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Local Rs. 2.50

Overseas : £ 0.53

Annual Subscription :

Local : Rs. 4.50

Overseas : £ 1.05

Report of the Coconut Research Board (1977)

The present report is the sixth Annual Report of the Coconut Research Board established under Section 58(1) of the Coconut Development Act No. 46 of 1971 by an Order published by the Minister of Plantation Industries in the Government Gazette of 30th March 1972.

The powers and functions of this Research Board have been specified in the said Order establishing the Board.

I BOARD OF DIRECTORS

The following served on the Board of Directors during the year under review:

Up to 31-08-1977

Dr. J. W. L. Peiris (*Acting Chairman*)
Prof. M. D. Dassanayake
Mr. P. W. R. de Silva
Dr. O. S. Peries
Mr. S. C. Mannapperuma
Dr. C. R. Panabokke

From 01-09-1977

Prof. B. A. Abeywickrama (*Chairman*)
Mr. A. J. W. Balthazaar
Mr. J. P. Fernando
Mr. W. A. B. O. Fernando
Mr. H. D. Moses
Dr. C. R. Panabokke
Dr. J. W. L. Peiris

Eight meetings of the Board were held during the year.

II. STAFF MATTERS

A. Appointments and Promotions

Mr. K. D. D. Jinadasa was appointed Deputy Director (Administration & Finance) with effect from 21-01-1977. Mr. Y. G. de Silva was appointed Assistant Administrative Officer with effect from 21-12-1977. Dr. R. Mahindapala was promoted Crop Protection Officer with effect from 13-12-1977. Mr. M. J. C. Perera, the Librarian, was promoted to Class IV of the Executive Grade with effect from 28-10-1977.

B. On training Abroad

Research Assistants, Messrs A. S. Amarasinghe, M. P. L. D. Martin, S. Mohanadas and B. H. Rohitha and Senior Technical Assistant Mr. P. A. C. R. Perera continued to be on overseas training. Research Assistant, Mr. P. Kanagaratnam, left the island on 09-02-1977 for postgraduate studies in Insect Pathology at the Glass house Crops Research Institute, Littlehampton, Sussex, England. Research Assistant, Mrs. L. V. K. Liyanage, left the island on 22-02-1977 to carry out pasture studies leading to a Master's Degree at the University of New England, Armidale, Australia. The Librarian, Mr. M. J. C. Perera, left the island on 29-09-1977 on a pre-project training in Library Science in the United Kingdom under a grant of the International Development and Research Centre (Canada.)

C. Returned from Training Abroad

Dr. R. Mahindapala, Research Assistant, resumed duties on 20-01-1977 after successfully completing his Ph. D. in Plant Pathology at the University of Exeter, England.

Mr. N. T. M. H. de Silva, Research Assistant, resumed duties on 15-02-1977 after successfully completing his M. Sc. course in Agricultural Economics at the Australian National University.

Mr. V. Nalliah, Senior Technical Assistant, resumed duties on 02-06-1977 after completing a training course in Radio Isotope Techniques in Agriculture at the Bhabha Atomic Research Centre, Bombay.

Mr. D. T. Mathes, Graduate Technical Assistant, resumed duties on 03-10-1977 after completing a Postgraduate Diploma Course in Biometry at the University of Reading, England.

D. Conferences and Visits Abroad

Dr. U. Samarajewa participated in the Symposium on Indigenous Fermented Food, held along with the Fifth International Conference on Global Impacts of Applied Microbiology held in Bangkok, Thailand from November, 20 to 27, 1977.

E. Completion of Secondment

Mr. K. D. D. Jinadasa completed his secondment at the Institute on 31-12-1977 and reverted to the Sri Lanka Administrative Service.

F. Resignations

Mr. M. A. T. de Silva, Research Officer, and Mr. K. Karunanayake, Experimental Officer, resigned from the service of the Board with effect from 01-05-1977 and 02-03-1977 respectively.

III. VISITORS TO THE INSTITUTE

During the year the Institute received 6129 visitors. Among those there were 5878 school children from 70 schools, 156 students from Institutions of Higher Studies, 35 employees from the Coconut Marketing Board and 60 visitors from overseas.

IV. NOTES ON REPORTS OF DIVISIONS

The following notes draw attention to points of interest relating mainly to the work of the Research Divisions of the Institute during the year.

DIVISION OF SOILS

Field experiments on Coconut nutrition and management techniques.

Long term field experiments

Twelve long term field experiments were maintained at Bandirippuwa, Ratmalagara, Pothukulama, Bingiriya, Veyangoda, Andigedera, Makandura and Kakkapalliya.

An experiment on soil erosion in a coconut land under different intercrops was commenced during the year.

Soil moisture experiments

The two soil moisture experiments at Bandirippuwa and Ratmalagara were maintained and soil moisture readings were regularly recorded. Tensiometers were installed at Bandirippuwa and soil moisture tensions were also recorded.

Pot experiments

Studies on the performance of Eppawala apatite were continued. A sandy soil from Bandirippuwa Estate, Lunuwila was used this year. The performance of *Paspalum commersonii* showed Eppawala apatite to be inferior to saphos phosphate.

Laboratory Investigations

Analysis of leaf, soil and nut water from the fertilizer experiments were continued to study the use of such analyses in determining fertilizer requirements of coconut.

The laboratory evaluation of the efficiencies of Eppawala apatite, saphos and concentrated superphosphate in five coconut soils was concluded. The results showed that Eppawala apatite is inferior to saphos phosphate even when applied at twice the rate of saphos. In most cases available phosphorus in Eppawala apatite treatments were not significantly different from the controls.

Studies on surface charge characteristics of nine samples belonging to three Great Soil Groups - Ultisols, Alfisols and Entisols, at different pH and ionic strengths were carried out. The zero point of charge of the soils ranged from 3.3 to 4.0 with the Alfisols having the lowest values and the Ultisols the highest. The results showed that the cation exchange capacity as determined by the routine ammonium method may give unrealistic values in tropical soils.

Soil Survey

A detailed soil survey was carried out at Walpita Estate, Kotadeniyawa, to study the influence of soil type and selected soil morphological properties on yield of coconut. The survey showed that the yield was highest in Sudu, Rathupasa and Katunayake series and least in Boralu (shallow). Palms in Boralu (deep) had intermediate yield.

A detailed soil survey of Bandirippuwa Research Station was completed. Four major soil series - Boralu, Pallama; Madampe and Sudu and their phases were identified and mapped.

A detailed reconnaissance soil survey of Dandagamuwa was mapped on the one inch sheet.

DIVISION OF BOTANY AND PLANT BREEDING

Breeding and selection for increased yields

Controlled pollination work

Hand pollination as a source of commercial seed is being gradually replaced with seed production from seed gardens. In the period under review, only three stations - Walpita, Ambakelle and Horrekelly functioned as hand pollination stations. 102,000 female flowers on about 750 mother palms were pollinated with *typica* (prepotent) pollen. About 30% of these will develop into seed nuts. 46,000 seednuts were harvested from crosses done in 1976.

Production of San Ramon planting material for a base collection

The population of San Ramon palms at the Institute can only be increased by crossing inter-se. The F₁ progeny of *San Ramon* palms planted at Pothukulama Research Station in 1964 was crossed in 1977. It is anticipated that 1500 seednuts can be harvested from 5200 female flowers that were pollinated.

Mother palm seed supply

During the year 1,413,513 selected seednuts were supplied to the Planting Division nurseries from seventeen estates. These consist of seven estates managed by the National Livestock Development Board, four estates belonging to the Coconut Research Board and six private estates. Selection of additional mother palms was carried out on Beligama Farm, Galewela and Siringapathe Farm, Badalgama both managed by the National Livestock Development Board. Seednut supplies to the Planting Division nurseries fell short by 600,000 nuts, due to a shortfall in crop as well as insufficiency estates for palm selection. Transport of seednuts to distant nurseries was affected by the non-availability of railway wagons.

Mass production of improved seed.

Research Nurseries. The undermentioned numbers of seednuts were planted in the nurseries at Bandirippuwa and the seed garden, Ambakelle.

Type	Bandirippuwa	Ambakelle	Total
Typica x typica (CRIC 60)	39,200	15,476	54,676
Typica x pumila } Pumila x typica } (CRIC 65)	6,022	17,702	23,724

This year 69,329 seedlings were issued consisting of 16,075 *typica X typica* (CRIC 60) 53,254 *pumila x typica* (CRIC 65) seedlings. An investigation on methods of mulching of nursery beds to eliminate frequent weeding and also to improve the quality of seedlings was completed.

Seed gardens and seed supply. About 92,000 button nuts are developing on emasculated inflorescences on dwarf (*pumila* and *eburnea*) palms in fields 5, 9 and 10. Screening for seedling quality in the previous year indicated a high degree of legitimacy with 97% hybrids. The screening procedure will have to be repeated on samples drawn from nuts developing on palms emasculated in 1977.

Assessment of hybrid performance in the different planting districts

A general assessment of performance has been completed in most areas where at least 65 plants have been planted at each location. The survey has yet to be attempted in the Northern and Eastern Provinces.

This year, an important field trial was initiated in conjunction with the Department of Agriculture at Maha Illuppallama Research Station. This is an evaluation of hybrid performance with and without irrigation using 320 seedlings (2 hectares=5 acres) for each treatment.

Agronomic trials on planting systems :

The yield data of the planting distance trial initiated in 1964 at the Pothukulama Research Station ^{is} ~~was~~ subject to analysis and the findings will be reported elsewhere.

Laboratory and field investigations

Genetics of colour inheritance^A in inter-varietal crosses. The two colour forms green and reddish brown - of the variety *typica*, form *typica* were crossed with :

- (a) Variety *Nana*, forms *pumila*, *eburnea* and *regia*
- (b) Variety *Aurantiaca*
- (c) Variety *typica*, form *typica* (green)
- (d) Variety *typica*, form *typica* (reddish - brown)

Nuts will be harvested in 1978 and petiole colours of the resultant seedlings noted.

