received in exchange for CRI publications.

Four issues, at quarterly intervals, of the Library Bulletin, compiled (in memeo form) by the Librarian were produced during the year.

W. R. N. NATHANAEL
Director.

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REPORT OF THE DIVISION OF BOTANY AND PLANT BREEDING (1972)

A. BREEDING AND SELECTION

The emphasis has been on the production of increased quantities of *typica* × *pumila* F_1 seed as the demand for this exceeds that for *typica* × *typica* planting material.

Controlled pollination work was carried out at eight stations. Table 1 gives a summary of the distribution of the parent palms, type of cross and number of female flowers pollinated.

TABLE I—Controlled Pollination Work

Station	*No. of palms*	*Total number of female flowers pollinated*	
		Typica × *typica*	*Typica* × *pumila*
Bandirippuwa	68	8,009	—
Achchithotam	80	4,825	9,832
Marandawila	39	4,088	—
I.S.G. Ambakelle	50	8,466	—
Ratmalapara	52	7,921	—
Walpita	200	—	48,869
Kiniyama	250	—	52,986
Andigedera	250	—	40,920
	989	33,309	152,607

Substantial quantities of *pumila* × *typica* hybrid seed are also produced from the Isolated Seed Garden, Ambakelle since 1965. This year 33,553 hybrid seed nuts were produced from 421 dwarf (*pumila*) palms.

14,953 *typica* × *typica* and 43,464 *typica* × *pumila* seednuts were harvested from crosses done in 1971. Eighteen estates in the private sector received 326 samples of *typica* (prepotent) and 336 samples of dwarf (*pumila*) pollen, in addition to technical assistance for implementing their own programmes of controlled pollination.

B. RESEARCH NURSERIES

The following quantities of seednuts were planted in the Research Nurseries at Bandirippuwa and Ambakelle Seed Garden.

Typica × *typica*	— 21,241
Typica × *pumila*	— 31,916
Pumila × *typica*	— 9,698

Besides the above, 6,200 dwarf seednuts (forms *eburnea* and *pumila*) were planted to provide the planting material for the Ambakelle Seed Garden Expansion Project. During the year 28,356 hand pollinated seedlings have been issued consisting of the following:

Typica × *typica*	— 9,541
Typica × *pumila*	— 8,450
Pumila × *typica*	— 10,365

As a continuation of the nursery trial (Annual Report of the Botanist, Coconut Research Institute, 1971), a comparative study is being made of nursery techniques as hitherto practised in Ceylon and those currently in use in Ivory Coast. 4,250 seednuts from each of the following types, *typica* × *typica*, *typica* × *pumila*, and *pumila* × *typica* have been planted in the conventional system together with a like number of nuts according to the Ivory Coast method. The trial is being duplicated under two rainfall regimes as may be found at Bandirippuwa and Coconut Seed Garden, Ambakelle, and is being repeated to cover two seasons.

C. INTER-VARIETAL CROSSES—*typica* × *pumila* F_1 hybrids

The flowering and yield performance of the earliest experimental material grown at Ratmalagara Research Station have been reported in previous Annual Reports. The yields for a four-year period (1969-1972) are given in Table II.

TABLE II—Mean yield of *Typica* × *pumila* F_1 progeny

Year	*Nuts*	*Weight per husked nut* *lb.*	(*g*)
1969	135	1.5	680
1970	137	1.5	680
1971	160	1.5	680
1972	151	1.5	680

The above data relate to *typica* × *nana* (form *pumila*) F_1 hybrids. *Typica* × *nana* hybrids where all three colour forms of *nana* (*pumila*, *regia* and *eburnea*) have been used as seed/pollen parents, have been under observation since 1958 (Annual Report of the Botanist, Coconut Research Institute 1971). The copra and oil contents of the nuts from these hybrids have been investigated this year and a paper submitted for publication. The results may briefly be summarised thus:

TABLE III—Mean Values of nut components of *typica* × *nana* F_1 hybrids

Type of cross	*Weight of husked nut* (*g*)	*Weight of copra per nut* (*g*)	*Oil content* %	*Weight of husk* (*g*)	*Weight of shell* (*g*)
Typica × *nana* form *pumila*	787	213	68.57	489	174
Typica × *nana* form *eburnea*	673	213	68.00	384	153
Typica × *nana* form *regia*	504	216	69.41	465	168

The husked nuts of *typica* × *nana* (form *pumila*) progeny are heavier (mean weight 787 gm. (28 oz.), than those from progeny where the forms *eburnea* and *regia* have been used as pollen parents [mean weight 673 g. (24 oz.) and 504 gm. (18 oz.) respectively]. However, as the copra produced is the same [213 - 216 g. (7.5. oz), Table III], and the difference in weight of shell is only about 20 g. the observed difference in weight of husked nut is perhaps a reflection on the quantity of liquid endosperm in these nuts.

Likewise, an analysis of variance of husked-nut weight (table IV (a)) shows a significant difference between types ($p < 0.001$), although this item is not significant in terms of copra produced per nut, (Table IV (b)).

The oil content of copra was estimated on 39 samples from different crosses and the mean values are as follows:

1. *Typica* × *nana* form *pumila* — 68.57%
2. *Typica* × *nana* form *eburnea* — 68.00%
3. *Typica* × *nana* form *regia* — 69.41%

Although the sample size is too small for definite conclusions to be drawn, it would appear that *typica* × *nana* form *regia* hybrids have a slightly higher oil content when compared with the other two, although the difference is not statistically significant (Table IV (c)).

The *typica* × *pumila* F_1 hybrids planted at Bandirippuwa Estate (Annual Report of the Botanist Coconut Research Institute 1970) have given a mean yield of 90 nuts per palm in the 9th year (fifth year of bearing).

Field trials of *typica* × *pumila*, *pumila* × *typica* and *typica* × *typica* under different agroclimatic conditions.

Fifty one 5 acre observation plots (each consisting of 2 acres *typica* × *pumila* 2 acres *pumila* × *typica*, and one acre *typica* × *typica*) were established in the Northern, North Central, Southern and Eastern provinces. These are being run as co-operative experiments.

TABLE IV—Analysis of Variance

(a) Weight of Husked Nuts

Source	*D.F.*	*S.S.*	*M.S.*	*V.R.*
Bn. Types	2	53283085	26641542	11.89**
Bn. Crosses wn. types	6	13449613	2241602	—
Bn. Individuals wn. Crosses	33	290037584	8789018	

(b) Weight of Copra/nut

Source	*D.F.*	*S.S.*	*M.S.*	*V.R.*
Bn. Types	2	93	46.50	—
Bn. Crosses wn. types	6	8684	1447.33	2.89*
Bn. Individuals wn. Crosses	33	16525	500.76	

(c) Oil Content

Source	*D.F.*	*S.S.*	*M.S.*	*V.R.*
Bn. Types	2	10.70	5.355	1.42
Bn. Crosses wn. types	6	22.70	3.783	2.47*
Bn. Individuals wn. Crosses	32	49.02	1.532	

D. MOTHER PALM SEED SUPPLY SCHEME

The Planting Division nurseries were supplied with 2,280,263 selected seednuts during the year.

E. THE ISOLATED SEED GARDEN, AMBAKELLE

Table V gives the mean yield per palm in the different fields for the period 1970-1972.

TABLE V—Coconut Seed Garden, Ambakelle—Field Nos. 1-8

Field No.	Type of planting material	Date of planting	Mean yield of nuts/palm 1970	1971	1972
1	*Typica* × *typica*	Dec. 1955	34	125	94
2	*Typica* × *typica*	Nov. 1956	28	89	75
3	*Typica* × *typica*	Nov. 1956	35	91	79
4	*Typica* × *typica*	Nov. 1956			
		Nov. 1957	35	90	76
5	*Nana* (*pumila*)	Nov. 1959	63	175	80
6	*Typica* × *typica*	Nov. 1960	24	73	49
7	*Typica* × *typica*	Nov. 1961	17	44	34
8A	*Typica* × *typica*	June 1962			
B	*Typica* × *typica*	Nov. 1962	30	64	58
C	*Typica* × *typica*	May 1963			

The fluctuations in yield could be largely associated with the rainfall pattern of previous years. This plantation is in the intermediate rainfall zone, and the mean annual rainfall for the period 1968-1972 has been 55.8″ fluctuating between 45″-71″. Although the rainfall is erratic a mean yield of between 75-125 nuts per palm per year during 1971-1972 for fields 1-4, is indeed satisfactory. At the conventional planting density of 64 palms/acre this would mean 4,800-8,000 nuts per acre per year from a 15-17 year old progeny of *typica* × *typica* crosses where the parents were selected on yield of nuts and copra. A fuller analysis will be published later.

Under the Seed Garden Expansion Project 50 acres jungle on the Southern side were cleared. About 35 acres have been planted with dwarf green (*pumila*) dwarf yellow (*eburnea*) and *typica* × *typica* hand pollinated seedlings in the ratio of 25 dwarfs; 3 *typica* .pollinator palms.

Soil Surveys on the Eastern and Northern barriers are in progress to assess their suitability for coconut.

F. FIELD EXPERIMENTS

The field experiments and observation plots at Bandirippuwa (14) Ratmalagara (3) Walpita (1) and Pothukulama (9) were maintained during the year.

The following additional field trials were laid down : (a) A comparative study of the F_2 of *typica* × *nana* (form *pumila*) hybrids at Bandirippuwa and a comparative study of *typica* × *nana* F_1 hybrids and their reciprocals at Pothukulama where all three colour forms of *nana* viz. *pumila* (green), *eburnea* (yellow) and *regia* (red) are used as pollen/seed parents.

G. LABORATORY INVESTIGATIONS

(a) An investigation on pollen storage and viability has indicated that pollen stored in an atmosphere of nitrogen will maintain its viability for periods in excess of those stored at 50% relative humidity. The percentage setting of nuts using "nitrogen-packed" pollen is being studied in the field, and the complete investigation will be reported later.

(b) Investigations on the extent of parthenocarpy in the dwarf (*nana*) variety of coconut are being continued.

(c) An investigation on stomatal density in varieties and forms of the coconut (commenced in 1971) was concluded this year and a paper submitted for publication. It indicated that stomatal density is a varietal characteristic. Variations due to the environment were negligible. All three colour forms of the self-pollinating *nana* variety had more stomata per unit area of the leaf surface when compared with

the varieties *typica* and *aurantiaca*. Stomatal density may prove to be a useful marker for the identification of *typica* × *nana* hybrids in the field, for these have on an average 27 stomata (range 25-29) per unit area of leaf surface which is the mid parental value for this character.

H. PUBLICATIONS

The following papers have been submitted for publication:—

1. Manthriratna, M. A. P. P. "Some results of field experimentation of *typica* × *nana* F_1 hybrids (2) Copra and Oil Content" (*Ceylon Coconut Quarterly*).
2. Manthriratna, M. A. P. P. and Sambasivam, S. "Stomatal density in varieties and forms of the coconut", (*Cocos nucifera* L. *Ceylon Coconut Quarterly*.
3. Hayward, M. D. and Manthriratna, M. A. P. P. (1972). Pollen development and variation in the genus Lolium. 1. Pollen size and tapetal relationships in male fertiles and male steriles. *z*—Pflanzenzüchtg 67 : 131-144.

A radio talk "Improved planting material for rehabilitating Sri Lanka's Coconut Industry" was broadcast in the English Service of the SLBC, under the auspices of the Ceylon Association for the Advancement of Science.

Conferences and training:

Dr. M. A. P. P. Manthriratna, Botanist, visited Ivory Coast on an F.A.O. Fellowship during April/May to familiarize himself with methods of breeding and selection of coconut (*Cocos nucifera* L) and oil palm (*Elaeis guineensis* Jacq). practised in that country. A report was submitted to FAO and the Coconut Research Board of Sri Lanka.

Dr. M. A. P. P. Manthriratna, Botanist, addressed the Staff Research Conference on "Coconut Research and Extension in Ivory Coast—its aims and objectives and a comparison with methods practised in Sri Lanka.

M. A. P. P. MANTHRIRATNA,
Botanist.

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REPORT OF THE SOIL CHEMISTRY DIVISION (1972)

SUMMARY

The long term field experiments at Bandirippuwa, Ratmalagara, Bingiriya, Pothukulama, Dankotuwa, Veyangoda and Rathgama were maintained. A new field experiment on the effect of magnesium on the growth and flowering of coconut seedlings was commenced.

Significant responses were given by (i) Nitrogen at Pothukulama and Monrovia, (ii) Phosphorus at Bandirippuwa, Ratmalagara, Pothukulama and Monrovia, (iii) Potassium at Bandirippuwa, Ratmalagara and Pothukulama. Singnificant NP and PK interactions at Ratmalagara and NK interaction at Bandirippuwa were also evident.

A. FIELD EXPERIMENTS

1. 4 × 4 × 4 NPK Experiment on Adult Palms—Bandirippuwa Estate. (Commenced November 1960).

The annual manuring, due in November 1972, had to be postponed due to the non availability of fertilizer at the time. The manuring was done in March 1973. A severe drought was experienced at the beginning of the year, from January to April. Consequently a drop in yield has been noticed in the August and November picks.