Effect of quality of male parent on performance of pumila x typica F₁ hybrids. Selected *pumila* palms were crossed with *typica* (prepotent), *typica* (high yielding) and *typica* (low yielding) palms to study nut components as well as subsequent hybrid performance in the field. Nut characters investigated were weight of husked nut, weight of kernel (endosperm) and weight of shell. It would appear that while there is a significant difference in these parameters between *pumila x pumila* (control) and *pumila x typica* (all types), there was no difference with the type of *typica* parent used for the cross i.e. prepotent, high yielding or low yielding. Growth and yield of 70 progeny from this trial are being evaluated.

Separation of pollen proteins of coconut by electrophoresis. Much difficulty was experienced in working out a suitable technique. The successful method that is now employed and some of the results of the preliminary investigation will be reported subsequently.

Organization of the shoot apex of pumila, typica and pumila x typica F₁ hybrids. The results of this investigation are being published in the form of two papers :-

- (a) Pattern of growth of the shoot apex with special reference to leaf and inflorescence initiation.
- (b) Differentiation of male and female flowers

CHEMISTRY DIVISION**Coconut Products****Production of Coconut Sugar, Jaggery and Golden Syrup :**

A simple colour reaction based on the Fehling's test to decide on the suitability of sweet toddy for the preparation of the above products was designed. The limiting conditions and methods for the preparation of them were worked out,

Fermentation of Coconut Sap :

Studies on the microbial succession in fermenting toddy are in progress. The controlled fermentation of sap on a large scale using selected cultures was started.

Nature of "Rabath"

Analysis of the white gelatinous solid masses adhering to tapped spathes showed them to be dextrans of microbial origin.

Use of the ebulliometer for estimation of alcohol in toddy :

Calibration of the above instrument against more accurate methods showed that the alcohol values read by the ebulliometer at the normal strength of toddy (6-8%) were accurate enough to be used even for research work.

Paper chromatographic studies on sugars and amino acids of coconut inflorescence sap are in progress.

Foliar Analysis

Study of the variation in concentration of nutrients between fronds in the adult coconut palm.

Sampling for this study was done on two occasions covering a wet and a dry period. 640 samples covering eight fronds were collected for this study and analysis for the major nutrients N,P,K, Ca and Mg are being carried out.

Effect of concentration of nutrient on growth and composition of hybrid seedlings in sand culture.

An experiment was laid down in sand culture to study the effect of nutrient supply on growth and chemical composition of hybrid seedlings.

Growth measurements (girth, height and leaf count) were maintained for an year, at the end of which destructive samplings of these seedlings were done to separate out the shoot (into various components) and root.

Samples are being analysed for major nutrients N,P,K, Ca and Mg.

DIVISION OF AGROSTOLOGY

Nitrogen fixation by pasture legumes

Continuation of the studies initiated last year confirmed that most of the pasture legumes available locally such as *Centrosema pubescens*, *Pueraria phaseoloides* and Siratro fix considerable quantities of nitrogen. The field trial set up last year using *Centrosema* and *B. miliiformis* to determine the total nitrogen output from a mixture of these two plants at different levels of applied nitrogen was sampled on three occasions and the data are being studied.

Pasture and fodder management studies

Two trials were set up with *Brachiaria ruziziensis* and *Digitaria decumbens*. These trials were sampled during the two growing seasons and the data obtained are being analysed. In addition to these, a trial was commenced to compare the milk production of Sinhala x Jersey cross-bred cows feeding only on fertilized *B. miliiformis* pasture with those that receive concentrates in addition to the normal estate grazing. The data collected from the first lactation showed that there is no significant difference between the two managements suggesting that the full production potential of these animals may be obtained from well managed *B. miliiformis* pasture.

Ecological studies

The trial carried out at Dodanduwa to study the performance of different pasture and fodder grasses in the high rainfall regions showed that *B. dictyoneura* and *B. ruzizensis* were superior to *B. miliiformis* and *B. Brizantha*. Therefore a trial was set up during the latter part of the year to study the performance of the two former grasses at high levels of nitrogen fertilizer.

DIVISION OF INTERCROPPING

Intercropping trials on estates

The project at Delgolla Estate, Kirimetiya, was terminated during the year as the land had to be handed back to the owners. The two projects at Mulleriyawa and Ingiriya were continued during the year.

At Mulleriyawa, the principal intercrop of banana was affected by the banana weevil. At Ingiriya, the operations still continue to run at a loss. However, some annual crops such as Cassava, *Dioscorea* and Passion fruit showed profits during the year. From the initial observations made, the most suitable crops for this high rainfall area appear to be perennial crops like coffee, cocoa and pepper. At Delgolla too the project continued to run at a loss. Most of the annual short term crops could not be produced at a profit except for vegetables like luffa and capsicums under irrigation. The banana at this project appears to be very severely affected by the drought.

Trials with perennial and long-term intercrops

- (a) Observations at Bandirippuwa and Pothukulama on several cocoa selections planted under coconut were continued.
- (b) A trial commenced at Walpita with robusta coffee planted at three densities and with three levels of fertilizer. Any effects on coconut yields will also be observed.
- (c) A trial with four cocoa varieties at three fertilizer levels was also commenced at Walpita
- (d) At Bandirippuwa, a trial was commenced with ten robusta coffee selections at three levels of fertilizer supply.
- (e) An observation trial on mulberry under coconut at De Soysa Estate, Kirimetiya was maintained.
- (f) A trial to study the performance of sugar cane varieties under coconut was commenced at De Soysa Estate, Kirimetiya. The early growth of some show considerable promise.
- (g) A trial to study the effects of perennial crops on the yield of coconut and the economics of intercropping with perennial crops was set up at Dodanduwa.
- (h) An economic evaluation of intercropping coconut with coffee, cocoa, pepper, cinnamon and papaw was commenced at Bandirippuwa.

Trials with short-term intercrops

At De Soysa Estate, Kirimetiya, studies were continued on the recording of morphological and agronomic characters of a collection of sixteen varieties of aroids and twenty-seven varieties of *Dioscorea* yams. The objective of this study is to prepare a key for their identification and to evaluate their suitability as intercrops.

Studies were also commenced during the year on the dormancy exhibited by certain of these yams. Preliminary trials carried out showed that treatments such as smoking, storing the yams with some kinds of leaves and the application of "Ethrel" promotes the ready sprouting of these yams.

During the Maha rains, trials were planted to study the effect of time of planting on the yield of green gram, cowpea, ground nuts and castor under rainfed conditions. The data from these trials show that irrespective of the duration of the crop, planting with the onset of the rains always gives the highest yields.

Animal Husbandry

The rotational cross breeding programme was continued during the year. There was no outbreak of any serious diseases and the health of the herd was satisfactorily maintained. Over a hundred head of animals were transferred to De Soysa Estate, Kirimetiya during the year. Already about (30-hectares=75 acres) of grass have been established at Kirimetiya.

CROP PROTECTION DIVISION

Pests

Biological control activities were continued during the year through the insectaries at Lunuwila and Mylambavely (E.P.). Promising indications for the control of several pests by the use of systemic insecticides were obtained.

Coconut Caterpillar : *Nephantis serinopa*

During the year several out-breaks of this pest were reported from Western Province, Southern Province and Eastern Province. These were effectively controlled by the release of parasites. The breeding programme of these parasites was continued at the two Insectaries at Lunuwila and Mylambavely (E.P.). Breeding of the Larval parasites - *Perisierola nephantidis*, *Eriborus trochanteratus*, *Spoggosia bezziana* and the egg parasites *Trichogramma braziliensis* was carried out.

Coconut Scale : *Aspidiotus destructor*

Several reports of this pest were received during the year from North Western Province, Western Province and Southern Province. On inspection, the indigenous coccinellid predators, *Chilocorus nigritus* and *Pullus xerampelinus* were found to be active. With the onset of the North East Monsoon the pest came under control naturally.

Red Weevil : *Rhynchophorus ferrugineus*

Reports of Red Weevil infestations were received from several districts. Since the recommended insecticide Metasystox was not freely available, alternate insecticides were tested in the laboratory. On account of the exorbitant cost, the small holders are rather reluctant to apply systemic insecticides.

Promecothea cumingi : After a period of surveillance it was noted that the original outbreak has been brought under complete control. During the course of the year, three pockets of infestations of this pest were observed at Katunayake, Ambalangoda and Galle, but the pest is under control by the parasite *Dimmockia javanica* which has now established well.

Black Beetle : Oryctes rhinoceros

Occasional infestations of this pest were recorded during the year under review. A virus *Rhabdionvirus oryctes*, capable of controlling this pest was disseminated in the field.

Biological control of Eupatorium odoratum

The performance of the defoliating caterpillar, *Ammalo insulata* which feeds on *Eupatorium odoratum* was studied further during the year.

Diseases

A few reports of Bud rot, stem bleeding and Grey Blight were received. Relevant control measures were recommended. Field experiments on Leaf Scorch Decline were continued.

BIOMETRY UNIT

Statistical Service

A routine statistical service to the Research Divisions involving advice regarding design of experiments and statistical analysis of experimental data was rendered.

Research

The following experiments were maintained satisfactorily.

Calibration Trial at Bandirippuwa Estate : Keeping records on crop components and vegetative records.

Irrigation Trial at Ratmalagara Estate : Watering coconut palms with different dosages and at different frequencies during the drought period,

Bunch Thinning Trial at Bandirippuwa Estate : Thinning bunches at different ages of maturity.

Copra conversion factor experiments at Bandirippuwa Estate and Ratmalagara Estate : Curing copra at different periods after harvesting coconuts.

Agri-Meteorology

Meteorological Stations

The three Agri-meteorological Stations at Bandirippuwa Estate, Ratmalagara Estate and Isolated Seed Garden were maintained.

Forecast of Total Production in Sri Lanka

A new production function for crop forecasting was evolved.

General

The Biometrician attended a number of meetings at the Coconut Development Authority and Bureau of Standards.

The Biometrician gave a course of lectures on "Design of Experiments" at the Management Level Training Programme on quality control at the Bureau of Standards.

The Biometrician served on the Specialist Committee on statistics and quality control at the Bureau of Standards.

The Biometrician gave a series of lectures on Biostatistics to Botany (Special) students of the Vidyalankara Campus.

The Biometrician gave a series of lectures on Biometry to the post-graduate students of the Post Graduate Institute of Agriculture.

The Biometrician continued to function as consultant Biometrician at the Rubber Research Institute of Sri Lanka.

The Biometrician continued to function as statistical adviser to the Sri Lanka Sugar Corporation.

PLANTING DIVISION**Issue of Planting Material**

Fifteen central nurseries were maintained by the Coconut Research Board. In addition to these, assistance was granted for the establishment of three nurseries for Agricultural Productivity Centres, three nurseries for District Development Co-operatives and thirteen nurseries for the Coconut Cultivation Board in 1977.

Total seednuts planted	—	14,06,343
Total seedlings booked	—	9,68,019
Total seedlings issued	—	8,74,964

PUBLICATIONS / PUBLICITY UNIT & LIBRARY

Publications of the Coconut Research Institute during the year included the following

'Ceylon Coconut Quarterly' Vol. XXV Numbers 3 / 4

'Pol Pawath' Vol, 6 Number 3

'Bibliographical Series on Coconut' Series 4 - 7

Advisory Leaflets, Sinhala numbers 1, 4, 5, 10, 21, 22, 29, 34, 37, 44, 45, & 46

Tamil Numbers 21, 37

English Numbers 15, 25, 37

U. PETHIYAGODA
Director

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Report of the Division of Soils (1977)

A. FIELD EXPERIMENTS

1. 4 x 4 x 4 NPK Experiment on Adult Palms - Bandirippuwa Estate (Commenced November 1960).

Owing to unavailability on time, fertilizer was not applied in 1977. As in the previous years very highly significant responses to phosphorus and potassium were observed. The main effects are shown in Table A 1.

Table A 1. Yield data for 1977 - kg copra/ha - 163 palms/ha. Copra yields adjusted by covariance analysis.

Treatment / palm / yr	kg copra/ha	%	Difference kg copra/ha
N ₀ 0.000 kg ammonium sulphate	— 791	100	—
N ₁ 1.103	— 779	99	-12
N ₂ 2.206	— 750	95	-41
N ₃ 3.309	— 713	90	-78
P ₀ 0.000 kg saphos phosphate	— 551	100	—
P ₁ 0.826	— 777	141	226*
P ₂ 1.652	— 783	142	232*
P ₃ 2.478	— 922	167	371**
K ₀ 0.000 kg muriate of potash (60%K ₂ O)	— 347	100	—
K ₁ 0.376	— 722	208	375**
K ₂ 0.752	— 939	271	592***
K ₃ 1.128	— 1019	294	672***

Significant difference P 0.05 = 142.2 kg/ha.

*, **, *** Significant at P 0.05, P 0.01 and P 0.001 respectively.

2. 3 x 3 x 3 NPK Experiment on Young Palms - Ratmalagara Estate (Commenced December 1948).

The annual manuring was done in November 1977. Potassium showed significant response at P 0.05 level. The main effects are shown in Table A 2.

Table A 2. Yield data for 1977 - kg copra/ha - 136 palms/ha.

Treatment / palm / yr.	Kg copra / ha	%	Difference kg / ha
N ₀ 0.681 kg ammonium sulphate	— 1885	100	—
N ₁ 1.362	— 1897	101	12
N ₂ 2.043	— 1815	96	-70

P ₀ 0.454 kg saphos phosphate	—	1810	100	—
P ₁ 0.908	—	1911	105	101
P ₂ 1.362	—	1876	104	66
K ₀ 0.681 kg muriate of potash (60% K ₂ O)	—	1806	100	—
K ₁ 1.362	—	1833	101	27
K ₂ 2.043	—	1957	108	151*

Significant difference at P 0.05 = 140.4 kg / ha

* Significant at P 0.05

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

Half yearly manuring was carried out in June. Phosphorus fertilizer was not applied. The annual application and the second half-yearly supply was done in December.

The yield data was adjusted for pre-differential manurial leaf counts by covariance analysis.

Analysis of variance showed no significant difference between treatments. The adjusted yield data are reported in Table A3.

Table A 3. Yield data for 1977 - kg copra/ha - 178 palms/ha. Copra yield adjusted by covariance analysis.

Treatment	Annual Manuring			Biannual Manuring		
	kg copra/ha	%	Difference kg copra/ha	kg copra/ha	%	Difference kg copra/ha
Control	2303	100.0	—	2303	100.0	—
Ammonium sulphate + saphos phosphate	2445	106.2	142	2398	104.2	95
Ammonium sulphate + superphosphate	2671	116.0	368	2695	117.0	392
Urea + saphos phosphate	2279	99.0	-24	2054	89.2	-249
Urea + superphosphate	2172	94.3	-131	2433	105.6	130

4. 5 x 5 x 5 NPK Experiment on Adult Palms - Naiwala Estate, Veyangoda (Commenced July 1967).

The differential manuring of the experiment was not carried out as it was decided to close down the experiment.

As in the past years response to potassium has been highly significant. The main effects are shown in Table A 4.

Table A 4. *Estimated yield for 1977 - kg copra / ha - 178 palms / ha*

<i>Treatment / palm / yr</i>	<i>kg copra/ha</i>	<i>%</i>	<i>Difference kg copra/ha</i>
N ₀ 0.000 kg ammonium sulphate	— 921	100.0	—
N ₁ 1.103 "	— 1034	112.3	113
N ₂ 2.206 "	— 1083	117.6	162
N ₃ 3.309 "	— 1023	111.1	102
N ₄ 4.412 "	— 839	91.1	-82
P ₀ 0.000 kg saphos phosphate	— 851	100.0	—
P ₁ 0.826 "	— 927	108.9	76
P ₂ 1.652 "	— 1021	120.0	170
P ₃ 2.478 "	— 1073	126.1	222
P ₄ 3.304 "	— 1067	125.4	216
K ₀ 0.000 kg muriate of potash (60% K ₂ O)	— 476	100.0	—
K ₁ 0.454 "	— 720	151.3	244
K ₂ 0.908 "	— 979	205.7	503
K ₃ 1.362 "	— 1239	260.3	763
K ₄ 1.816 "	— 1481	311.1	1005

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

Owing to unavailability on time, fertilizer was applied in January, 1977. As in the past years the response to phosphorus was significant at P 0.05. The main effects are shown in Table A 5.

Table A 5. *Estimated yield for 1977 - kg copra/ha - 148 palm/ha*

<i>Treatment / palm / yr</i>	<i>kg copra/ha</i>	<i>%</i>	<i>Difference kg copra/ha</i>
N ₀ 0.000 kg ammonium sulphate	— 2247	100.0	—
N ₁ 1.103 "	— 2229	99.2	-18
N ₂ 2.206 "	— 2170	96.6	-77
N ₃ 3.309 "	— 2070	92.1	-177
N ₄ 4.412 "	— 1931	85.9	-316
P ₀ 0.000 kg saphos phosphate	— 1927	100.0	—
P ₁ 0.826 "	— 2003	103.9	76
P ₂ 1.652 "	— 2104	109.2	177
P ₃ 2.478 "	— 2231	115.8	304
P ₄ 3.304 "	— 2383	123.7	456
K ₀ 0.000 kg muriate of potash (60% K ₂ O)	— 2066	100.0	—
K ₁ 0.454 "	— 2165	104.8	99
K ₂ 0.908 "	— 2197	106.3	131
K ₃ 1.362 "	— 2161	104.6	95
K ₄ 1.816 "	— 2059	99.7	-7

Mg ₀	0.000	kg kieserite	—	2167	100.0	—
Mg ₁	0.681	"	—	2191	101.1	24
Mg ₂	1.362	"	—	2172	100.2	5
Mg ₃	2.043	"	—	2111	97.4	-56
Mg ₄	2.724	"	—	2008	92.7	-159

6. Comparison of Eppawala Apatite with Saphos Phosphate - Mahayaya Estate, Makandura and Andigedera Estate, Bingiriya (Commenced June, 1975).

At Mahayaya Estate, nitrogen and phosphorus fertilizers were applied in August, 1977 while potassium - not available then, was applied in December, 1977. The annual manuring at Andigedera Estate was done in November, 1977.

At Mahayaya estate, saphos phosphate, at level 2, was significantly better than Eppawala apatite.

Table A 6. Yield data for 1977 - kg copra/ha. Copra yields adjusted by covariance analysis - 158 palms / ha

Level	Eppawala apatite	Saphos phosphate
1	597	611
2	572	681*
3	678	643
4	614	632

Significant difference at P 0.05 = 106 kg/ha

*Significant at P: 0.05.

7. Magnesium Experiment on Young Palms - Bandirippuwa Estate, Lunuwila (Commenced October, 1972).

The first application of magnesium fertilizer for the year was done belatedly in July. 290.6 g (level 1) and 581.2 g (level 2) of kieserite per palm were used together with the basic dose of 1134.0 g per palm of young palm mixture.

Significant increase in number of leaves was produced by magnesium.

Table A 7. Effect of magnesium on leaf production in 1977 (leaves/palm/yr)

	Mg ₀	Mg ₁	Mg ₂
T x T	8.69	11.64**	11.19**
T x D	10.86	10.78	12.50*
D x T	9.97	13.22**	12.11*
OP	8.25	9.56*	10.89**

Significant difference at P 0.05 = 1.19 leaf/palm/yr.

*,** significant at P 0.05 and P 0.01 respectively.

8. Fertilizer Experiment on Young Hybrid Palm - Bandirippuwa Estate (Commenced December 1973).

The half-yearly applications of fertilizers were done in July, 1977 and January, 1978.

The composition of the fertilizer mixture was : 113.5 kg ammonium sulphate, 34 kg saphos phosphate and 56.8 kg muriate of potash (60% K₂O.) The rates of application were :

Levels	kg/seedling/application
0	0.000
1	1.361
2	2.722
3	4.082

Leaf counts were taken in January and August. No significant effect between the treatments were noticed.