The data for the year show highly significant responses to phosphorus and potassium, and a positive NK interaction at 0.1 level was also evident.

The main effects are presented in Table AI and the NK interaction in Table A2.

TABLE A 1—Yield Data for 1972-Kg Copra per Hectare .163 Palms per Hectare Copra Yields Adjusted by Covariance Analysis

Treatment Annual		*Kg. Copra Per Hectare*	%	*Difference Kg. Copra/Ha*
N_0	(0.0 Kg. N)	1576	100.0	—
N_1	(0.227 Kg. N)	1669	105.9	93
N_2	(0.454 Kg. N)	1697	107.7	121
N_3	(0.681 Kg. N)	1629	103.4	53
P_0	(0.0 Kg. P_2O_5)	1410	100.0	—
P_1	(0.227 Kg. P_2O_5)	1646	116.7	236*
P_2	(0.454 Kg. P_2O_5)	1677	118.9	267*
P_3	(0.681 Kg. P_2O_5)	1838	130.3	428**
K_0	(0.0 Kg. K_2O)	1224	100.0	—
K_1	(0.227 Kg. K_2O)	1628	133.0	404**
K_2	(0.454 Kg. K_2O)	1830	149.5	606***
K_3	(0.681 Kg. K_2O)	1888	154.2	664***

Significant difference P. 0.05 - 155.4 Kg./ha.

TABLE A 2—Adjusted NK Interactions—Kg./ha

	N_0	N_1	N_2	N_3
K^0 ..	1415	1213	1220	1046
K_1 ..	1585	1646	1648	1635
K_2 ..	1580	1915	1868	1954
K_3 ..	1723	1902	2051	1881

2. 3 × 3 × 3 NPK Experiment on Young Palms—Ratmalagara Estate (Commenced December 1948)

The annual manuring was done in December 1972. A severe drought was experienced from January to April, 1972.

Phosphorus and potassium gave significant responses, the former at 5% level and the latter at 1% level. Positive NP and PK interactions were also noted.

Table A3 gives the main effects for the year 1972 and Table A4 the NP and PK interactions.

TABLE A3—Yield Data for 1972-Kg. Copra Per Hectare. (136 Palms per Hectare)

	Treatment (Annual)	*Kg. Copra Per Hectare*	%	*Difference Kg. Copra/ha*
N_0	(0.681 Kg. Ammonium Sulphate) ..	2790	100.0	—
N_1	(1.362 Kg. „ „ ..	2755	98.7	-35
N_2	(2.043 Kg. „ „ ..	2694	96.6	-96
P_0	(0.454 Kg. Saphos Phosphate) ..	2584	100.0	—
P_1	(0.908 Kg. „ „ ..	2859	110·6	275
P_2	(1.362 Kg. „ „ ..	2796	108.2	212
K_0	(0.681 Kg. Muriate of Potash) ..	2613	100.0	—
K_1	(1.362 Kg. „ „ ..	2734	104.6	121
K_2	(2.043 Kg. „ „ ..	2892	110.7	279

Significant difference at P. O. 05 - 171.9 Kg. Copra/ha.

TABLE A4—NP Interaction (Kg. Copra/ha)

	N_0	N_1	N_2
P_0	2857	2505	2444
P_1	2840	2964	2834
P_2	2733	2855	2860

PK Interaction (Kg. Copra/ha)

	P_0	P_1	P_2
K_0	2524	2590	2781
K_1	2533	2911	2816
K_2	2748	3137	2852

3. 4 × 4 × 4 NPK Experiment on Young Palms-Pothukulama Research Station. (Commenced December 1960)

Owing to the fertilizer being not available on time the annual manuring, due in December 1972 was carried out in February 1973. The weather was dry during the application of the fertilizer. However, the soil was moist. The severe drought experienced in the early part of 1972 affected the yield of nuts. The harvest in November 1972 was about 50 per cent of the corresponding pick in 1971.

Significant responses have been given by nitrogen (5% level), phosphorus and potassium (1% level). The main effects are presented in Table A 5.

TABLE A 5—Yield Data for the Year 1972. Kg. Copra/ha. (178 Palms per Hectare)

Treatment	*Kg. Copra/ha*	%	*Difference Kg. Copra/ha*
N_0	2179	100.0	—
N_1	2443	112.1	264*
N_2	2382	109.5	203
N_3	2221	101.9	42
P_0	2097	100.0	—
P_1	2270	108·2	173
P_2	2337	111.4	240
P_3	2522	120.3	425**
K_0	2030	100.0	—
K_1	2280	112.3	250
K_2	2476	122.0	446**
K_3	2439	120.1	409

4. Experiment on Forms of Nitrogen, Phosphorus and Frequency of Manuring—Pothukulama Research Station, Pallama. (Commenced June 1967)

The annual application of fertilizer was done in July 1972 and the half-yearly application in January 73. Sodium nitrate, being unavailable, was replaced with ammonium sulphate.

5. Experiment on Quality of Nitrogen and Frequency of Manuring-Mawatte Estate, Dankotuwa. (Commenced December 1964).

The half yearly manuring was done in June 1972 and the annual manuring in December 1972. Sodium nitrate and Ammonium nitrate were not available and the corresponding plots were treated with Ammonium Sulphate.

TABLE A 6—Yield Data for 1972-Kg. Copra Per Hectare (163 Palms per Hectare) Copra Yield Adjusted By Covariance Analysis

Treatment	*Annual Manuring* (*Kg. Copra/ha*)	%	*Biannual Manuring* (*Kg. Copra/ha*)	%
Control	2258	100·0	2258	100·0
Ammonium Sulphate ..	2418	107·1	2343	103·8
Urea	2345	103.9	2305	102·1
Ammonium Nitrate ..	2262	100.2	2351	104·1

The absence of sulphur from the plots treated with Urea and Ammonium nitrate has not produced any adverse effects on the quality of copra.

6. 5×5×5×5 NPK Mg Experiment on Adult Palms-Monrovia Estate, Rathgama. (Commenced November 1967)

The annual application of fertilizer was done in December 1972. Highly significant response to nitrogen and potassium is indicated. The main effects are recorded in Table A 7.

TABLE A 7—Estimated Yield Data (From Production Function) for 1972, Kg. Copra per Hectare. (178 Palms per Hectare).

Treatment	*Kg. Copra per Hectare*	%	*Difference Kg. Copra/ha*
N_0	850	100.0	—
N_1	1654	194.6	804
N_2	2204	259.3	1354
N_3	2502	294·4	1652
N_4	2546	300.0	1696
P_0	1949	100.0	—
P_1	2121	108.8	172
P_2	2123	108.9	174
P_3	1953	100.2	4
P_4	1611	82.7	338
K_0	1449	100.0	—
K_1	1755	121.1	306
K_2	2007	138.5	558
K_3	2203	152.0	704
K_4	2343	161.7	894
Mg_0	1814	100.0	—
Mg_1	1891	104.2	77
Mg_2	1960	108.0	146
Mg_3	2020	111.4	206
Mg_4	2072	114.2	258

7. 5×5×5 NPK Experiment on Adult Palms-Naiwala Estate, Veyangoda.—(Commenced July 1967)

The annual manuring was carried out in July 1972.

8. 5×5×5×5 NPK Mg Experiment on Adult Palms-Marandawila Estate, Bingiriya.—(Commenced November 1967.)

The annual manuring was done in December 1972.

9. 5×5×5 BZ_1 S Experiment on Adult Palms-Monrovia Estate, Rathgama.—(Commenced June 1969)

The annual manuring was done in June 1972. Application of zinc fertilizer was omitted as it was not available.

10. Effect of Magnesium on Young Palms-Bandirippuwa Estate:

The object of the experiment is to determine, (i) the effect of magnesium on the growth and flowering of young coconut palms, and (ii) the susceptibility of 4 classes of tall palms (TD, DT, TT, and open-pollinated tall) to a deficiency of magnesium.

The design consists of a split plot lay out with 3 replicates where the 4 classes of tall palms form main plots and the 3 levels of magnesium form sub-plots. The sub-plots carry 12 effective palms each with double guard rows between them.

An 18 acre block of land on the eastern side of Bandirippuwa Estate, Lunuwila was chosen for this experiment. The land is on a major slope dipping towards the East.

All existing coconut palms were uprooted and cleared before laying out the experiment.

A phase-level soil survey of the experimental area revealed the presence of four fairly distinct phases in this area. The texture of the surface soil ranged from loamy sands in the summit regions to coarse sands in the valley regions.

The planting of 4 varieties of coconut seedlings commenced on 24th of October, 1972.

Contour drains were also opened out in November and December, 1972.

11. Experiment to Study The Effect of Micronutrient Deficiencies on the Uptake and Distribution of all nutrients. (Pot Experiment)

150 fruits selected from the first bunch drupes of the Botanist's 300 palm block at Bandirippuwa Estate, were collected on the 21st of April, 1972. These were seasoned and allowed to germinate for 3½ months. When sprouting was at the "Crow's beak" stage, the drupes were dehusked, and 30 seed nuts of uniform size and weight were chosen. These were planted on the 11th of August, 1972 in acid-washed silica sand in polythene-lined enamelled pots, and covered with polythene sheets tied over the mouth.

The following treatments are under investigation: All nutrients, -Fe, -Mn, -Cu, -Zn and -B. Each treatment is tested on 5 plants separately (replicates), which are arranged in a randomised order on long out-door stands carrying clear perspex roofing.

During an initial period of 4 weeks, the seedlings received only deionised water. Differential treatment commenced during the 5th week after planting. The following were the supply levels of essential nutrients: 170 ppm N, 41 ppm P, 156 ppm K, 160 ppm Ca, 36 ppm Mg, 48 ppm S, 5.6 ppm Fe, 0.55 ppm Mn, 0.06 ppm Cu, 0.06 ppm Zn, 0.54 ppm B and 0.05 ppm Mo. Initially nutrients were supplied twice weekly, but later the frequency was increased to alternate days.

Amputation of seednuts was done during the period 13-11-72 to 6-12-72. The kernels and cotyledons of amputated seednuts were sampled for chemical examination.

B. LABORATORY INVESTIGATIONS

1. Estimations of total nitrogen, total exchangeable bases, exchangeable potassium, calcium and magnesium, Olsen's bicarbanate soluble phosphorus were carried out on soil samples from nodal profiles from Vanathavillu, Attavillu, Koswatta, Ranna, Koggala, Walasmulla, Wellawaya, Kirimetiyana, Sirikandura, Labuduwa, Akkaraipattu, Koduwamaduwa, Passekudah, Kalkudah, Vakarai, Kondalmadu, Samanturai and Addalaichenai.

2. The content of nitrogen, phosphorus, potassium, calcium, and magnesium, were determined in leaf samples from the NPK Mg experiment at Marandawila Estate.

3. Preliminary studies were carried out to determine a suitable procedure for the estimation of sulphur in coconut leaves. In the procedure that was developed, sulphur was initially precipitated with Barium chloride solution from an acid digest, and the resulting sulphate was then dissolved with a standard solution of EDTA. The excess of EDTA was back-titrated with a standard solution of magnesium, and the amount of sulphur was calculated from the difference. Recovery studies showed that very satisfactory and reproducible results could be obtained if certain basic precautions are taken.

Using the above procedure 150 leaf samples taken from the following localities were analysed:— Walahapitiya Estate, Nattandiya, Monrovia Estate, Ratgama, Bandirippuwa Estate, Lunuwila, Kirimetiyana Estate, Lunuwila and Beligama Estate, Matale. The summary of the analytical data will be published on completion of the work.

C. SOIL SURVEY

(Report written by Mr. K. S. O. Perera, Technical Assistant, Soil Survey)

Detailed soil surveys at all levels were carried out, consisting of the following projects.—

1. Dandegamuwa 1" sheet.
2. New Isolated Seed Garden Project, Ambakelle.
3. Areas at Alutarama and Hembarawa, Mahiyangana.
4. Bandirippuwa Research Station.
5. Dammada Estate, Kiriwawla.

The Dandegamuwa 1" Sheet

Geology:

Rocks of the area belong to the Highland series and the predominant rocks consist of charnokites, biotite gneisses, granite gneisses and quartzites.

Physiography:

The landforms in the area are controlled by the degree of erosion of the underlying rocks. The Mantled Plain: Quartzite with its high ridges, steep slopes and moderately narrow valleys reflects the resistance of the quartzitic basement. The Mantled Plain: Charnokite, Biotite Gneiss and Granitic Gneiss consists of lower ridges, undulating slopes, and broad valleys. Sometimes the ridge summits bear prominent erosional escarpments and the slopes consist of rockknob plains.

Soil Classification

1. Kiriwana Complex:

The Kiriwana complex is developed on the Mantled Plain Quartzite, and consists of the following series.

Series I.—(Soils of the summits and upper slopes)

These are shallow, excessively drained reddish soils, with prominent blocky quartz in the profile. These are extremely dry soils and drought wilting of palms was prominent.

Series II.—(Soils on the intermediate slopes)

These are moderately deep, well drained gravelly clayloams. Drought wilting was prominent in this series.

Series III.—(Soils of the valleys):

These are deep, well drained, coarse sandy clay loams.