9. Soil Moisture Experiments at Bandirippuwa Estate and Ratmalagara Estate (Commenced 1974).

The two experiments were concluded during this year. The results are being analysed.

10. Chlorine Experiment at Ratmalagara Estate, Madampe (Commenced June 1977)

Chlorine has been reported to be an important nutrient for coconut. To test this hypothesis an experiment comparing different rates of NaCl and KCl was commenced at Ratmalagara estate.

The experimental layout is of fully randomized design. There are 8 treatments replicated thrice. Each plot consists of 12 palms. The plots are separated by single guard rows. The rates of application are given below :

Levels	Common salt (55% Cl), kg / palm / yr	Muriate of potash (45% Cl), kg / palm / yr.
1	0.00	0.00
2	0.60	0.75
3	1.20	1.50
4	1.80	2.25

Each experimental palm is given a basal dose of 0.627 kg urea, 0.8 kg saphos phosphate and 1.375 kg sulphate of potash / yr.

Premanurial yields were recorded commencing November, 1976. The first differential manuring was carried out in June 1977.

B. POT EXPERIMENTS

1. Comparison of Eppawala Apatite with Saphos Phosphate using *Paspalum Commersonii*.

Studies on the performance of Eppawala apatite were continued, A glass-house experiment was conducted, using a sandy regosol from Bandirippuwa estate.

Vegetative growth of the plants was poor. All the plants treated with Eppawala apatite showed symptoms of phosphorus deficiency. Chemical analysis of the dry matter was not done as the yield was low.

The yield of dry matter of plants from saphos phosphate treatments was more than double that from plants treated with Eppawala apatite, even though the levels of the latter were double those of the former.

2. Comparison of Eppawala Apatite with Saphos Phosphate Using P-32

To overcome the problems of transplanting shock encountered in the procedure followed in 1976, it was decided to transplant 4 month old seedlings in pots and grow them for a period of 4 months to establish their root system before application of P-32 labelled superphosphate. Eight equidistant holes of 3 cm diameter and 10 cm depth were made at 4 cm from the circumference of the seednut and 25g labelled superphosphate applied to each pot was equally distributed in the holes. After superphosphate addition the holes were filled with soil. Other details of design of this experiment were identical with those of 1976. Labelled superphosphate was applied in February 1977 and leaves were sampled at the end of 4 and 8 weeks for determination of total P and P-32 uptake. "A" values were computed from these data. The data on "A" values again revealed very high coefficients of variation (C. V. about 100 percent) which did not permit meaningful assessment of the relative efficiency of Eppawala apatite and imported rock phosphate as sources of P for coconut.

It was decided to carry out the studies with adult palms in the field.

C. LABORATORY INVESTIGATIONS

1. Surface Charge Characteristics of some Acid Coconut-Growing Soils

Surface charge characteristics of 14 samples belonging to three Great Soil Groups, Ultisol, Alfisol and Entisol, at different pH and ionic strengths showed that all the soils contain predominantly the "constant surface potential" type of colloids; the Alfisols contain also some colloids of the "constant surface charge" type. The point of zero charge of the soils ranged from pH 3.0 to 4.3 with the Alfisols having the lowest values and the Ultisols the highest. Net surface charge densities at the soil pH and pH 7.0 and ionic strengths of 0.005 M and 1M showed that cation exchange capacity as determined by the routine NH_4OAc method may give very unrealistic values compared to the actual field situation.

Addition of phosphorus decreased the point of zero charge and increased the negative surface charge densities of these soils.

2. Analysis of Soil Samples from Fertilizer Experiments

Soil samples from the manure circles of Naiwala and Pothukulama response curve experiments were collected and analysis for different forms of K and P, total N, exchangeable Ca and Mg and pH were carried out.

3. Analysis of Leaf Samples from Fertilizer Experiments

Leaf samples (14th leaf) were collected from the Naiwala and Pothukulama response curve experiments in September and analysis for N,P,K, Ca, Mg and Cl were commenced.

D. SOIL SURVEY

1. Detailed Soil Survey of Walpita Estate, Kotadeniyawa

The influence of soil type on nut yield and flowering characteristics of young coconut on a 10 ha Block at Walpita estate was investigated. Detailed soil survey of the area revealed that there are four soil series - (1)a. Boralu-moderately deep phase (Plinthudults), (1b)

Boralu-deep phase (plinthudults), (2) Sudu (Quartzipsamments), (3) a variant of Katunayake (Quartzipsamments), and (4) Rathupasa (Quartzipsamments) which produced yields (15th to 19th year) of 47,55 62,63 and 65 nuts/palm/year respectively. Although the palms in Sudu produced high nut yield, they came into bearing later than the others due to the impeded drainage conditions.

Yields were higher on soils having greater soil depths, gravel depths (depth at which gravels begin to appear) lighter texture and moderately good drainage. In light and medium textured soils, soil depth had a significant bearing on yield—a depth of 120 cm appeared to be the critical depth. At depth > 140 cm, yield was significantly affected by texture—lighter textured soils had a significantly higher proportion of high yielding palms than heavier textured soils. The interaction between gravel depth and texture on yield were similar to soil depth and texture. A gravel depth of 60 cm appeared to be the critical level for light textured soils. Under moderate and good drainage, yield continued to increase with both soil and gravel depths without any indication of a critical depth. Generally, under any gravel or soil depths, “moderately well” drained soils were preferred to well drained soils.

2. Detailed Soil Survey of Bandirippuwa Estate, Lanuwila

The survey was carried out by Mr. K. S. O. Perera and the following soils were identified (Figure 1).

(a) Boralu series - *Soils of the ridge*

The soils are formed on undulating to nearly rolling landscape and are derived from the lateritic products of the underlying Vijayan basement of crystalline rocks.

The soils are very shallow to moderately deep, sandy clay loams with gravels and are well drained.

Three phases were identified: (i) Boralu series—very shallow phase, (ii) Boralu series—shallow phase, (iii) Boralu series—moderately deep phase.

(b) Pallama series - *Soils of the upper slopes*

The landscape is undulating. The soils are probably formed on the accumulated erosional products (from the Boralu landscape) on top of the Boralu footslopes.

The soils are moderately deep to deep, sandy clay loams, overlying the buried Boralu surface. They are well drained.

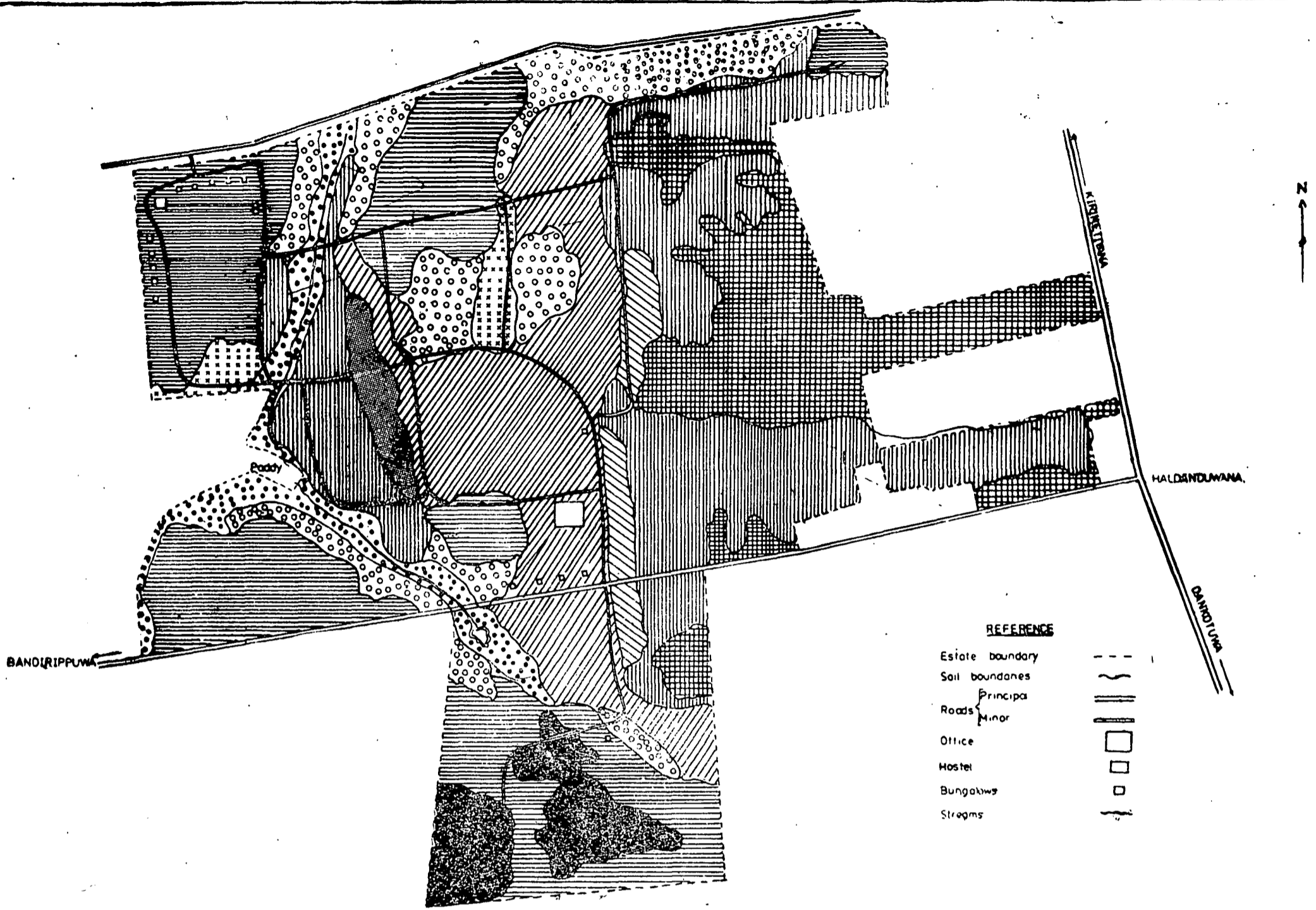
(c) Pallama series (variant) — *Soils of the terrace and terrace bottom slopes*

The landscape is nearly level to undulating. Marine sedimentation has deposited sands on the old Pallama surface. The depth of the surface sandy horizon of these soils ranges from few cm to about 50 cm with the maximum depth reaching in the terrace bottom slopes. The soils are well drained.