Kurunegala Complex:

The Kurunegala complex consists of a series association developed on rocks of the Highland Series described above, other than the quartzites.

Though the morphological and drainage characteristics of the Complex are somewhat similar, there are indications that soil depth is related to the nature of the parent rocks.

Soils of the Kurunegala Complex are thus shallow to moderately deep, gravelly to sandy clay loams, well to imperfectly drained.

Madampe Series

In the areas between Kuliyapitiya and Hettipola, soils similar to the Madampe series but with more gravel than in the typical series has been observed.

Alutarama and Hembarawa, Mahiyangana

A soil survey was carried out along the Mahavelli plain of Alutarama and Hembarawa.

Physiography

The landform consists of a rolling mantled plain of low ridges and moderately steep slopes striking in the north south direction and with the western region of the system sloping towards the Mahavelli-Ganga. Generally to the east of the mantled plain are present erosional remnants of higher ridges striking in the north-south direction.

Geology

The rocks of the area belong to the Highland series.

Soils

On the western region of the rolling mantled plain, shallow well drained soils are developed on the low ridges and deep well drained soils on the slopes. The soils of the inter ridge valleys, and along the flat valley adjacent to the Mahavelli Ganga are imperfectly to poorly drained.

Isolated Seed Garden, Ambakelle

The two soil categories identified in the area consist of the Madampe Complex and drainage associates and the Andigama Series and its soil depth phases.

The Madampe complex is developed on a gently rolling landscape, consisting of well drained sandy loams on the higher positions of relief and imperfectly to poorly drained loamy sands in the valleys.

Andigama Series

The soils of the Andigama Series are developed on the western slope of the southern jungle barrier and the presence of gullies in this area indicates a process of erosion giving rise to strongly eroded phases near the gullies, moderately eroded phases in the medium slopes and slightly eroded phases on the upper slopes, an example of progressive erosion as a function of slope.

Coconut Research Institute, Bandirippuwa Estate

The region consists of an older peneplained surface with parallel ridges striking in a north east direction, and steep to gentle elongated slopes. Upon this older land surface which had been derived from the weathering of crystalline rocks, sedimentation has taken place by a sea of regression, and the depth of sedimentation is related to the slope of the land. The higher ridges stand exposed as outcrops of the older peneplain.

Soil Classification

The three soil categories identified in the area consist of (i) the Boralu Series, (ii) Pallama Series and (iii) the Madampe Complex. The Boralu Series is developed on the ridge summits and upper slopes, while the Pallama Series is developed on the intermediate slopes. The Madampe Complex and its drainage associates are developed on the elongated slopes, and valleys.

The survey is proceeding.

D. MISCELLANEOUS

Miscellaneous surveys, for advisory purposes, were also conducted.

E. PERSONNEL

The following appointments were made during the year:

Mr. A. S. Amarasinghe, Research Assistant, Soil Survey, 1st November 1972.
Miss G. M. Anthonypillai, Technical Assistant, 1st July 1972.
Mr. A. Wilson, Field Assistant, 1st September 1972.
Mr. P. J. E. Fernando, Field Assistant, 1st September 1972.

T. S. BALAKRISHNAMURTI
Acting Soil Chemist

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REPORT OF THE AGROSTOLOGY DIVISION (1972)

The work of the Agrostology Division embodies the following fields. (1) Soil Nutrient studies (Glass House Studies) (2) Pasture Management (3) Intercropping and (4) Animal Husbandry.

1. SOIL NUTRIENT STUDIES

On the above studies four experiments were completed during the year.

C. 390 (Bandirippuwa)

This is an experiment set up to study the nutrient status of soils that were cropped to different pasture species during the past few years.

The soils were sampled from plots of a pasture/coconut experiment (P_{18}) carried out at Bandirippuwa Estate.

It is a factorial pot experiment of two levels each of N.P, K Ca, and Mg on each of the soils that were cropped to different pasture species with two replications of each of the treatments and the experiment planted to *Paspalum commersonii*. The data of the first, second and the third harvests are presented in tables I, II and III respectively.

C 391 Kuliyapitiya Soil:

This is a 2^5 factorial pot experiment of Fe, Cu, Zn, Mn and Mo with two replications of each of the treatments and the pots were planted to *Paspalum commersonii*. The data for the first, second and third harvests are presented in tables IV, V and VI respectively.

TABLE IV—First Harvest

TREATMENTS			Mn_0 Mo_0	Mn_0 Mo_7	Total Mn_0	Mn_7 Mo_0	Mn_7 Mo_7	Total Mn_7	Total Mo_0	Total Mo_7	Total
Zn_0	Cu_0	Fe_0	8.68	9.47	18.15	8.12	10.74	18.86	16.70	20.21	36.91
		Fe_7	12.73	10.49	22.92	11.86	9.23	21.09	24.29	19.72	44.01
	Cu_7	Fe_0	11.63	9.33	20.96	12.27	9.57	21.84	23.90	18.90	42.80
		Fe_7	12.27	12.05	24.32	11.22	9.47	20.69	23.49	21.52	45.01
Zn_7	Cu_0	Fe_0	8.07	8.71	16.78	11.19	8.71	19.90	19.26	17.42	36.68
		Fe_7	11.35	11.40	22.75	11.17	10.23	21.40	22.52	21.63	44.15
	Cu_7	Fe_0	10.74	10.37	21.11	8.77	11.93	20.70	19.51	22.30	41.81
		Fe_7	9.55	11.75	21.30	8.98	11.18	20.16	18.53	22.93	41.46
G. Total											

TABLE V—Second Harvest

TREATMENTS			Mn_0 Mo_0	Mn_0 Mo_7	Total Mn_0	Mn_7 Mo_0	Mn_7 Mo_7	Total Mn_7	Total Mo_0	Total Mo_7	Total
Zn_0	Cu_0	Fe_0	9.51	12.78	22.29	11.66	10.82	22.48	21.17	23.60	44.77
		Fe_7	7.45	8.08	15.53	9.87	7.96	17.83	17.32	16.04	33.36
	Cu_7	Fe_0	10.22	6.61	16.83	10.06	5.38	15.44	20.28	11.99	32.27
		Fe_7	9.76	7.95	17.71	10.53	9.35	19.88	20.29	17.30	37.59
Zn_7	Cu_0	Fe_0	6.51	8.22	14.73	11.77	8.63	20.40	18.28	16.85	35.13
		Fe_7	7.60	7.71	15.31	9.09	6.84	15.93	16.69	14.55	31.24
	Cu_7	Fe_0	6.91	7.18	14.09	9.19	11.37	20.56	16.10	18.55	34.65
		Fe_7	8.44	8.03	16.47	9.76	7.66	17.42	18.20	15.69	33.89

TABLE VI—Third Harvest

TREATMENTS			Mn_0 Mo_0	Mn_0 Mo_7	Total Mn_0	Mn_7 Mo_0	Mn_7 Mo_7	Total Mn_7	Total Mo_0	Total Mo_7	Total
Zn_0	Cu_0	Fe_0	2.84	2.75	5.59	2.60	2.66	5.26	5.44	5.41	10.85
		Fe_7	3.02	2.72	5.74	2.70	2.83	5.53	5.72	5.55	11.27
	Cu_7	Fe_0	2.05	2.08	4.13	2.50	2.86	5.36	4.55	4.94	9.49
		Fe_7	3.29	2.38	5.67	3.57	2.66	6.23	6.86	5.04	11.90
Zn_7	Cu_0	Fe_0	3.03	2.50	5.53	4.00	4.02	8.02	7.03	6.52	13.55
		Fe_7	3.44	3.39	6.83	3.02	3.05	6.07	6.46	6.44	12.90
	Cu_7	Fe_0	3.18	3.57	6.75	2.58	3.93	6.51	5.76	7.50	13.26
		Fe_7	2.96	3.27	6.23	3.99	2.66	6.65	6.95	5.93	12.88
G. Total											

C 392 (Kuliyapitiya Soil)

This is a 2^5 factorial pot experiment of Fe, Cu, Zn, Mn and Mo planted to *Phaseolus lathytroides*. The total yield of the first two harvests are presented in Table VII.

TABLE VII—Total of the First and Second Harvests

TREATMENTS			Mn_0		Total	Mn_7		Total	Total	Total
			Mo_0	Mo_7	Mn_0	Mo_0	Mo_7	Mn_7	Mo_0	Mo_7
Zn_0	Cu_0	Fe_0	5.89	6.57	12.46	5.75	6.12	11.87	11.64	12.69
		Fe_7	5.78	7.06	12.84	5.71	5.47	11.18	11.49	12.53
	Cu_7	Fe_0	5.57	5.96	11.53	5.32	6.43	11.75	10.89	12.39
		Fe_7	5.36	7.34	12.70	5.55	6.29	11.84	10.91	13.63
Zn_7	Cu_0	Fe_0	4.98	6.90	11.88	5.42	6.51	11.93	10.40	13.41
		Fe_7	4.82	6.79	11.61	5.44	6.82	12.26	10.26	13.61
	Cu_7	Fe_0	5.92	6.65	12.57	5.57	6.90	12.47	11.49	13.55
		Fe_7	6.50	6.51	13.01	4.80	5.60	10.40	11.30	12.11
G. Total			44.82	53.78	98.10	43.56	50.14	93.70	88.38	103.92

C 393

This experiment is similar to experiment C 392 the indicator plant used being *Sesamum indicum* The yield data of the first harvest is presented in Table VIII.

TABLE VIII

TREATMENTS			Mn_0		Total	Mn_7		Total	Total	Total
			Mo_0	Mo_7	Mn_0	Mo_0	Mo_7	Mn_7	Mo_0	Mo_7
Zn_0	Cu_0	Fe_0	5.20	5.84	11.04	4.79	4.50	9.29	9.99	10.34
		Fe_7	4.32	5.27	9.59	5.73	5.73	11.46	10.05	11.00
	Cu_7	Fe_0	5.43	5.63	11.06	3.77	6.90	10.67	9.20	12.53
		Fe_7	4.28	5.98	10.26	4.89	5.77	10.66	9.17	11.75
Zn_7	Cu_0	Fe_0	4.03	5.27	9.30	4.22	5.75	9.97	8.25	11.02
		Fe_7	5.36	5.98	11.34	5.39	5.42	11.81	10.75	11.40
	Cu_7	Fe_0	6.29	5.27	11.56	4.84	7.00	11.84	11.13	12.27
		Fe_7	3.15	4.10	7.25	3.86	4.23	8.09	7.01	8.33
G. Total			38.06	43.34	81.40	37.49	45.30	82.79	75.55	88.64

TABLE I—First Harvest

TREATMENTS		Ca_0 Mg_0	$Mg_{1\frac{1}{2}}$	Total Ca_0	Ca_{10} Mg_0	$Mg_{1\frac{1}{2}}$	Total Ca_{10}	Total Mg_0	Total $Mg_{1\frac{1}{2}}$	Total
K_0 P_0	N_0	1.54	0.78	2.32	0.53	0.85	1.38	2.07	1.63	3.70
	N_5	0.16	0.81	0.97	1.84	1.75	3.59	2.00	2.56	4.56
K_0 P_8	N_0	1.86	1.05	2.91	0.99	0.70	1.69	2.85	1.75	4.60
	N_5	1.30	5.24	6.54	3.58	4.85	8.43	4.88	10.09	14.97
K_8 P_0	N_0	0.78	0.62	1.40	0.88	0.88	1.76	1.66	1.50	3.16
	N_5	0.37	3.82	4.19	5.16	4.81	9.97	5.53	8.63	14.16
K_8 P_8	N_0	1.17	1.49	2.66	1.19	1.34	2.53	2.36	2.83	5.19
	N_5	0.66	0.33	0.99	9.16	6.84	16.00	9.82	7.17	16.99
	E.C.	7.84	14.14	21.98	23.33	22.02	45.35	31.17	36.16	67.33
K_0 P_0	N_0	1.75	2.41	4.16	2.57	2.68	5.25	4.32	5.09	9.41
	N_5	1.67	2.43	4.10	4.79	5.40	10.19	6.46	7.83	14.29
K_0 P_8	N_0	2.27	2.02	4.29	2.03	1.89	3.92	4.30	3.91	8.21
	N_5	5.70	5.81	11.51	5.77	6.66	12.43	11.47	12.47	23.94
K_8 P_0	N_0	1.21	1.79	3.00	2.49	2.58	5.07	3.70	4.37	8.07
	N_5	2.83	0.88	3.71	5.81	4.23	10.04	8.64	5.11	13.75
K_8 P_8	N_0	1.47	2.84	4.31	2.08	1.73	3.81	3.55	4.57	8.12
	N_5	6.86	6.13	12.99	7.39	6.37	13.76	14.25	12.50	26.75
	B.M.	23.76	24.31	48.07	32.93	31.54	64.47	56.69	55.85	112.54
K_0 P_0	N_0	0.78	0.70	1.48	3.01	3.72	6.73	3.79	4.42	8.21
	N_5	0.54	0.83	1.37	4.01	4.21	8.22	4.55	5.04	9.59
K_0 P_8	N_0	3.70	2.42	6.12	3.46	3.55	7.01	7.16	5.97	13.13
	N_5	4.65	5.40	10.05	9.47	9.96	19.43	14.12	15.36	29.48
K_8 P_0	N_0	1.87	2.16	4.03	3.77	3.80	7.57	5.64	5.96	11.60
	N_5	1.37	0.93	2.30	4.87	4.98	9.85	6.24	5.91	12.15
K_8 P_8	N_0	2.54	1.88	4.42	2.89	3.23	6.12	5.43	5.11	10.54
	N_5	6.62	3.63	10.25	9.56	7.49	17.05	16.18	11.12	27.30
	B.B.	22.07	17.95	40.02	41.04	40.94	81.98	63.11	58.89	122.00
K_0 P_0	N_0	1.63	1.55	3.18	2.98	2.09	5.07	4.61	3.64	8.25
	N_5	0.80	0.99	1.79	5.28	4.97	10.25	6.08	5.96	12.04
K_0 P_8	N_0	2.87	1.99	4.86	2.01	1.55	3.56	4.88	3.54	8.42
	N_5	5.29	6.58	11.87	8.34	8.92	17.26	13.63	15.50	29.13
K_8 P_0	N_0	1.21	1.92	3.13	2.83	3.59	6.42	4.04	5.51	9.55
	N_5	2.82	1.71	4.53	7.00	7.05	14.05	9.82	8.76	18.58
K_8 P_8	N_0	1.95	1.82	3.77	2.92	3.14	6.06	4.87	4.96	9.83
	N_5	4.12	4.64	8.76	9.86	9.98	19.84	13.98	14.62	28.60
	P.M.	20.69	21.20	41.89	41.22	41.29	82.51	61.91	62.49	124.40