(d) Rathupasa series (variant) — *Soils of the lower terrace*

The landscape is gently undulating to nearly level. A lower beach terrace may have been present during the marine phase and the sediments have resulted in a light yellowish brown deep soil with loamy sand grading downwards to a sandy clay loam. The soils are well drained. These soils have slight resemblance to Rathupasa series

SOIL MAP OF THE BANDIRIPPUWA ESTATE RESEARCH STATION.



REFERENCE

- Estate boundary
- Soil boundaries
- Roads
 - Principal
 - Minor
- Office
- Hostel
- Bungalows
- Streams

Mapped by - PERERAKSO 1977.

Assigned by - D.S. WIJAYATUNGE

U.S.S. PERERA
DIVISION OF SOILS
Estate plan - E.N. Fernando
D.S. Wijayatunge.

Cartography O.S. WIJAYATUNGE

Scale 1 Inch to 88 Chains

SOILS	GEOLOGY	PHYSIOGRAPHY
A ₁ BORALU SERIES, VERY SHALLOW PHASE	LATERIZATION OF CRYSTALLINE BASEMENT	STRONGLY UNDULATING
A ₂ BORALU SERIES, SHALLOW PHASE.	DO	- DO -
A ₃ BORALU SERIES, MODERATELY DEEP PHASE	DO	UNDULATING
B ₁ PALLAMA SERIES	COLLUVIAL SEDIMENTS ON BURIED BORALU SURFACE	- DO -
B ₂ PALLAMA SERIES, VARIET.	MARINE SEDIMENTS ON BURIED PALLAMA SURFACE	GENTLY UNDULATING TERRACE T ₁
B ₃ DO - - DO -	- DO -	FOOT SLOPES OF TERRACE T ₁
C ₁ RATUPASA SERIES, VARIET	MARINE SEDIMENTS	GENTLY UNDULATING TERRACE T ₃
C ₂ MADAMPE SERIES,	- DO	GENTLY UNDULATING
C ₃ SUDU SERIES,	-	- DO -
C ₄ ARUVI SERIES	RECENT STREAM SEDIMENTS	

(e) Madampe series — *Soils of the slopes*

The landscape is undulating. The soils are deep loamy sands grading downwards to sandy loams. The soils are imperfectly drained.

(f) Sudu series — *Soils of the valley bottoms*

The landscape is gently undulating to nearly level. The soils are deep sands with imperfect to poor drainage.

(g) Aruvi series — *Soils of the stream beds*

These are poorly drained stream sediments. The soils are sandy clay loams at the surface passing to sandy clays at depth.

E. MISCELLANEOUS

The following papers were published in scientific journals or presented in scientific meetings :

1. Loganathan, P., R. G. Burau and D. W. Fuerstenau (1977). Influence of pH on the sorption of Co^{2+} , Zn^{2+} and Ca^{2+} by a hydrous manganese oxide. *Soil Sci. Soc. Amer. J.* **41**, 56-64.
2. Loganathan, P. and V. Nalliah (1977). Downward movement and transformation of phosphorus in soils after long-continued fertilizer application to coconut (*Cocos nucifera*). *J. Agric. Sci. Camb.* **89**, 279-284.
3. Loganathan, P. and T. W. Fernando (1977). Efficiencies of Eppawala, saphos and concentrated super phosphates in some coconut soils — a laboratory evaluation. *Trop. Agric.* **133**, 23-34. 105-116
4. Loganathan, P. (1977). Profitability of fertilizing young coconut: results of three long-term field experiments. *Ceylon Cocon. Q.* **28**, 68-72.
5. Balakrishnamurti, T. S. (1977). Fertilizer placement experiments on coconut using radioactive phosphorus. Paper presented at the *Annual Sessions, Soil Science Society of Ceylon*, Dec. 3rd 1977.
6. De Silva, M. A. T., G. M. Anthonypillai and D. T. Mathes (1977) Sulphur nutrition of coconut. *Expl. Agric.* **13**, 265-271.

F. PERSONNEL

1. The Soil Chemist continued to serve in the Board of Study for Agricultural Chemistry and as a visiting lecturer at the Post Graduate Institute of Agriculture, University of Sri Lanka.
2. Mr. V. Nalliah, Senior Technical Assistant assumed duties in June 1977, after successfully completing his training at Bhabha Atomic Research Centre, Bombay.
3. Mr. M. A. T. de Silva, Research Officer resigned from the Institute on 1st May, 1977.
4. The Soil Chemist was elected as a Member of the Royal Institute of Chemistry (M. R. I. C.) and a Chartered Chemist (C. Chem.) by the Royal Institute of Chemistry on 8th February 1977.

P. LOGANATHAN
Soil Chemist

Report of the Division of Botany and Plant Breeding (1977)

BREEDING AND SELECTION

1.1. Controlled pollination work

Controlled pollination as a source of commercial seed is to be suspended from January 1978, and hence the programme was progressively cut down with the closure of the pollination stations. Only three stations, the Seed Garden, Ambakelle, Seed Garden, Horrekelly and Walpita were used for commercial seed production and 108,700 female flowers have been pollinated, (table 1), these consisting of *typica* x *typica* crosses. It is anticipated that about 30 percent of these will develop into nuts.

Table 1. Number of female flowers pollinated.

	Pollination Stations		
	Seed Garden Ambakelle	Seed Garden Horrekelly	Walpita Progeny Trial
January	—	3384	5298
February	—	4110	6064
March	—	5511	5149
April	—	3188	5634
May	—	1254	3371
June	—	3057	4702
July	—	4012	3374
August	—	4421	4589
September	—	4319	3777
October	—	2633	1143
November	—	—	3081
December	—	—	1140
Total	—	35889	47332
		—	25489

Besides the above, 5200 female flowers of the variety San Ramon were pollinated with San Ramon pollen. It is hoped to produce about 1500 hand pollinated SR x SR seednuts which would help to increase the base collection of this useful genetic material.

About 46,000 seednuts were harvested from crosses done in 1976. Private and public sector estates were supplied with 120 samples of *typica* (prepotent) and 228 samples of dwarf (*pumila*) pollen for implementing their own pollination programmes.

1.2. RESEARCH NURSERIES

CRIC 60 and CRIC 65 seednuts harvested during the year were distributed to the two nurseries at Bandirippuwa Estate and the Seed Garden Ambakelle in the following manner.

Type of seednuts	Bandirippuwa nursery	Ambakelle Seed Garden nursery	Total
<i>Typica x typica</i> (CRIC 60) —	39,200	15 476	54676
<i>Typica x pumila</i> and <i>pumila x typica</i> (CRIC 65)	6,022	17 702	23724

In order to facilitate distribution of seedlings to smallholders, a small quota of hybrid seednuts was issued to the Planting Division nurseries at Walpita, Ratmalagara and Ibbagamuwa to serve small-holders in the localities served by these nurseries.

This year 69,329 seedlings were issued from Bandirippuwa nursery and the Ambakelle Seed Garden nursery and this consists of 16,075 *typica x typica* (CRIC 60) and 53254 *pumila x typica* (CRIC 65) seedlings.

1.3. INTER - VARIETAL HYBRIDS

1.3.1. The growth, period for flowering and yield of F_1 hybrids have been presented in previous annual reports. A field experiment was laid down in December 1972 to compare the growth, flowering and yield of

- Typica x nana* (form *pumila*) and its reciprocal
- Typica x nana* (form *regia*) and its reciprocal
- Typica x nana* (form *eburnea*) and its reciprocal

This plantation is five years old and the data on initial flowering is given in table 2.

Table 2. Performance of hybrids - Field No. 10

Pothukulama Research Station				
Type of hybrid	No. of seedlings established	No. of palms in flower as at Dec. 76 - Dec. 77		Period for flowering (months)
(a) <i>Typica x nana</i> (form <i>pumila</i>)	56	14	40	48.3
(b) <i>Nana</i> (form <i>pumila</i>) x <i>typica</i>	54	29	48	44.2
(c) <i>Typica x nana</i> (form <i>regia</i>)	22	04	21	51.8
(d) <i>Nana</i> (form <i>regia</i>) x <i>typica</i>	76	34	67	45.5
(e) <i>Typica x nana</i> (form <i>eburnea</i>)	22	—	—	—
(f) <i>Nana</i> (form <i>eburnea</i>) x <i>typica</i>				

Types (e) and (f) are not in flower as they were planted later. Furthermore, due to casualties in the field some of the seedlings had to be transplanted twice to make a compact block. It will be observed that types (b) and (d) take virtually the same period of time — 44.2 and 45.5 months respectively—for initial flower production. The slightly longer period taken for types (a) and (c) where the female parent is *typica*, may probably be due to the fact that a few illegitimate progeny (*typica* open pollinated), resulting from damage to pollination bags or improper bagging, and escaping detection at the nursery stage, would have taken a longer period for flowering.

1.3.2. Assessment of hybrid performance in the different planting districts

A general assessment of hybrid performance has been completed in most areas where at least 65 plants have been grown at each location. The survey has yet to be attempted in the Northern and Eastern Provinces.

An important field trial was initiated this year in conjunction with the Dept. of Agriculture at Maha Illuppallama Research Station. This is an evaluation of hybrid performance with and without supplemental irrigation using 320 seedlings on 2 hectares (5 acres) for each treatment.

1.4. Mother palm seed supply scheme

1,413,513 selected seednuts from 17 estates were supplied to the Planting Division nurseries. These consist of seven estates managed by the National Livestock Development Board, four estates belonging to the Coconut Research Board and six private estates. Our collection of mother palms was further augmented as a result of selection carried out on Beligama Farm, Galewela and Siringapathe Farm, Badalgama, both managed by the National Livestock Development Board. Seed nut supplies to the Planting Division nurseries fell short by 610,000 nuts due to a shortfall in crop as well as insufficient estates for selection of additional palms. Transport of selected seednuts to distant nurseries was affected by the non-availability of railway waggons.