E.C. — Estate Control.
B.M. — *Brachiaria miliiformis*
B.B. — *Brachiaria brizantha.*
P.M. — *Panicum maximum.*

TABLE II—Second Harvest

TREATMENTS			Ca_0 Mg_0	Ca_0 $Mg_{1\frac{1}{2}}$	Total Ca_0	Ca_{10} Mg_0	Ca_{10} $Mg_{1\frac{1}{2}}$	Total Ca_{10}	Total Mg_0	Total $Mg_{1\frac{1}{2}}$	Total
K_0	P_0	N_0	0.41	0.41	0.82	0.63	0.78	1.41	1.04	1.19	2.23
		N_5	0.22	2.08	2.30	1.60	2.12	3.72	1.82	4.20	6.08
	P_3	N_0	0.53	0.49	1.02	0.86	0.68	1.54	1.39	1.17	2.56
		N_5	3.41	2.52	5.93	1.18	1.96	3.14	4.59	4.48	9.07
K_3	P_0	N_0	1.12	1.24	2.36	1.14	1.80	2.94	2.26	3.04	5.30
		N_5	2.23	2.74	4.97	2.27	2.64	4.91	4.50	5.38	9.88
	P_3	N_0	0.69	1.64	2.33	1.05	0.93	1.98	1.74	2.57	4.31
		N_5	2.48	0.39	2.87	1.71	1.87	3.58	4.19	2.26	6.45
	E.C.		11.09	11.51	22.60	10.44	12.78	23.22	21.53	24.29	45.82
K_0	P_0	N_0	1.86	3.00	4.86	1.70	2.14	3.84	3.56	5.14	8.70
		N_5	3.34	1.91	5.25	2.96	3.18	6.14	6.30	5.09	11.39
	P_3	N_0	1.33	1.07	2.40	1.69	1.29	2.98	3.02	2.36	5.38
		N_5	4.85	3.60	8.45	2.70	2.69	5.39	7.55	6.29	13.84
K_3	P_0	N_0	2.14	2.79	4.93	2.39	2.56	4.95	4.53	5.35	9.88
		N_5	3.60	3.23	6.83	3.99	3.05	7.04	7.59	6.28	13.87
	P_3	N_0	1.70	2.19	3.89	2.12	2.21	4.33	3.82	4.40	8.22
		N_5	3.51	4.78	8.29	3.37	2.80	6.17	6.88	7.58	14.46
	B.M.		22.33	22.57	44.90	22.92	19.92	42.84	45.25	42.49	87.74
K_0	P_0	N_0	3.24	3.70	6.94	3.01	3.17	6.18	6.25	6.87	13.12
		N_5	3.65	3.39	7.04	4.23	3.91	8.14	7.88	7.30	15.18
	P_3	N_0	2.44	3.45	5.89	2.59	1.76	4.35	5.03	5.21	10.24
		N_5	6.08	6.64	12.72	4.87	4.24	9.11	10.95	10.88	21.83
K_3	P_0	N_0	4.77	4.87	9.64	3.64	3.61	7.25	8.41	8.48	16.89
		N_5	4.46	5.27	9.73	5.85	4.82	10.67	10.31	10.09	20.40
	P_3	N_0	3.59	2.78	6.37	3.49	3.71	7.20	7.08	6.59	13.67
		N_5	6.80	7.41	14.21	4.09	4.84	8.93	10.89	12.25	23.14
	B.B.		35.03	37.51	72.54	31.77	30.06	61.83	66.80	67.57	134.37
K_0	P_0	N_0	2.73	2.79	5.52	1.91	2.06	3.97	4.64	4.85	9.49
		N_5	4.05	3.51	7.56	3.39	3.70	7.09	7.44	7.21	14.65
	P_3	N_0	3.09	1.88	4.97	2.06	1.54	3.60	5.15	3.42	8.57
		N_5	2.24	2.99	5.23	3.66	2.58	6.24	5.90	5.57	11.47
K_3	P_0	N_0	3.76	3.42	7.18	1.85	2.34	4.19	5.61	5.76	11.37
		N_5	4.20	2.43	6.63	3.81	4.29	8.10	8.01	6.72	14.73
	P_3	N_0	2.20	1.74	3.94	3.02	2.74	5.76	5.22	4.48	9.70
		N_5	5.95	4.12	10.07	4.30	3.72	8.02	10.25	7.84	18.09
	P.M.		28.22	22.28	51.10	24.00	22.97	46.97	52.22	45.85	98.07

E.C. — Estate Control.
B.M. — *Brachiaria miliiformis.*
B.B. — *Brachiaria brizantha.*
P.M. — *Panicum maximum.*

TABLE III—Third Harvest

TREATMENTS			Ca_0 Mg_0	$Mg_{1\frac{1}{2}}$	Total Ca_0	Ca_{10} Mg_0	$Mg_{1\frac{1}{2}}$	Total Ca_{10}	Total Mg_0	Total $Mg_{1\frac{1}{2}}$	Total
K_0	P_0	N_0	0.58	0.65	1.23	0.76	1.08	1.84	1.34	1.73	3.07
		N_5	1.61	3.33	4.94	3.38	3.55	6.93	4.99	6.88	11.87
	P_8	N_0	0.55	0·59	1.14	0.66	0.88	1.54	1,21	1.47	2.68
		N_5	3.61	2.59	6.20	2.69	3.41	6.10	6.30	6.00	12.30
K_8	P_0	N_0	0.65	0.45	1.10	1.32	1.29	2.61	1.97	1.74	3.70
		N_5	2.07	2.68	4.75	2.00	4.82	6.82	4.07	7.50	11.57
	P_8	N_0	0.46	1.10	1.56	1.72	1.15	2.87	2.18	2.25	4.43
		N_5	4.22	0.73	4.95	7.13	7.15	14.28	11.35	7.88	19.23
E C			13.75	12.12	25.87	19.66	23.33	42.99	33.41	35.45	68.86
K^0	P_0	N_0	1.76	1.32	3.08	1.59	2.07	3.66	3.35	3.39	6.74
		N_5	2.36	1.86	4.22	3.44	2.51	5.95	5.80	4.37	10.17
	P_8	N_0	0.89	1.30	2.19	1.64	1.20	2.84	2.53	2.50	5.03
		N_5	5.69	4.23	9.92	4.82	6.06	10.88	10.51	10.29	20.80
K_8	P_0	N_0	1.54	1.30	2.84	2.06	1.57	3.63	3.60	2.87	6.47
		N_5	2.49	5.24	7.73	3.66	3.76	7.42	6.15	9.00	15.15
	P_8	N_0	1.96	1.18	3.14	1.55	2.30	3.85	3.51	3.48	6.99
		N_5	4.86	4.25	9.11	6.18	8.29	14.47	11.04	12.54	23.58
B.M.			21.55	20.68	42.23	24.94	27.76	52.70	46.49	49.44	94.93
K_0	P^0	N_0	2.78	3.30	6.08	2.72	2.51	5.23	5.50	5.81	11.31
		N_5	5.53	4.73	10.26	3.85	3.78	7.63	9.38	8.51	17.89
	P_8	N_0	1.79	1.20	2.99	11.30	1.16	2.46	3.09	2.36	5.45
		N_5	6.67	6.05	12.72	4.86	4.68	9.54	11.53	10.73	22.26
K_8	P_0	N_0	2.95	2.39	5.34	2.60	2.55	5.15	5.55	4.94	10.49
		N_5	4.24	6.88	11.12	5.11	4.14	9.25	9.35	11.02	20.37
	P_8	N_0	2.17	2.45	4.62	2.66	3.12	5.78	4.83	5.57	10.40
		N_5	8.62	11.55	20.17	11.16	10.06	21.22	19.78	21.61	41.39
B.B.			34.75	38.55	73.30	34.26	32.00	66.26	69.01	70.55	139.56
K_0	P_0	N_0	1.36	1.53	2.89	2.12	1·80	3.92	3.48	3.33	6.81
		N_5	3.95	4.13	8.08	2.43	3.18	5.61	6·38	7.31	13.69
	P_8	N_0	1.31	1.19	2.50	2.23	1.78	4.01	3.54	2.97	6.51
		N_5	2.44	3.22	5.66	5·90	4.81	10·71	8.34	8.03	16.37
K_8	P_0	N_0	1.72	1.22	2.94	2.04	2.37	4.41	3.76	3.59	7.35
		N_5	2.67	3.57	6.24	2.60	2.26	4.86	5.27	5.83	11.10
	P_8	N_0	1.11	1.22	2.33	3.28	1.95	5.23	4.39	3.17	7.56
		N_5	8.55	7.24	15.79	10.06	9.30	19.36	18.61	16.54	35.15
P.M.			23.11	23.32	46.43	30.66	27.45	58.11	53.77	50.77	104.54

E.C. *Estate Control*
B.M. *Brachiaria miliiformis*
B.B. *Brachiaria brizantha*
P.M. *Panicum maximum*

(2) PASTURE MANAGEMENT STUDIES

Experiment P 38 B/E

Placement × levels of fertilizer on a coconut/pasture association

This is a 2×3 factorial experiment of two levels of fertilizer (normal and double) applied in three different ways (a) total fertilizer broadcast (b) half placed and half broadcast and (c) total placed on a Coconut/Pasture association. The herbage and nut yields are presented in Table IX.

TABLE IX

Yield of B.miliiformis and Coconut with Different Levels and Placement of Fertilizer (Mean of Four Replicates)

Treatments		*Herbage Yield (Gm./m.²)*	*Nut Yield (nuts/hectare)*
Normal dose of fertilizer	Total placed	112.7	10,495
	½ placed ½ Broadcast	149.7	13,207
	Total Broadcast	175.4	10,456
Double the fertilizer dose	Total placed	136.3	11,230
	½ placed ½ Broadcast	119.1	12,002
	Total Broadcast	206.9	11,919

At both levels of fertilizer application high yields of pasture were obtained when the fertilizer was totally broadcast. This experiment has completed its seventh year at the end of the year 1972.

Experiment P_5 R/E

Levels of manuring and grazing on a Brachiaria miliiformis/Cocos nucifera Association

This experiment was managed to schedule during the year. The data relating to yield of nuts and herbage are presented in Table X.

TABLE X

Yield of B.miliiformis and Cocos nucifera at different levels of grazing and manuring

Treatments		*Herbage Yield (Gm./m.²)*	*Nut Yield (nuts/hectare)*
ESTATE CONTROL WEEDS	FNGO	164.7	14,355
BRACHIARIA MILIIFORMIS	FNGO	313.7	9,340
,, ,,	FNGN	307.2	12,012
,, ,,	FNGH	261.8	10,022
,, ,,	FHGN	288.1	13,502
,, ,,	FHGH	244.0	14,905

F = Fertilizer N = Normal G = Grazing
O = Nil H = Heavy

Here the normal fertilizer is a mixture of 2 cwts./acre of Ammonium Sulphate and 1 cwt./acre each of Saphos Phosphate and muriate of potash per year applied broadcast to both crops, while the heavy fertilizer application is double this quantity.

It appears that the sharp drop in yield of coconuts due to the establishment of pasture has been corrected by the combined effect of heavy fertilizer application and heavy grazing.

Experiment P 21 R/E

Levels of Fertilizer on a Coconut/Pasture Association

This experiment is in its second year after the *Brachiaria brizantha* was replaced by *Brachiaria miliiformis.*

It is a 2^3 factorial of levels of N, P and K to study the competition between *Cocos nucifera* and *Brachiaria miliiformis.* The pasture yield and nut yield data are presented in Table XI.