2. SEED GARDENS

2.1. First Seed garden, Ambakelle

Rogueing of palms and recording weight of husked nuts in fields 1, 2, 3, 4, 6, 7 and 8 was completed and the programme for mass production of *typica x typica* seed through emasculation and natural pollination will commence as soon as problems of labour and adequate supervision have been settled.

Production of hybrid seed from fields 5, 9 and 10 was continued during the year and the details are given in table 3. Thirty five thousand hybrid seednuts were harvested from fields 5 and 7 from emasculations done in 1976. The seed Garden received 1900 mm. of rain with January the only dry month and there should be a substantial increase in crop next year.

Table 3. *Pumila x typica* hybrid seed production through emasculation and natural pollination.

Month	Number of seednuts Field No. 5	Seednuts developing Field No. 9	12 weeks after emasculation Field No. 10*
January	— 1616	996	234
February	— 1594	604	167
March	— 2282	856	785
April	— 3542	2386	1764
May	— 5367	7058	4531
June	— 6161	8140	5388
July	— 4873	7516	5065

August	—	5583	7275	3729
September	—	4069	5679	4565
October	—	2770	4137	3247
November	—	2976	3950	3898
December	—	1429	2225	5713
Total	—	42268	50822	39086

Grand Total : 132, 176 hybrid seednuts

* Not in full production and palms emasculated for the first time.

2. 2. Second seed garden, Horrekelly

Vacancies in fields 1, 3, 4 and 5 were supplied with 1450 dwarf (variety *nana* form *pumila*) seedlings. Horrekelly received only 1168 mm of rain with long dry spells affecting the growth of the underplantation.

3. LABORATORY AND FIELD INVESTIGATIONS

3.1. Colour inheritance in inter-varietal crosses.

The two colour forms—green and reddish—brown of the variety *Typica* form *typica* at the Marandawila Progeny Trial and Walpita Progeny Trial were crossed with :—

- Variety *Nana* forms *pumila*, *eburnea* and *regia*.
- Variety *Aurantiaca*, form *thembili* (king coconut)
- Variety *Typica* form *typica* (green)
- Variety *Typica* form *typica* (reddish—brown)

Table 4 gives the number of nuts developing from the different crosses. These will be harvested in 1978 and nut components as well as petiole colours of resulting seedlings will be determined.

Table 4. Colour inheritance in inter-varietal hybrids (Summary of crosses.)

Type and No. of female parents used	+ Male parent and No. of button nuts developing 8 weeks after pollination						
	TG	TR	DG	DY	DR	KC	OP
* A Tall (green) 23 palms	174	97	184	131	47	192	580
Tall (reddish brown) 23 palms	131	98	107	123	74	123	538
* B Tall (green) 26 palms	70	71	91	52	132	77	540
Tall (reddish brown) 10 palms	34	24	30	9	42	28	190

*A *Population of palms from Walpita Progeny Trial

*B *Population of palms from Marandawila Progeny Trial

- + TG—tall, green, variety *typica* form *typica*—nuts with green epicarp
 TR—tall, reddish—brown, variety *typica* form *typica* nuts with reddish brown epicarp
 DG—Dwarf green, variety *nana* form *pumila*—nuts with green epicarp
 DY—Dwarf Yellow—variety *nana* form *eburnea*—nuts with yellow epicarp

DR - Dwarf red - variety *nana* form *regia* - nuts with reddish epicarp
 KC - King coconut - variety *Aurantiaca* form *thembili* - nuts with reddish epicarp
 (OP - open pollinated seednuts of palms used as female parent)

3.2. Effect of quality of male parent on performance of *pumila* x *typica* F₁ hybrids.

Selected variety *Nana* form *pumila* palms were crossed with *typica* (prepotent); *typica* high-yielding and *typica* low-yielding palms, to study the effect of the different yield classes of male parents on nut components as well as subsequent hybrid performance in the field. Nut characters that were investigated were (a) weight of husked nut, (b) weight of kernel (endosperm) and (c) weight of shell. It would appear that while there is a significant difference in these parameters between *pumila* (control) and *pumila* x *typica* (all types), there was no difference arising from the type of *typica* pollen parent used for the cross *i.e.* prepotent, high-yielding or low yielding. Growth and yield of the different progeny types resulting from the use of pollen from male parents of widely varying yield potential are being studied in the field

3.3. Separation of pollen proteins of coconut by electrophoresis as a tool in varietal identification.

A successful technique has now been worked out, the essential details of which are as follows :-

- (a) Macerate 150 - 200 mg. pollen in a ground glass homogeniser using 1 ml. of cold phosphate buffer (pH 8.0)
- (b) Centrifuge at 4000 g. for 15-20 minutes.
- (c) Place a drop of the super-natant at the top of the poly-acrylamide gel rods.
- (d) Run the apparatus for 60 - 70 minutes at 100 - 110 v DC.
- (e) De-stain in dilute acetic acid

Differences in the band pattern in some varieties and forms of coconut have been observed and this will be reported in detail after further study.

3.4. Organization of the stem apex of variety *typica* form *typica*, variety *nana* form *pumila*, and *pumila* x *typica* F₁ hybrids. The results of this investigation are being prepared for publication in the form of two communications.

- (a) Pattern of growth of the shoot apex with special reference to leaf and inflorescence initiation.
- (b) Differentiation of male and female flowers.

4. PUBLICATIONS :

Manthirratna, M. A. P. Planting densities and planting systems for coconut (*Cocos nucifera* L). A study of vegetative characters. Perak Planters' Journal for 1976. 57 - 59.

Manthirratna, M. A. P. Progress in Coconut Breeding - Sri Lanka. Association for the Advancement of Science Seminar on "Progress in Plant Breeding in Sri Lanka" May 1977.

M. A. P. MANTHIRRATNA
 Botanist

Ceylon Cocon. Q. (1978) 29, 25 - 26

Printed in Sri Lanka.

Report of the Chemistry Division (1977)

PLANT CHEMISTRY

1. Study of the variation in concentration of nutrients between fronds in the adult coconut palm.

In order to study the sources of variation in leaf sampling of coconut, variation in concentration of nutrient between fronds is an important consideration in the selection of specified leaf ranks.

With this in view, sampling was done on two occasions covering a wet and dry period.

Sampling for this study was done on 20 healthy adult palms from the Botanist's Projeny Trial at Walpita. Samples were taken from fronds 1, 4, 7, 10, 13, 16, 19 and 22. From each frond 5 leaflets from either side of the mid-portion of the fronds were taken and sampled separately. Each of these samples were then subsampled in the laboratory to obtain duplicate samples for chemical analysis. Analysis for the major nutrients N,P,K, Ca and Mg are carried out.

2. Effect of concentration of nutrient on growth and composition of hybrid seedlings in sand culture.

Details of the experimental layout have already been recorded in the Annual Report of 1976.

Growth measurements (girth, height and leaf count) were maintained for an year at the end of which destructive sampling of the seedlings was done to separate out the shoot (into various components) and root.

Samples are being analysed for the major nutrients N,P,K, Ca and Mg

3. Carbohydrate analysis.

Techniques in carbohydrate analysis were studied using samples of pith from the trunk and petioles of fronds from adult coconut palms for carbohydrate components.

Detailed and more systematic work is expected to be done in 1978.

PRODUCT TECHNOLOGY — SAP PRODUCTS.

4. Fermentation of toddy.

The succession of microbial flora together with concomitant biochemical changes was studied at regular intervals of time in fermenting coconut sap collected in flame sterilized earthenware pots. Three phases of biochemical changes corresponding to three broad types of microbial invasions were observed. The experiments are being repeated.

5. Production of coconut sugar and jaggery.

The percentage of reducing sugar in the sap was found to play a vital role in governing the quality and yields of sugar and hardening of jaggery. Sap containing more than 8% reducing sugars (as a % of total sugar) cannot be used to prepare jaggery. At this concentration the sugar yields drop below 50%. A simple colour reaction to check on the suitability of sap for jaggery and sugar preparation was devised which could be easily adopted in the field.

6. Nature of Rabath.

Analysis of rabath and studies on the formation of rabath indicated this to be a polymerised form of (complex) sugar produced during microbial activity on sap. Probably *Leuconestoc* sp. are converting sugars to dextrans. No evidence was found in favour of the belief that "rabath" oozes out of spathes under certain climatic conditions. Paper chromatographic studies on rabath shows the presence of many amino acids in traces and glucose, galactose, fructose, raffinose and melibiose.

7. Calibration of the ebulliometer for estimation of alcohol in toddy.

The ebulliometer used for the estimation of alcohol in toddy was calibrated against the pycnometer and hydrometer estimations. The pycnometer method is accepted to be the most accurate of the three. The readings obtained using the ebulliometer for samples containing between 6-8% alcohol agreed with those of the pycnometer. The ebulliometer was found to measure alcohol in toddy accurately. The calibration of ebulliometer by the hydrometer method will eliminate errors that could arise due to faulty thermometers or scales in the instruments.

8. Paper chromatographic studies on sugars and amino acids in coconut inflorescence sap.

Studies on changes in amino acids and sugars in sweet toddy during natural and controlled fermentation are in progress. Sucrose, glucose and fructose were the only sugars detected at different stages of fermentation. Changes in the composition of amino acids were found to be not significant.

9. Other projects in progress.

- (a) Use of inhibitors to arrest fermentation during collection of sap.
- (b) Preparation of Golden syrup from sweet toddy.
- (c) Use of absorbants and spices to improve the flavour of toddy distillates.

Publications.

Two papers have been submitted for publication in the Ceylon Coconut Quarterly and two others were presented, one at the International Conference on Global Impacts of Applied Microbiology held in Bangkok, Thailand from 20 to 27 November 1977 and one at SLAAS Sessions 1977, all on studies pertaining to sap products.

Personnel.