TABLE XI

Yield of Herbage and Nuts due to Levels of N, P and K Applied Broadcast to a Coconut/ B.miliiformis Association

Treatments			*Herbage Yield (Gm./m².)*	*Nut Yield (nuts/hectare)*
N_2	P_1	K_1	307.2	12,012
N_2	P_1	K_2	306.7	13,350
N_4	P_1	K_1	286.0	10,925
N_4	P_1	K_2	362.8	11,498
N_2	P_2	K_1	268·0	12,546
N_2	P_2	K_2	328.1	13,324
N_4	P_2	K_1	295.7	12,026
N_4	P_2	K_2	288.1	13,502

Experiment P 22 R/E

Levels of Fertilizer × Pasture Management on the yield of Coconut and Pasture

This experiment was managed to schedule during the year. There appears to be no significant difference in the yield of coconut due to pasture management, while grazing appears to be superior to mowing on yield of pasture. At heavy fertilizer application there is an increase in the yield of pasture and coconuts.

TABLE XII

Herbage Yield (Gm/m²) and No. of nuts/hectare at Different levels of Fertilizer and Pasture Management

Treatments		*Herbage Yield (Gm/m²)*	*Nut Yield (Nuts/hectare)*
Pasture Mowed	½ Fertilizer	169.1	13,705
	1 „	244.3	14,338
	2 „	242.9	14,500
	4 „	300.5	15,716
Pasture Grazed	½ „	302.1	12,120
	1 „	241.4	14,117
	2 „	299.8	14,288
	4 „	385.4	15,093

Experiment P_{70} R/E

The effect of frequency of defoliction and levels of nitrogen applied in two forms as Sulphate of Ammonia and Urea on the herbage dry matter yield and the crude protein content of Brachiaria miliiformis.

This is a (3 × 3 × 2) factorial experiment of three frequencies of cutting (2 4 and 6 weeks) with three levels of nitrogen 0, 1 and 2 cwts./acre) applied in two forms $(NH_4)_2 So_4$ and Co $(NH_2)_2$ each treatment being replicated thrice. Two cycles were completed during the year and the total of the cycles for each treatment tabulated and presented in table XIII.

The samples of a cycle of last year from this experiment were analysed this year for crude protein content and the values are presented in figure 1.

TABLE XIII

Herbage dry matter yield at Different Frequencies of Cutting, levels of Nitrogen and forms of Nitrogen (Total of two Cycles) in Gm/m^2

Treatments		*Two weeks (Gm/m^2)*	*Four weeks (Gm/m^2)*	*Six weeks (Gm/m^2)*	*Total*
	N_0	1,197	821	1,001	3,019
Ammonium Sulphate	N_1	1,263	1,017	1,266	3,546
	N_2	1,268	1,168	1,287	3,723
$(NH_4)_2 So_4$ Total	.. ..	3,728	3,006	3,554	10,288
	N_0	826	659	764	2,251
Urea	N_1	856	740	946	2,542
	N_2	845	947	931	2,723
CO $(NH)2_2$ Total	.. ..	2,527	2,346	2,643	7,516
		6,255	5,352	6,197	17,804

The herbage yield data indicate that the addition of nitrogen in the form of Ammonium Sulphate is superior to the addition of nitrogen in the form of Urea. However a progressive increase in yield is observed with the increase in the added levels of fertilizer.

There appears to be no effect in the herbage yield due to frequencies of defoliation.

The crude protein content figures indicate that with time there is a progressive fall in the nitrogen content of the pasture and there too the Ammonium Sulphate is a better source of nitrogen compared with Urea.

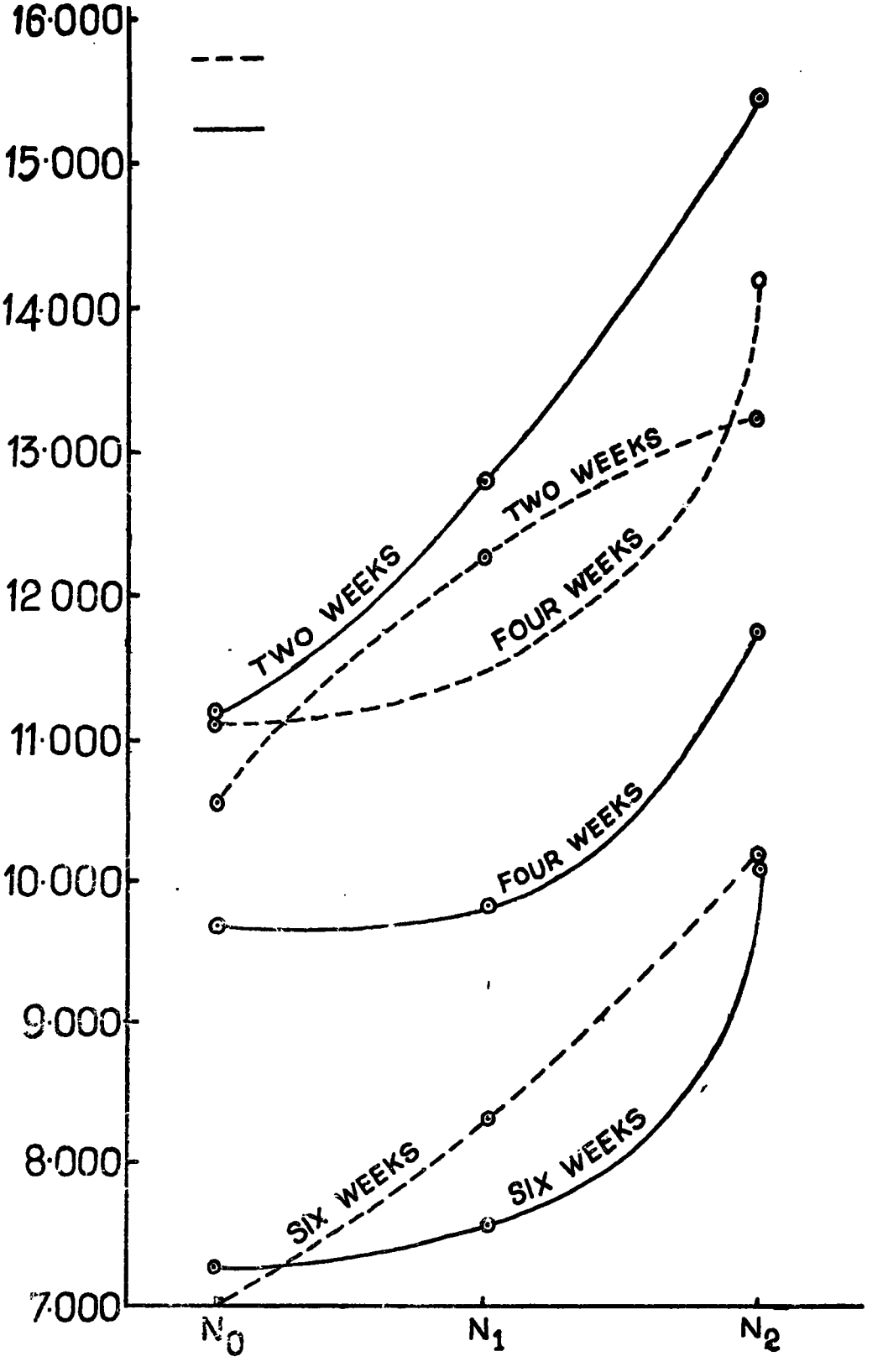
Experiment P 84 (Baddegama)

This is an experiment to determine the effects of establishing pasture and cultivation of soil (subsoiling) on leaf scorch affected palms.

This experiment was harrowed: cultivated as per schedule and manured during the year. However when it was found that the palms used for the experiment were not showing typical symptoms of leaf scorch the experiment had to be discontinued. Difficulties in the management of this cooperative experiment was another factor which contributed to its closure.

Experiment P 85 (Kuliyapitiya)

This is a trial on levels of nitrogen on *Brachiaria miliiformis* under coconut at Walakumburamulla Estate, Kuliyapitiya. The levels of nitrogen are N_0, N_1, N_2, N_4 and N_8 each replicated four times. The


16·000
15·000
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10·000
9·000
8·000
7·000
TWO WEEKS
TWO WEEKS
FOUR WEEKS
FOUR WEEKS
SIX WEEKS
SIX WEEKS
N0
N1
N2

Figure 1.

experiment was sampled five times during the year and the total of the average herbage yields per treatment of the five samplings are presented in Table XIV.

TABLE XIV

Dry matter yield in Gm/m²

Treatments	*Herbage Yield Gm/m²*
N_0	264.4
N_1	333.2
N_2	346.0
N_4	415.0
N_8	467.7

Four sets of samplings of the experiment were analysed for crude protein content and the average values per replicate are presented in Table XV.

TABLE XV

Percent Crude Protein Content of B.miliiformis at different levels of Nitrogen

Dates of Sampling Treatments	*28-7-71	22-9-71	10-5-71	*9-6-72
N_0	5.3962	5.7263	4.4212	5.2869
N_1	5.8562	5.4488	4.2412	8·6512
N_2	7.6419	6.0356	4.6956	9.7425
N_4	11.1625	6.3106	6.1962	12.3344
N_8 .. .	12.9912	7.8556	9.6518	14·3506

**First samplings after manuring.*

In this the first and the last columns give values of the first samplings after manuring and it is observed that the crude protein content of these samplings is higher than in the other sets of samplings. However a progressive increase in the crude protein is obtained with increasing levels of nitrogen fertilizer in the all four sets of analysis.

Experiment P 86 (Kobbeigane)

This experiment is similar to experiment P 85 and it is being carried out at Kobbeigane. This was sampled thrice during the year and the total dry matter yields of the three samplings are presented in Table XVI.

TABLE XVI

Total dry matter yield of the three samplings in Gm/m²

Treatments	*Herbage Yield*
N_0	213.5
N_1	274.4
N_2	272.5
N_4	304.2
N_8	329.5

Experiment P 87 (Baddegama)

This too is similar to P 85 and is being carried out at Fredsrhue Estate Baddegama. Four samplings were taken during the year and the totals of the four samplings are presented in Table XVII.

TABLE XVII

Herbage dry matter yield in Gm./m^2 total of the Average/Replicate of the four samplings

Treatments	*Herbage Yield*
N_0	413.9
N_1	382.2
N_2	568.4
N_4	652.0
N_8	619.5

INTERCROPPING

During Maha of the year 1972 preliminary observation trials were laid down on sunflower Green Gram, Black Gram and Cowpea.

On sunflower planted at Bandirippuwa Estate a calculated yield of 452 lbs./acre were obtained with the variety TURKEY 170430 in spite of the heavy loss of crop due to willing.

With Green and Black Gram of the variety MI_1 (both crops), calculated yields of 400 lbs./acre and 312 lbs./acre were obtained respectively in spite of losses due to damage by rats and squirrels. Black Gram was planted at a spacing of 12" × 6" with a fertilizer application of one cwt./acre of a 1: 2: 1 mixture of N.P. and K.

Cowpea variety MI_1 gave a calculated yield of 300 lbs./acre with a manuring rate of one cwt./acre of ammonium sulphate.

The following yields were obtained from the observation trials conducted during Maha 1972 at Ratmalagara Estate.

BLACK GRAM	468 lbs.
GREEN GRAM	236 lbs.
COWPEA (ARLINGTON)	48 lbs.
COWPEA (MI_1)	365 lbs.

4. ANIMAL HUSBANDRY

The rotational cross breeding programme suggested by Professor Mahadevan (Dean of the Faculty of Agriculture, University of West Indies) is in progress. Forty four calves have been obtained by crossing the F_1, progeny of (SINHALA × JERSEY) with SINDHI.

A total collection of 88,395 pints of milk were produced during the year at Bandirippuwa and Ratmalagara Estates.

The herd strength at the end of the year was as follows.

	Bulls	*Cows*	*Heifer Calves*	*Bull Calves*	*Total*
Bandirippuwa Estate	02	138	170	57	367
Ratmalagara Estate	04	31	14	06	55
Total	06	169	184	63	422

There were 110 births and 39 deaths of animals in the herd during the year.

PERSONNEL

During the year, Mr. D. E. F. Ferdinandez, officer-in-charge of the Division left the Island to pursue post graduate studies at the University College of North Wales, Bangor, U.K.

Dr. M. A. P. Manthriratne, Botanist was appointed Acting Agrostologist in addition to his normal duties.

Messrs. N. T. M. H. de Silva, B.Sc. Agric. (Hons.)Cey.and M.P.L.D. Martin, B.Sc. Agric.(Hons.) Cey., were appointed Research Assistants of the Division. Miss V. Thambiah B.Sc. (Cey.) and Mrs. M. R. P. Sinnathamby, B.Sc. (Madras) were appointed Technical Assistants with effect from 1st July, 1972.

Messrs. R. M. Dayaratne and P. J. E. Fernando were promoted Field Assistants in the Engineering and Soil Survey Units respectively.

Messrs. Oliver Fernando and Sisira Perera were promoted Field Laboratory Attendants with effect from 1st September, 1972.

DR. M. A. P. MANTHRIRATNE
Acting Agrostologist

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REPORT OF THE CROP PROTECTION DIVISION (1972)

1. Biological Control of Promecotheca cumingi.

The Biological Control Laboratory established at Havelock Terrace Havelock Town, Colombo 5 was maintained throughout the year. Mr. Y. Elikewala, Research Officer, Central Agricultural Research, Institute continued to function as Officer-in-Charge of the laboratory and Dr. H. E. Fernando, Entomologist, C.A.R.I. as Leader of the Scientific Team for *Promecotheca* control.

Surveys conducted from October-December 1971 before the liberation of parasites introduced from abroad indicated that apart from a pocket of disease affecting *Promecotheca* larvae in the Kalutowila area, a very low degree of natural parasitization was taking place by the egg parasite *Achrysocaris promecothecae* in certain areas. In the bulk of the 15,000 acres infested survival of *Promecotheca* however was 100%.

The larval and egg parasites *Dimmockia javanica* and *Achrysocaris promecothecae* respectively were introduced from Singapore while the larval and pupal parasite *Pediobius parvulus* was introduced from Fiji. These were bred and multiplied in the Biological Control Laboratory, and releases in the infested areas commenced in December 1971. Since then a total of 130,525 *Dimmockia* 33,250 *Pediobius* and 125 *Achrysocaris* have been liberated in all areas.

Evaluation of the results achieved have shown that *Dimmockia* established rapidly and gave excellent control of the pest. *Pediobius* has consistently failed to establish in Sri Lanka although it had proved to be the most effective control for the pest in other parts of the World. *Achrysocaris* continued to give only a low degree of control. Our data prove that *Dimmockia* alone has generally been responsible for over 50 to 75% control of the pest in most areas here. Furthermore there was a rapid increase of naturally (viral, fungal or bacterial disease) occurring control factors following the introduction of *Dimmockia*. We therefore cannot exclude the possibility that probing of *Promecotheca* larval bodies by the swordlike ovipositors of egg-laying *Dimmockia* females caused wounds through which these diseases entered and killed the pest larvae. *Dimmockia* would then be responsible not only for a very high degree of direct control but also indirectly for a portion of the control by natural factors.

A few examples to illustrate the dominant part in control played by *Dimmockia* are mentioned below:—

(1)	Negombo	100% total control of which 80.6% was by *Dimmockia*
(2)	Panagoda	93.3% total control of which 59.8% was by *Dimmockia*
(3)	Bangadeniya	100% total control of which 62.5% was by *Dimmockia*
(4)	Kandana	88.2% total control of which 52.3% was by *Dimmockia*
(5)	Weligama	100% total control of which 77.0% was by *Dimmockia*

The overall control of *Promecotheca* achieved to date is near complete so much so that it has become difficult to collect *Promecotheca* larvae to maintain even nucleus cultures of *Dimmockia* in the laboratory.

2. The Coconut Caterpillar

The parasite breeding programme for the biological control of the coconut caterpillar—*Nephantis serinopa* was continued at the Bandirippuwa and Mylambavelly Insectaries.

The breeding of *Nythobia*, *Perisierola* and *Brachymeria* has been stepped up whilst only nuclei cultures of the less effective parasites have been maintained. Very few new infestations of the pest were recorded during the year, and successful control was achieved by the release of parasites in almost all foci of infestation.

Data on the fluctuations of pest densities were collected from five estates in the Eastern Province, six estates in the North Western Province and one estate in the Western Province. An experiment to study the effect of caterpillar attack on coconut yields was started in the Puttalam District during the year.

Field Releases of Parasites of *Nephantis serinopa* during 1972

Parasite	*E.P.*	*W.P.*	*N.P.*	*S.P.*	*N.W.P.*	*Total*
Elasmus nephantidis	—	1,485	500	1,140	4,905	8,030
Microbracon brevicornis	27,200	600	—	—	3,000	30,800
Perisierola nephantidis	144,750	11,400	3,400	56,400	147,100	363,050
Sp'ggosia bezziana	3,590	425	45	85	2,235	6,380
Tetrastichus israeli	46,550	39,200	13,845	13,600	154,000	267,195
Trichospilus pupivora	—	77,800	20,000	28,000	293,400	419,200
Nythobia Sp.	2,535	525	200	—	4,781	8,041
Brachymeria nephantidis	—	450	—	—	3,895	4,345
Total	224,625	131,885	37,990	99,225	613,316	1,107,041

3. The Red Weevil

Following the long drought that prevailed during the first half of the year, the incidence of this pest has been somewhat on the increase, though no major out-breaks as such have been evident. Some young plantations in the Mahiyangana, Bibile, Moneragala and Udawalawe areas associated with Colonization schemes have been found to be attacked by this pest.

The trap for the red weevil has been used on some estates and subjected to further tests. The breeding of the predator *Platymeris levicollis* was resumed after a lapse of some months and field releases were carried out to study its predatory action under natural conditions.

4. The Coconut Scale

Fresh reports of the coconut scale, *Aspidiotus destructor* were received during the latter part of the year, and in particular, infestations were evident in the North Western and Southern Provinces.

Research on the breeding of the predator—*Chilochorus nigritus* in the laboratory was continued, and the first stage of this programme concluded successfully.

5. Rhinoceros Beetle

No fresh reports of *Oryctes rhinoceros* were received during the year, and research on this pest was temporarily suspended.

6. Other Coconut Pests

There were no fresh out-breaks of the nettle grub—*Parasa lepida*, the bag worm—*Psyche albipes* or *Sophrops eurystoma*.

Xyleborus similis. This insect was found to attack coconut plantations in the Northern Province and a certain amount of control was affected with systemic insecticides. Further research is being carried out.

7. Diseases

Very few reports of Bud Rot and Stem Bleeding were received during the year. Research on *Ganoderma* has been initiated, as this has been found in association with coconut palms.

Steps have been taken no despatch samples of plant tissue from palms showing symptoms of 'Leaf Scorch' disorder to Berlin for electron microscopy to detect the presence of Mycoplasma in the phloem elements.

R. MAHINDAPALA,
Research Assistant in Charge,
Crop Protection Division.

Ceylon Cocon. Q. (1972) **24**, 46-48
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ANNUAL REPORT OF THE BIOMETRICIAN (1972)

1. STATISTICAL SERVICE

The routine statistical work of the research divisions was attended to.
Advice was given to research officers regarding the designs for new experiments.

2. RESEARCH

(a) Calibration Trial

The yield recording of the Calibration Trial was maintained uninterrupted.

(b) High and Low Yielding Palms

The study of the distinguishing characters of High and Low yielding palms based on the palms in the calibration trial was continued.

(c) Optimum Fertilizer Dosage

The study on the evaluation of an "optimum fertilizer dosage for coconut in the context of a foreign exchange crisis" was continued.

(d) Agri-Meteorology

The agri-meteorological stations at Bandirippuwa Estate, Ratmalagara Estate and Isolated Seed Garden were maintained satisfactorily.

(i) Drought Index:

Work was continued towards evolving a more efficient "drought index" because it was felt strongly that a drought index will reflect the reaction of the palm to lack of moisture much better than a precipitation index.

This work will receive attention on a more permanent footing only after the new staff approved for this Unit is appointed.

(ii) Crop-Forecasting Formula for Ceylon:

A study was made of the relationship between an interim drought index and the production of coconuts in Ceylon. Fertilizer consumption in Ceylon was also used as one of the independent variables in the production function. A report giving the crop forecasting function was submitted to the Coconut Development Authority.

(iii) Rainfall in 1972:

The rainfall in the important coconut growing areas in 1972 are shown in Table 1.

TABLE 1—Rainfall in Important Coconut Growing Areas

Station	*Total Rainfall*		AV (53-71)
	1972	1971	
Lunuwila .. .. (Bandirippuwa Estate)	78.72	75.99	79.50
Madampe .. .. (Ratmalagara Estate)	53.30	54.21	64.28
Chilaw	52.38	39.70	61.79
Puttalam	64.36	41.22	46.44
Kurunegala	115.39	112.32	87.01

(*iv*) *Drought Indices:*

The drought indices of some coconut areas are shown in Table 2.

TABLE 2—Drought Index in the Coconut Growing Areas

	Drought Index		*Drought Index for the year*		
	Mean for 10 yrs.	*Range*	1970	1971	1972
1. Tangalle	152.0	30.1–414.6	58.5	43.0	448.7
2. Kudawewa	196.0	0.0–457.6	253.6	73.1	448.7
3. Wariyapola*	213.0	0.0–526.8	209.1	43.0	538.1
4. Kuliyapitiya	152.5	0.0–288.2	116.1	0.0	429.7
5. Madampe	320.9	0.0–569.1	167.3	234.0	672.2
6. Lunuwila	146.1	0.0–407.7	117.0	0.0	282.2
7. Palavi	536.4	43.0–885.6	653.3	521.0	672.2
8. Rajakadaluwa	278.9	0.0–465.4	277.0	278.7	660.5
9. Battuluoya	447.2	167.9–754.8	701.5	446.0	660.5
10. Negombo*	141.6	0.0–305.4	117.0	68.8	378.5
11. Giriulla	60.1	0.0–127.3	165.2	111.8	282.2
12. Kurunegala*	113.6	0.0–254.6	151.4	0.0	217.6
13. Polgahawela*	100.0	0.0–217.1	150.5	53.8	165·2

**Favours production.*

The drought index for a given year when compared with the mean and the range gives an idea of the crop prospects for the ensuing year.

(*v*) *Crop Prospects for* 1973:

Crop prospects in all coconut growing areas for the year 1973 are very gloomy—especially so during the first half of the year.

(*vi*) *Forecast of Total Production:*

(a) Verification of forecast for 1972

Production Predicted 2958 million nuts.
Production realised (Est.) 3073 million nuts.
Error of forecast 3.7%

(b) Forecast for 1973

Forecast of Production 1973 — 1978 million nuts.

3. PRODUCTION AND EXPORTS

The estimated production of coconuts for the year 1972 is 3073 million nuts. This is 9.8% higher than 1971, 15% higher than last 5 years' average and only 2.4% lower than the previous record in 1964.

The nut equivalent of exports for 1972 is 1258 million nuts. This is 23.5% more than 1971, 30.0% more than last 5 years' average and 22.6% less than the previous record.

The total value of nut products for 1972 is Rs. 268 million. This is 4.4% less than in 1971, 7.1% more than last 5 years' average and 19.8% less than the record.

The average value of nut products in 1972 is Rs. 212.79 per 1000 nuts. This is 22.6% less than in 1971, 17.2% less than the last 5 years average, and 29.7% less than the previous record.

As far as the pattern of exports is concerned, the proportion of coconut oil and fresh nuts remained the same as in the previous year. However the proportion of copra exported was almost double that of 1971 and the proportion of DC exported was very much less than during the previous year.

4. MISCELLANEOUS

Talks on "The weather, climate and coconut crops" were given to the following.

(i) Students of the Faculty of Agriculture.

(ii) A group of D.R.O., A.G.A., and D.A.E.O. of Colombo district.

5. EXTERNAL WORK

(i) Rubber Research Institute:

The Biometrician continued to function as consultant Biometrician to the Rubber Research Institute of Ceylon.

(ii) University of Sri Lanka (Vidyodaya Campus):

The Biometrician was appointed a visiting Lecturer in "Applied Statistics" both for the final year undergraduates as well as Post-graduate Diploma students in statistics.

6. STAFF

Mr. Sundaralingam, Graduate Trainee, was confirmed in the post of Technical Assistant.

V. ABEYWARDENA
Biometrician.

19th May, 1973.

Ceylon Cocon. Q. (1972) **24**, 49-52
Printed in Sri Lanka.

REPORT OF THE PLANTING DIVISION (1972)

NURSERIES: 14 Nurseries were maintained during the year.