1. Mr. M. Jeganathan was promoted as Research Officer and Acting Chemist with effect from 1st January 1977.
2. Dr. U. Samarajeeva, Research Assistant, attended the Symposium on Indigenous Fermented Foods held in conjunction with the International Conference on Global Impacts of Applied Microbiology, in Bangkok, Thailand from 20 to 27 November, 1977.
3. Mr. S. Mohanadas, Research Assistant, continued his post-graduate training in Plant Biochemistry at the Waite Agricultural Research Institute, University of Adelaide, Australia.
4. Mr. P. M. J. Fernando, Laboratory and Field Attendant, was promoted as Clerk-Typist with effect from 26th April, 1977.
5. Mr. Y. H. N. Jayatissa, Laboratory and Field Attendant, was transferred from the Crop Protection Division with effect from 9th May.

M. JEGANATHAN
Actg. Chemist

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Report of the Agrostology Division (1977)

GENERAL

The 2 glass houses were out of commission and as a result work on soil fertility studies had to be temporarily stopped.

Work connected with the animal production studies from grass legume mixtures was commenced during the year. Pasture has been established and the plots demarcated. Legumes were introduced during the latter part of the year and it is hoped that grazing could commence early next year,

A. Soil Nutrient Studies Sirikandura Estate Soil

The experiments that were set up during the previous year with this soil were terminated during the early part of the year due to the unsatisfactory condition in the glass houses. The data collected from these experiments showed that the soil was acutely deficient in N,P,K and Mg. None of the minor nutrients tested were found to be deficient.

B. Pasture Studies

1. Comparison of 3 fodder grasses at 4 levels of nitrogen for dry matter production and effect on coconut yields (P 88 B/E)

The prevailing adverse weather conditions permitted only 4 samplings to be done during the year for the determination of dry matter production. Rather erratic responses to applied N were recorded during the year. Relatively high yields were recorded in the plots that did not receive nitrogen. The responses to the higher levels of nitrogen were also not marked. The dry matter yield data and the nut yield data are presented in Tables 1 and 2 respectively.

Table 1. Total dry matter yield of the three fodder grasses in experiment P 88 for the year 1977 in Kg/ha (mean of 3 replicates)

N level	<i>Pusa giant</i>	<i>Guinea B</i>	<i>Setaria anceps</i>
N ₀	4517.4	5862.0	4951.2
N ₁	5575.7	7100.7	5673.3
N ₂	5627.2	6633.5	5555.6
N ₃	5619.1	8674.4	5695.5

Table 2. Nut yields and Copra weight due to the three fodder grasses of experiment P88 for the year 1977 (mean of 3 replicates)

N level	<i>Pusa giant</i>		<i>Guinea B</i>		<i>Setaria anceps</i>	
	Nuts per ha	Copra kg/ha	Nuts ha	Copra kg/ha	Nuts ha	Copra kg/ha
N ₀	5732	963.9	7275	1233.6	6484	1118.8
N ₁	6800	1130.3	8105	1308.2	7116	1227.9
N ₂	7433	1256.6	5496	952.5	7314	1233.6
N ₃	7630	1262.3	6326	1055.7	7156	1273.8

2. To study the effect of three levels of applied nitrogen on the growth, persistence and crude protein output of *Centrosema pubescens* and *Brachiaria miliiformis* when grown alone and in mixture under coconut (P 94 B/E)

Two samplings were taken, one at the end of each growing season. The dry matter yields from the two harvests are shown in Table 3. There was a progressive increase in yield of *B. miliiformis* due to the increase in the level of added nitrogen both when grown alone and in combination with the legume. The growth of the legume was however not influenced by the addition of nitrogen either when grown alone or in combination with grass.

Table 3. Total dry matter yield of the two samplings of experiment P94 (mean of 4 replicates) in mixture

Added N	grass alone		legume alone		Total
	grass	legume	grass	legume	
N ₀	1334	367	1108	131	1239
N ₁	1367	264	1210	129	1339
N ₂	1576	394	1312	93	1405

3. To study the performance of *Brachiaria ruziziensis* under coconut at four levels of nitrogen application and three frequencies of defoliation (P95 B/E)

Two cycles of defoliation were done during the year. The dry matter yield from the two cycles are given in Table 4. No significant differences in the dry matter yields were recorded for frequencies of defoliation or levels of added nitrogen.

Table 4. Total dry matter yield of the 2 cycles of defoliation done in experiment P95 in gm/m² (mean of 4 replicates)

	3 weeks	4 weeks	6 weeks
N ₀	440.6	443.5	424.0
N ₁	509.3	439.0	462.3
N ₂	485.8	442.7	461.6
N ₃	583.2	589.2	564.6

4. Performance of a virus resistant strain of Pangola grass (*Digitaria decumbens*) at different levels of nitrogen application (P97 B/E)

The strain of Pangola grass introduced earlier was found to be prone to attack by a stunting virus. The strain under test in this trial was introduced from the V. R. I., Peradeniya and was reputed to be resistant to the stunting virus. The experiment was an observation trial to test its resistance to the virus and also to determine its production potential under coconut at varying levels of nitrogen application. The experiment was planted with the May-June rains and three cuts were taken up to December and the total dry matter yields are presented in Table 5. Observations made during the year showed that the grass strain was resistant to the stunting virus and yields increased progressively with increase in the levels of applied nitrogen.

Table 5. Total dry matter yield in gm/m² from 3 cuts in experiment P97 (mean of 4 replicates)

	N ₀	N ₁	N ₂	N ₃
	208.2	305.8	429.2	439.1

5. Live weight gains of animals grazing *B. brizantha* compared with *B. brizantha* and legume combination (P101 R/E)

The treatments are as follows :

1. *Brachiaria brizantha* alone
2. " " with Centro
3. " " with Siratro
4. " " with Gliricidia

Cross bred bull calves are used in this trial at an intensity of 4 bull calves to the acre. Weekly live weights are recorded and the animals are pulled out when there is no more feed left in the plot. Grazing commenced with the September rains and it is still too early to make any comparisons.

6. Evaluation of five pasture grasses and four fodder species under coconut in the wet zone (P93, Sirikandura Estate)

The experiment was sampled 4 times during the year and the dry matter yield data are given in Table 6.

Table 6. Total herbage dry matter yield for the four samplings of experiment P93 in gm/m² (mean of 4 replicates)

Grass variety	Dry matter yield	
	N ₁	N ₂
<i>Pangola</i>	250.3	259.6
<i>Brachiaria brizantha</i>	886.6	846.7
<i>Brachiaria miliiformis</i>	435.8	666.2
<i>Brachiaria ruziziensis</i>	580.3	647.6
<i>Brachiaria dictyoneura</i>	1000.0	1022.5
<i>Green panic</i>	434.3	609.6
<i>Setaria anceps</i>	601.0	704.0
<i>Guinea B</i>	688.2	773.0
<i>Pusa giant</i> (NB 21)	665.7	581.0

The data collected during the last 2 years indicate that of the tested pasture species *B. dictyoneura* is superior to the other. An experiment is to be set up to study this grass in greater detail.

D. E. F. FERDINANDEZ
Officer-in-Charge

Report of the Intercropping Division (1977)

I. General

The intercropping project at Delgollawatta Estate, Kirimctiyana was terminated in June as the land had to be handed over to the owners. Two new projects were commenced during the year at Walpita and Dodanduwa mainly to study perennial intercrops such as coffee, cocoa, pepper, cinnamon and cloves. The effect of these crops on the yield of coconuts will also be studied at these two projects.

Cattle cross breeding programme was continued during the year. The hybrid vigour obtained in the first generation appears to be stabilised in the subsequent generations as result of rotational cross breeding.

II. Delgolla Project

The following 7 crops were planted with a view to studying their performance and yield under coconut. They are manioc, sweet potato, brinjal, capsicum, luffa, bandakka and betel.

As in the previous year the performance of some crops grown did not show any appreciable improvement this year as well. This could be attributed to the inherent soil type of the area being mainly shallow and gravelly with very low humus content and poor water holding capacity. According to observations made up to end of June, it would not be wrong to say that some crops are suited for intercropping in the area while the others are uneconomic. The factors enumerated above have mainly contributed to the low income as a whole indicating a loss from the project up to end of June this year.

The total expenditure	up to	30-06-1977 is Rs. 5251.36
The total income	up to	30-06-1977 is Rs. 2543.68
Total loss	up to	30-06-1977 is Rs. 2707.68

The project terminated by end of June 1977.

III. St. Peter's Project - Ingiriya

15 crops during the Yala and Maha seasons were established. They include root crops like manioc, sweet potato and colocasia, some types of vel ala, kiri ala, kukulala and hingurala plus low country vegetables like luffa, cucumber, red pea, bitter gourd, brinjal and bandakka, chillies and betel were also tried out.

Observations reveal that due to the high rainfall experienced in the area, extensive damage was caused to some crops. The low country vegetables appeared to yield good results. Ginger, turmeric, manioc and dioscorea also have performed well.

Records maintained during the year show an expenditure of Rs. 5449.12 while the income for the same year is Rs. 3451.76. The loss from the project is Rs. 1997.36.

IV. Koodaluagara Project — Mulleriyawa

During the yala and maha seasons 11 crops were established. They are banana, turmeric, brinjal, chillies, bandakka, manioc, long beans, capsicum, luffa, betel and sweet potato. The terraced area in this project was confined to the cultivation of vegetables and provision was made for irrigation facilities.

Root crops like manioc and turmeric were good performers while the other crops suffered considerable damage due to the vagaries of nature.

Accounts as at 31-12-1977 are as follows :

Total amount expended	Rs. 7339.35
Total income	Rs. 3781.75
Loss from the project	Rs. 3557.60

V. Agronomic studies at Kirimetiya Estate

(i) Ground nut

An experiment was laid down to study the effect of time of planting ground nut under coconut at 2 weekly intervals after the commencement of the rains during Maha 1976/77. The plan of the experiment and the results are as follows :

Location : De Soysa Estate, Kirimetiya.

<i>Treatments :</i>	<i>Date of planting</i>
T ₁ - with the commencement of the rains	— 04-10-1976
T ₂ - 2 weeks after " " " "	— 18-10-1976
T ₃ - 4 " " " " " "	— 01-11-1976
T ₄ - 6 " " " " " "	— 15-11-1976

Design : Randomized with 4 replicates

Plot size : 1 coconut square (30' x 30')

Effective plot size : 20' x 20' - 400 sq. ft.