Seednuts planted for issue of Seedlings in May/June and October/November (1972) Planting Seasons

	Name of Nursery	*May/June 72*	*Oct./Nov. 72*
1.	Alampil	—	100,497
2.	Attavillu	—	181,800
3.	Bandirippuwa	42,800	33,870
4.	Eraminigolla	25,000	32,275
5.	Handapangala	—	149,613
6.	Hettipola	15,000	47,248
7.	Ibbagamuwa	100,000	212,647
8.	Kalawewa	—	121,075
9.	Killinochchi	—	76,850
10.	Koggala	32,000	48,540
11.	Mylambavely	—	97,400
12.	Ratmalagara	31,100	173,131
13.	Walpita	46,050	100,000
14.	Wilpotha	10,000	216,540
		301,950	1,591,486

Seedlings: Orders were booked and payments received in 1972 for 1,174,118 seedlings for the undermentioned issue seasons:

	Name of the Nursery	*Oct./Nov.* 1971	*May/June* 1972	*Oct./Nov.* 1972	*Total*
1.	Alampil	nil	nil	62,669	62,669
2.	Attavillu	8,200	1,000	93,915	103,115
3.	Bandirippuwa	329	28,999	33,159	62,487
4.	Eraminigolla	4,655	12,390	17,138	34,183
5.	Handapangala	350	nil	67,966	68,316
6.	Hettipola	3,993	14,085	25,435	43,513
7.	Ibbagamuwa	1,070	29,065	148,361	178,496
8.	Kalawewa	500	nil	82,580	83,080
9.	Killinochchi	4,590	nil	40,765	45,355
10.	Koggala	1,447	25,058	29,772	56,277
11.	Mylambavely	4,310	nil	58,230	62,540
12.	Ratmalagara	20,145	35,385	68,981	124,511
13.	Walpita	12,245	40,151	61,649	114,045
14.	Wilpotha	19,106	19,105	97,320	135,531
	Total	80,940	205,238	887,940	1,174,118

Seedlings Issued: 1,186,935 seedlings were issued during the year 1972 and the distribution in Nurseries for the various seasons was as follows:

Nurseries	*Oct./Nov. 1971*	*May/June 1972*	*Oct./Nov. 1972*	*Total*
1. Alampil	—	—	51,549	51,549
2. Attavillu	12,800	—	68,485	81,285
3. Bandirippuwa	102	19,627	13,299	33,028
4. Eraminigolla	4,753	12,615	15,349	32,717
5. Handapangala	350	—	65,662	66,012
6. Hettipola	10,243	8,020	28,210	46,473
7. Ibbagamuwa	17,940	51,097	114,539	183,576
8. Kalawewa	3,422	—	80,980	84,402
9. Killinochchi	16,109	—	35,020	51,129
10. Koggala	5,375	23,913	11,922	41,210
11. Mylambavelly	27,743	—	53,305	81,048
12. Ratmalagara	61,652	15,205	50,959	129,816
13. Walpita	48,881	30,972	30,151	110,004
14. Wilpotha	107,061	7,100	82,525	196,686
Total	316,431	168,549	701,955	1,186,935

Distribution of Orders by Revenue Districts

OCTOBER/NOVEMBER—1971 SEASON

Revenue District	*Seedlings booked by Estate Owners*	*Seedlings booked by Small holders*	*Seedlings booked by Govt. Agents*	*Seedlings booked by Govt. Depts.*	*Total*
1. Anuradhapura	nil	50	nil	nil	50
2. Amparai	nil	nil	nil	750	750
3. Badulla	nil	300	nil	nil	300
4. Batticaloa	1,360	1,725	nil	55	3,140
5. Colombo	2,395	6,054	nil	nil	8,449
6. Galle	nil	1,382	nil	nil	1,382
7. Hambantota	nil	150	nil	nil	150
8. Jaffna	800	3,750	nil	nil	4,550
9. Kalutara	nil	nil	nil	nil	nil
10. Kandy	nil	2,405	nil	nil	2,405
11. Kegalle	500	1,795	nil	nil	2,295
12. Kurunegala	5,725	11,526	nil	nil	17,251
13. Mannar	nil	nil	nil	nil	nil
14. Matale	nil	nil	nil	nil	nil
15. Matara	nil	40	nil	nil	40
16. Monaragala	nil	350	nil	nil	350
17. Nuwara Eliya	nil	nil	nil	nil	nil
18. Polonnaruwa	nil	nil	nil	nil	nil
19. Put alam	8,605	8,712	nil	nil	17,317
Chilaw	5,700	14,212	nil	nil	19,912
20. Ratnapura	nil	24	nil	nil	24
21. Trincomalee	nil	50	2,500	nil	2,550
22. Vavuniya	nil	25	nil	nil	25
Total	25,085	52,550	2,500	805	80,940

Distribution of Orders by Revenue District

MAY/JUNE—1972 SEASON

	Revenue District	*Seedlings booked by Estate Owners*	*Seedlings booked by Small-holders*	*Seedlings booked by Govt. Agents*	*Seedlings booked by Govt. Dept.*	*Seedlings booked by Crop Diver.*	*Total*
1.	Anuradhapura ..	nil	nil	nil	nil	nil	nil
2.	Amparai	nil	nil	nil	nil	nil	nil
3.	Badulla	nil	nil	nil	nil	nil	nil
4.	Batticaloa	nil	nil	nil	nil	nil	nil
5.	Colombo	12,375	21,507	nil	25	100	34,007
6.	Galle	nil	4,808	nil	nil	nil	4,808
7.	Hambantota ..	10,500	600	nil	nil	nil	11,100
8.	Jaffna	nil	nil	nil	nil	nil	nil
9.	Kalutara	1,100	4,322	nil	nil	nil	5,422
10.	Kandy	300	5,342	6,500	50	1,925	14,117
11.	Kegalle	800	7,990	nil	nil	235	9,025
12.	Kurunegala ..	39,024	22,985	nil	nil	nil	62,009
13.	Mannar	nil	nil	nil	nil	nil	nil
14.	Matale	2,000	800	nil	nil	nil	2,800
15.	Matara	360	4,710	nil	nil	nil	5,070
16.	Monaragala ..	nil	nil	nil	nil	nil	nil
17.	Nuwara Eliya ..	nil	nil	nil	1,500	nil	1,500
18.	Polonnaruwa ..	nil	nil	nil	nil	nil	nil
19.	Puttalam	13,570	4,965	nil	nil	nil	18,535
	Chilaw	13,100	17,545	nil	nil	nil	30,645
20.	Ratnapura ..	1,000	3,725	nil	nil	1,475	6,200
21.	Trincomalee ..	nil	nil	nil	nil	nil	nil
22.	Vavuniya	nil	nil	nil	nil	nil	nil
	Total	94,129	99,299	6,500	1,575	3,735	205,238

Distribution of Orders by Revenue Districts

OCTOBER/NOVEMBER—1972 SEASON

	Revenue Districts	*Seedlings booked by Estate Owners*	*Seedlings booked by Small-holders*	*Seedlings booked by Govt. Agents*	*Seedlings booked by Govt. Depts.*	*Seedlings booked by Crop Div.*	*Total*
1.	Anuradhapura ..	1,000	4,782	50,000	nil	nil	55,782
2.	Amparai	2,300	400	10,000	nil	nil	12,700
3.	Badulla	1,000	2,975	11,000	8,032	nil	23,007
4.	Batticaloa	7,500	8,630	15,300	nil	nil	31,430
5.	Colombo	6,175	19,397	nil	2,000	1,510	29,082
6.	Galle	700	2,949	9,047	400	1,240	14,336
7.	Hambantota ..	3,200	100	15,000	nil	nil	18,300
8.	Jaffna	12,950	11,095	22,450	nil	nil	46,495
9.	Kalutara	nil	2,290	10,000	nil	1,715	14,005
10.	Kandy	8,200	2,408	nil	32,241	2,485	45,334
11.	Kegalle	2,150	3,955	4,000	nil	5,730	15,835
12.	Kurunegala ..	51,360	26,288	28,710	nil	200	106,558
13.	Mannar	480	1,520	12,500	2,000	nil	16,500
14.	Matale	5,310	7,600	24,990	12,120	1,350	51,370
15.	Matara	nil	1,535	16,500	nil	650	18,685
16.	Monaragala ..	nil	11,335	21,000	9,924	nil	42,259
17.	Nuwara Eliya ..	nil	nil	2,200	300	nil	2,500
18.	Polonnaruwa ..	nil	2,590	24,500	nil	nil	27,090
19.	Puttalam	70,195	76,966	55,000	nil	nil	202,161
	Chilaw	19,180	26,576	nil	316	nil	46,072
20.	Ratnapura ..	1,350	5,840	12,000	nil	700	19,890
21.	Trincomalee ..	nil	1,010	5,000	nil	nil	6,010
22.	Vavuniya	12,770	4,800	18,430	6,539	nil	42,539
		205,820	225,041	367,627	73,872	15,580	887,940

SUMMARY

	Oct./Nov. 1971	*May/June* 1972	*Oct./Nov.* 1972	*Total*
Seedlings booked by				
Small-holders	52,550	99,299	225,041	376,890
Estate Owners	25,085	94,129	205,820	325,034
Crop Diversification Scheme	nil	3,735	15,580	19,315
Govt. Agents through Land Commissioner ..	2,500	6,500	367,627	376,627
Govt. Departments and Institutions ..	805	1,575	73,872	76,252
	80,940	205,238	887,940	1,174,118

P. D. L. FERNANDO,
Planting Officer.

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REPORT OF THE PUBLICATIONS UNIT AND LIBRARY (1972)

Journals: The following issues of the C.R.I. Journals were published during the year:—

Ceylon Coconut Quarterly
Vol. XXI Nos. 3/4
Vol. XXII Nos. 1/2 and 3/4

Ceylon Coconut Planters' Review
Vol. VI Nos. 2, 3 and 4

Pol Pawath
Vol. IV No. 4
Vol. V Nos. 1 and 2

Advisory Leaflets: Wherever necessary, the CRI leaflets were revised and/or reprinted in order to up-date the information and to maintain the stock position.

Leaflet Nos. 49 and 50 were published in Sinhala during the year.

A Special leaflet on Promecotheca cumingi was issued, and this has now been revised to be published as Advisory Leaflet No. 52 in all three languages.

Library: 120 new books have been added to the library making a total of 3,100. Subscriptions have been paid for 7 new journals making a total of 152. In addition to these 150 Journals are being received in exchange for CRI publications.

Four issues, at quarterly intervals, of the Library Bulletin, compiled (in mimeo. form) by the Librarian were produced during the year.

M. J. C. PERERA,
Acting Publications Officer.

Ceylon Cocon. Q. (1972), 24, 54-57
Printed in Sri Lanka.

REPORT OF THE ADMINISTRATION DIVISION (1972)

CADRE

The Staff of the Coconut Research Board at the end of December, 1972 was as follows.

	Special Class	*Class I*	*Class II*	*Class III*	*Class IV*	*Total*
Executive Grade	—	5	4	12	—	21
Technical & Supervisory Grade ..	12	—	32	—	—	44
Intermediate Grade	—	—	8	—	—	8
Clerical & Allied Grade ..	—	—	25	—	—	25
Operative Grade	—	—	43	—	—	43
Minor Grade .. .	—	121	67	—	—	188
	12	126	179	12	Nil	329

PROMOTIONS DURING THE YEAR

INTERNAL

The following internal promotions were made during the year.

1. EXECUTIVE GRADE

From Assistant Staff (Special Grade) to Executive Grade Class III. Mr. G. W. M. Wijetunge, Accounting Assistant as Accountant with effect from 26.07.1972.

2. TECHNICAL AND SUPERVISORY GRADE (SPECIAL CLASS)

From Assistant Staff Grade IIA to Technical and Supervisory Grade (Special Class).

Mr. F. H. B. Felix Silva, Welfare Officer as Office Assistant with effect from 26.07.1972.

Mr. J. A. Cadelis, Senior Field Assistant as Nurseries Inspection Officer with effect from 26.07.1972.

3. TECHNICAL AND SUPERVISORY GRADE CLASS II

From Assistant Staff Grade II B to Technical and Supervisory Grade Class II as Technical Assistants.

Mr. M. S. Velu, Senior Field Assistant as Technical Assistant with effect from 26.07.1972.

Mr. P. Sundaralingam, Graduate Trainee as Technical Assistant, with effect from 01.07.1972.

Miss J. D. Nadarajah, Graduate Trainee as Technical Assistant with effect from 01.07.1972.

Miss S. D. Ramanathan, Graduate Trainee as Technical Assistant with effect from 01.07.1972.

Miss G. M. Anthony Pillai, Graduate Trainee as Technical Assistant with effect from 01.07.1972.
Mr. V. Sinnathamby, Graduate Trainee as Technical Assistant, with effect from 01.07.1972.
Miss V. Thambiah, Graduate Trainee as Technical Assistant, with effect from 01.07.1972.
Miss M. R. A. Sinnathamby, Graduate Trainee, as Technical Assistant, with effect from 01.07.1972.

4. INTERMEDIATE GRADE

From Assistant Staff Grade II B to Intermediate Grade Class II,
Mrs. T. M. H. Fernando, Clerk/Typist as Stenographer, (English) with effect from 26.07.1972.
Mr. H. W. Molligoda, Clerk/Typist as Translator with effect from 07.08.1972.

5. CLERICAL AND ALLIED GRADE

From Minor Staff to Clerical and Allied Grade Class II,
Mr. P. Daluwatte, Office Attendant as Clerk/Typist with effect from 07.08.1972.

6. OPERATIVE GRADE

From Minor Staff to Operative Grade Class II with effect from 01.09.1972.
Mr. B. M. Jayanayake, Nursery Attendant as Field Assistant
Mr. P. P. Sumanathilake, Nursery Attendant, as Field Assistant
Mr. K. W. Kithsiri, Nursery Attendant as Field Assistant
Mr. Edwin Gamage, Field Attendant as Field Assistant
Mr. R. M. Dayaratne, Lab/Field Attendant as Field Assistant
Mr. R. B. Wewelpola, Nursery Attendant as Field Assistant
Mr. W. G. Fernando, Nursery Attendant as Field Assistant
Mr. A. Wilson, Lab/Field Attendant as Field Assistant
Mr. W. B. Edward Fernando, Nursery Attendant as Field Assistant
Mr. S. A. Peiris, Lab/Field Attendant, as Field Assistant
Mr. P. J. E. Fernando, Field Attendant as Field Assistant.

EXTERNAL APPOINTMENTS

The following external appointments were made during the year , Dr. J. Sivapragasam was appointed full time Chairman of the Coconut Research Board.

Mr. K. D. J. Wilmot, Chief Administrative Officer with effect from 05.01.1972. Mr. Wilmot was appointed as Deputy Director (Adm. & Finance) with effect from 11th April, 1972.

Mr. A. S. Amarasinghe was appointed to Executive Grade Class III as Research Assistant with effect from 01.11.1972.

Mr. P. Kanagaratnam, was appointed to Executive Grade Class III as Research Assistant with effect from 01.11.1972.

Mr. S. Mohandas was appointed to Executive Grade Class III as Research Assistant with effect from 01.11.1972.

Mr. B. H. Rohita was appointed to Executive Grade Class III as Research Assistant with effect from 01.11.1972.

Mr. M. P. L. D. Martin was appointed to Executive Grade Class III as Research Assistant with effect from 01.11.1972.

Mr. Ananda Senaratne was appointed as Engineering Assistant with effect from 16.08.1972.

Mr. C. S. E. Fernando was appointed as Assistant Administrative Officer with effect from 17.10.1972.

Mr. A. A. A. Attanapola was appointed as Personnel Officer with effect from 07.08.1972.

Miss Y. V. Jayatillake was appointed as Stenographer (English) with effect from 07.08.1972.

Miss N. G. Weerasuriya as Stenographer (English) with effect from 01.11.1972.

RETIREMENTS, RESIGNATIONS AND DEATHS

Deaths

Nil

Retirements

Mr. S. C. Kahawita, Chief Administrative Officer retired from the service of the Institute after a period of 28 years.

Administrative Changes

The functions of the Advisory Division were transferred to the Coconut Cultivation Board under the new Coconut Development Act. The staff of the Division was absorbed by the Coconut Cultivation Board as from 1.5.1972.

WELFARE

(A) Thrift, Savings and Stores

The C.R.I. Co-operative Multi-purpose Society catered to the needs of members in the supply of essential articles including foodstuffs and materials. The society has still further expanded its activities. The Board continued to give its annual grant of Rs. 1,500/-.

(B) Housing

The Housing Committee was reconstituted with the Deputy Director (Administration & Finance) as Chairman, and representatives of three Unions as Committee members. 11 meetings were held during the year.

(C) Workmen's Compensation

There were few accidents during the year. Prompt attention was given to patients where transport was needed to the nearest hospital in case of temporary disablement cases. Payment of the first seven days wages to temporary disablement cases where there is no legal liability is covered under an additional premium as a special concession to employees of the Institute.

(D) Recreational and Cultural Activities

The activities of the Recreation Club were given a new look with the organisation of regular "Club Nights" and Get-to-gether parties. The club participated in the "D" and "G" Divisions Government Service Cricket Tournament. In addition to the usual annual Christmas Party there was a Chairman's Christmas Party at which children of all employees who were below 10 years of age received christmas gifts. The usual grants and other assistance were given by the Coconut Research Board.

The Coconut Research Board Art Circle and the C.R.B. Catholic Association organised a few excursions for its members.

(E) Financial Aid

The following amounts were given out as loans during the year.

(*i*) *Provident Fund* — A sum of Rs. 226,600.89 as Provident Fund Loans and Rs. 21,740.69 as Provident Fund Insurance premia.

(*ii*) *Distress* — A sum of Rs. 95,440.54 as Distress Loans.

(*iii*) *Transport* — A sum of Rs. 12,100/- as transport loans was paid during the year.

(F) Medical Aid

The Contributory Medical Aid Scheme continued to be in force. A sum of Rs. 59.918.93 has been paid on medical aid claims. 10 meetings of the Medical Aid Committee were held during the year. Credit facilities from the private doctors continued with the grant of the usual discount allowed to members.

GENERAL

Relationships between the Institute and its Social and Welfare Organisations were cordially maintained and every assistance was given in carrying out the establishment work of the Institute. In particular, applications and complaints regarding Provident Fund, Festival advances, Loans, Gratuities, Insurance, Medical Aid, employment and training have been dealt with during the year. There were no industrial disputes and the employer—employee relationships remained cordial during the year.

K. D. J. WILMOT
Deputy Director,
Administration & Finance.

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REPORT ON ESTATES (1972)

(1) BANDIRIPPUWA ESTATE, LUNUWILA

Acreage Statement

Area	*A.*	*R.*	*P.*
Bandirippuwa (1)	153	0	00
Bandirippuwa (2) A	118	0	38
Bandirippuwa (2) B	59	3	26
Bandirippuwa (2) C	34	3	07
Total	365	3	31
Research	125	3	00
Estate	222	1	17
Buildings etc.	17	0	00
Paddy etc.	0	3	14
Total	365	3	31

Distribution of Acreage by Blocks

Block	*Research*			*Estate*			*Total*		
	A.	*R.*	*P.*	*A.*	*R.*	*P.*	*A.*	*R.*	*P.*
B/E (1) 1 ..	5	3	02	14	2	32	20	1	34
2 ..	10	0	00	6	1	07	16	1	07
3 ..	11	3	02	9	0	09	20	3	11
4 ..	8	3	04	33	1	28	42	0	32
5 ..	9	1	05	9	2	35	19	0	00
6 ..	2	0	06	1	2	01	3	2	07
B/E (2) A ..	38	0	10	103	3	35	142	0	05
B ..	22	0	05	27	2	09	49	2	14
C ..	18	0	06	16	0	21	34	0	27
	125	3	00	222	1	17	348	0	17
						Buildings etc.	17	0	00
						Waste land and Paddy	0	3	14
							365	3	31

Census of Palms (ended 1971)

	1	2	3	4	5	6	*A*	*B*	*C*	*Total*
Full Bearing ..	1,545	783	1,196	2,055	1,140	687	4,229	3,297	1,972	16,814
Partial bearing ..	15	2	49	—	—	9	180	1	—	256
Duds ..	17	5	13	40	2	—	57	9	26	169
In Flower ..	12	—	31	12	2	8	79	—	—	144
Established ..	74	—	74	—	6	5	289	—	—	448
Seedlings ..	2	—	26	10	2	—	523	5	—	568
Vacancies ..	181	75	197	390	326	68	2,497	627	540	4,900
Total ..	1,846	865	1,586	2,507	1,478	696	7,854	3,929	2,538	23,299

Comparative Rainfall (1971 and 1972) with respective wet* and rainy days†.

Month	1971 *Inches*	*Wet days*	*Rainy days*	1972 *Inches*	*Wet days*	*Rainy days*	*Total Rainfall (Inches)*	*Average 1966-1970*
January ..	5.25	9	2	—	—	—	16.66	3.33
February ..	3.84	4	—	—	—	—	13.50	2.70
March ..	5.61	6	—	0.16	1	—	16·95	3.39
April ..	9.82	14	1	8.26	10	3	41.40	8.28
May ..	5.52	16	—	17.42	16	—	42.66	8.53
June ..	10.51	17	—	4.31	9	—	27.53	5.51
July ..	5.42	9	1	2·16	5	1	19.61	3.92
August ..	1.95	6	—	0.38	2	—	8.15	1.63
September ..	10.41	16	—	7.29	14	1	37.78	7.56
October ..	10.18	13	1	20.63	23	—	74.56	14.91
November ..	2.19	2	1	8·89	12	—	50.41	10.08
December ..	6.25	13	2	4.00	9	1	28.55	5.71
Total ..	76.95	125	8	73.50	101	6	377.76	75.55

* (0.04″ *and above*) †(0.01″ *to* 0.04″)

CROPS

Total Crops from 1968 with respective averages

Crop	1968	1969	1970	1971	1972	*Total*	*5 year Average*
1st Crop ..	170,016	105,366	96,588	149,980	170,178	692,178	138,436
2nd Crop ..	172,374	177,849	152,715	185,612	238,852	927,402	185,480
3rd Crop ..	243,038	216,126	209,388	234,371	207,761	1,110,684	222,137
4th Crop ..	215,977	189,375	181,506	205,893	160,942	953,693	190,739
5th Crop ..	102,517	104,043	151,414	160,776	129,772	648,522	129,704
6th Crop ..	76,192	89,417	128,540	147,736	60,794	502,679	100,536
Total ..	980,164	882,176	920,151	1,034,368	968,299	4,835,158	967,032

There was a crop decrease of 116,069 *nuts in* 1972.

Disposal of Crops (1972)

Converted into Copra	926,703	
Sold to Staff	2,843	
Sold to Research	6,105	
Nut allowance	19,426	
Missing	193	
Empties	13,029	(1.3%)
Total	968,299	

926,703 nuts were turned into copra weighing 721 candies 525 lbs. with an out turn of 1,283 nuts per candy. The percentage of No. 1 copra was 91.0%.

Field Notes

The following field operations have been carried out during the year:—

(1) *Weeding*—Weeds have been effectively controlled on the estate by the establishment of grass as recommended by the Board.

(2) *Drains*—All existing drains have been maintained in good order.

(3) *Manuring*—Palms in the estate section were manured with a mixture containing 4 parts of sulphate of ammonia, 2 parts of saphos phosphate and 2 parts of muriate of potash at the rate of 8 lbs. per palm. On a recommendation made by the Soil Chemist 3 lbs. of kieserite were applied to palms showing symptoms of magnesium deficency. The manure was applied in full circles and forked in. The palms in the research section were manured as per experimental requirements.

(4) *Fencings*—All fence posts in the western boundary of the estate were replaced by concrete fence posts.

D. C. ELLAWELA
Superintendent, Bandirippuwa Estate

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(II) RATMALAGARA ESTATE, MADAMPE

Acreage Statement

Area	*A.*	*R.*	*P.*
Research Section	156	0	0
Estate Section	80	0	0
Roads and Buildings	5	0	0
Jungle and Waste land	19	0	0
Nurseries	13	0	0
	273	0	0

Distribution of Acreage by Blocks

	A.	*R.*	*P.*
Botany Division Experiments	38	2	0
Soil Chemistry Division Experiments	63	0	0
Agrostology Division Experiments	52	0	0
Biometry Division Experiments	2	2	0
Planting Division	13	0	0
Estate Section	80	0	0
Roads and Buildings	5	0	0
Jungle and Waste land	19	0	0
	273	0	0

Census of Palms

Particulars	*Bk.*1	*Bk.*2	*Bk.*3	*Bk.*4	*Bk.*5	*Bk.*6	*Bk.*7	*Bk.*8	*B.B*	*Total*
Full bearing	1,555	230	755	1,359	1,171	1,589	2,532	333	2,721	12,245
In flower	1	—	—	26	—	—	31	8	6	72
Young Palms	47	—	15	85	—	2	200	2	262	613
Duds (poor yield)	20	6	19	11	—	40	11	4	—	111
Vacancies	8	4	35	42	—	58	20	8	146	321
	1,631	240	824	1,523	1,171	1,689	2,794	355	3,135	13,362

B/B—Botanist's Blocks

Comparative Rainfall 1971/72 with wet days*

Month	1971 *ins.*	**Wet days*	1972 *ins.*	**Wet days*	*Total Rainfall ins.* 1966-1970	*Average* 1966-1970 *ins.*
January	3.47	9	0.37	1	5.50	1.10
February	3.68	4	—	—	10.57	2.11
March	0.95	5	1.70	2	17.63	3.52
April	6.28	9	8.48	11	47.14	9.43
May	4.98	9	11.27	13	33.13	6.62
June	8.49	15	0.63	5	21.17	4.23
July	0.97	8	0.64	2	15.71	3.14
August	2.42	7	0.38	1	7.39	1.48
September	5.70	13	8.06	12	20.53	4.10
October	13.98	15	13.23	18	76.26	15.25
November	0.70	3	4.93	11	43.62	8.72
December	2.61	13	4.62	9	31.35	6.27
Total	54.23	110	54.31	85	330.00	66.00

*Wet days—Rainfall of 0.04" and above.

Total Crops from 1968 to 1972

	1968	1969	1970	1971	1972
1st Pick	127,455	144,718	105,702	136,883	153,485
2nd Pick	152,715	197,352	119,474	194,549	203,711
3rd Pick	130,223	192,682	170,522	184,576	198,611
4th Pick	131,400	149,919	154,242	215,698	218,160
5th Pick	94,000	83,622	102,138	157,402	126,332
6th Pick	75,276	63,099	103,141	134,132	104,521
Total nuts	711,067	831,392	755,219	1,023,240	1,004,820

Crop Disposal (1972)

Cured into Copra	959,628
Issued to Research	10,393
Allowance to Staff and Labourers	12,312
Empties and rejections	19,710
Missing	2,777
Total	1,004,820

Copra

The 959,628 nuts converted into copra were graded as follows:—

	Candies	*lbs.*	
No. 1 Copra	535	106	(81.21%)
No. 2 Copra	99	223	(15.08%)
No. 3 Copra	24	223	(3.71%)
Total	658	549	

The Copra out-turn was 1,456 nuts per candy.

Field Notes

All buildings and fences have been maintained in a satisfactory condition during the year under review.

Drains and drain bunds have been maintained in good condition. Weeding operations on the estate section have been suspended for the establishment of grass under coconut. All field works estimated for the year have been carried out.

R. M. DE SILVA,
Superintendent,
Ratmalagora Research Station— Madampe.