Spacing : 2' x 4"

Season : Maha 1976/77.

Results :

<i>Treatment</i>	<i>Plot No.</i>	<i>Yield/plot in gm</i>	<i>Total yield in gm</i>	<i>Date of harvest</i>
T ₁	403	7022	26,467	11-01-1977
	203	6910		
	301	6145		
	101	6390		
T ₂	204	3950	14,835	04-02-1977
	104	3670		
	303	3710		
	401	3505		
T ₃	405	1920	8,440	02-03-1977
	302	3120		
	102	880		
	201	2500		

(50% pods germinated at the time of harvest)

T ₄	{	402	1980	4,920	02-03-1977
		304	1200		
		202	490		
	}	103	1250		

(25% pods germinated at the time of harvest)

(ii). A similar experiment was laid down during Yala 1977 the details of which are given below :

Location : De Soysa Estate, Kirimetiya.

<i>Treatments</i> :		<i>Date of planting</i>
T ₁	with the commencement of the rains	— 20-04-1977
T ₂	2 weeks after " " "	— 13-05-1977
T ₃	4 " " " " "	— 27-05-1977
T ₄	6 " " " " "	— 09-06-1977

Plot size : 1 coconut square (30' x 30')

Effective plot size : 20' x 20' — 400 sq ft

Spacing : 2' x 4"

Season : Yala 1977

Results :

<i>Treatments</i>	<i>Plot No.</i>	<i>Yield/plot in gm</i>	<i>Total yield in gm</i>	<i>Date of harvest</i>	
T ₁	{	101	4340	19,260	09-08-1977
		203	4930		
		301	5360		
	}	403	4630		
T ₂	{	204	4760	14,600	23-08-1977
		104	4370		
		303	2820		
	}	401	2650		
T ₃	{	101	2950	11,870	06-09-1977
		201	4080		
		302	3220		
	}	405	1620		
T ₄	{	202	1770	3,886	20-09-1977
		402	246		
		103	880		
	}	304	990		

Results of both experiments indicate that the highest yields are obtained when planted with the onset of the rains.

(iii) Cow pea Variety MI-35

Experiment to study the effect of planting cow pea variety MI-35 at 3 weekly intervals after the commencement of the rains was planted during Maha 1976/77. Plan and results are listed below.

Location : De Soysa Estate, Kirimetiya.

Season : Maha 76/77.

Extent : 16 coconut squares.

Treatments: T₀ - Planting with the commencement of rains.

T ₁	-	3 weeks after	"	"	"
T ₂	-	6	"	"	"
T ₃	-	9	"	"	"

Design : Fully randomized with 4 replicates.

Plot size and spacing : Each plot measuring 600 sq ft includes 1 coconut square having 20 rows planted at 12" x 6".

Results : The following yields were recorded :

<i>Treatment</i>	<i>Plot No.</i>	<i>Wt. of good seed per plot in gm</i>	<i>Wt. of spoilt seed per plot in gm</i>	<i>Total yield per plot in gm</i>
T ₀	401	1552.5	74	1626.5
	204	1810.0	52	1862.0
	302	1153.5	157	1310.5
	104	1099.0	86	1185.0
T ₁	103	1263	75	1338
	304	1297	30	1327
	202	1462	100	1562
	403	1412	92	1504
T ₂	102	—	—	466
	301	—	—	263
	404	—	—	349
	203	—	—	161
T ₃	101	—	—	48
	402	—	—	51
	303	—	—	34
	201	—	—	72

Note : Spoilage of seeds has been mainly due to attack by sucking and leaf eating insects and by pests like parrots, rats, rabbits and bandicoots. Considerable damage was also caused by falling coconut trees, heavy rain and by drought as seen by very much reduced yields in treatments T₂ and T₃.

(iv). In Yala 1977 the same experiment was repeated and the results are as follows :

<i>Treatment</i>	<i>Plot No.</i>	<i>Wt. of good seed per plot in gm</i>	<i>Wt. of spoilt seed per plot in gm</i>	<i>Total yield per plot in gm</i>
T ₀	{ 298	850	370	1220
	{ 200	600	520	1120
(Date of planting: 28-04-'77)	{ 100	875	325	1200
	{ 401	700	400	1100

Well distributed rain till harvest. Many empty seeds with no market value, due to insect attack. About 75% of Arlington cow pea seed mixed with MI-35 seed.

Treatment	Plot No.	Wt. of good seed per plot in gm	Wt. of spoilt seed per plot in gm	Total yield per plot in gm
T ₁ (Date of planting: 20-05-'75)	{ 300	900	165	1065
	{ 198	650	250	900
	{ 403	850	175	1025
	{ 99	1000	200	1200

Agromyza and leaf eating caterpillar attack. About 20% of Arlington seed mixed with MI-35 seed.

T ₂ (Date of planting: 16-06-'77)	{ 299	370	53	423
	{ 199	520	82	602
	{ 404	255	40	295
	{ 78	380	121	501

No rain for 3 weeks after flowering. Growth rate poor due to drought. About 50% seed damaged by parrots and rats.

T₃ — Seeds not sown due to the intense drought prevailing at the time.

Here again the best results are obtained when planted with the rains both in Maha and Yala seasons.

(v). Green gram

Green gram variety MI-1 was planted under coconut at 2 weekly intervals after the commencement of the rains during Maha 1976/77 to study the effect of time of planting on the yield.

Plan and the results of the experiment are as follows:

Location : De Soysa Estate, Kirimetiya.

Season : Maha 76/77.

Extent : 16 coconut squares.

Treatments : T₀ — Planting with the commencement of the rains

T₁ — " 2 weeks after " " " "

T₂ — " 4 " " " " "

T₃ — " 6 " " " " "

Design : Fully randomized with 4 replicates.

Plot size and spacing : Each plot measuring 600 sq ft includes 1 coconut square having 20 rows planted at 12" x 6".

Results : The following results have been recorded.

Treatment	Plot No.	Wt. of good seed per plot in gms.	Wt. of spoilt seed per plot in gms.	Total yields per plot in gms.
T ₀ (Date of planting: 05-10-76)	{ 301	215	110	325
	{ 407	330	45	375
	{ 204	320	50	370
	{ 103	260	100	360

Much damage to plants by pests like parrots, rats, rabbits and bandicoots and also due to falling coconut trees and washing off of plants by heavy rain.

T_1	{ 408	192.0	36.0	228.0
	{ 102	192.5	32.0	224.5
(Date of planting: 19-10-76)	{ 302	257.0	37.0	294.0
	{ 201	224.0	36.0	260.0

About 25% of the plants attacked by insects. Drought prevalent.

T_2
(Date of planting: 06-11-76) This could not be carried out to a finish as all the plants died due to severe drought prevailing at the time.

T_3
(Date of planting: 23-11-76) Failure due to virus attack.

Here too, early planting with the rains gave the best yields.

(vi). Sugar cane varietal trial

12 varieties were established under coconut during Yala 1976. The varieties are.

Co775, Co527, Co1111, Co1001, Q70, Q68, Q86, Q66, S1, S30, P54/107 and M13/56.

Plot size : Each plot measured 111. sq meters which included 6 rows of sugar cane.

Planting : 3 budded sets pretreated with Aldrex were placed horizontally in the furrow end to end with the buds facing sideways. A basal dressing of NPK was given and thereafter top dressings at 1½ and 3 months were given. Weeding and pest and disease control measures were undertaken as and when required.

Results : Yield of cane, Brix value and % of Sucrose in juice of each variety are given below.

Serial No.	Variety	Yield Tons / ha	Brix value	%Sucrose in juice
1	Co775	102.0	15.7	16.9
2	Co527	20.4	18.4	20.4
3	Co1111	24.9	16.8	16.4
4	Co1001	26.6	17.0	16.6
5	Q 70	84.0	15.8	15.2
6	Q 68	26.4	18.8	15.4
7	Q 86	20.4	17.9	16.1
8	Q 66	22.0	17.1	17.7
9	S 1	48.9	18.5	18.0
10	S 30	31.6	16.5	17.07
11	P54/107	24.7	17.7	17.7
12	M13/56	22.8	19.3	21.6

The three varieties Co775, Q70 and S1 appear to be promising as intercrops in the intermediate zone. Of the three varieties Co775 and Q 70 are exotic. Although their yields are better than the local selection S1 they are susceptible to stem borer attack.

VI. Intercropping project at Sirikandura Estate, Dodanduwa

The above project was initiated in February 1977 and so far 8 perennial crops have been established. Monthly and total expenses against each crop upto 31-12-1977 are given in Schedule "X".

VII. Walpita project

Coffee : A trial was planted to study the effect of 3 planting densities and 3 levels of fertilizer application on the growth and yield of coffee and the effect of the coffee on the production of coconut.

Design : Randomized block with 4 replicates.

The planting densities were 8' x 6', 8' x 8' and 8' x 10' triangular in the coconut avenue. The 3 levels of fertilizer application were, $\frac{1}{2}$, 1 and $1\frac{1}{2}$ times the normal fertilizer application.

There was no marked response to either the level of fertilizer application or the density at the initial stages.

Cocoa : A trial was set up to study the performance of 4 cocoa selections at 3 levels of fertilizer application when planted 8' x 8' triangular in the coconut avenue.

The cocoa selections were

1. ICS 1
2. NA 32
3. Amelonado
4. Millawana

The levels of fertilizer were $\frac{1}{2}$, 1 and $1\frac{1}{2}$ times the normal level of fertilizer application.

Height and girth of stem measurements taken do not indicate any significant difference between varieties.

Mixed planting trial of cocoa, coffee and pepper

This trial was set up to study the agronomic feasibility of growing cocoa, coffee and pepper together as intercrops under coconut. The planting system adopted was as follows:

A single row of cocoa plants between 2 rows of coconut, cocoa plants being 8' on the row.

VIII. Experiments on dormancy in yams

Experiments were carried out on 3 varieties of Dioscorea viz, Kahata ala, Kirikondol and Raja walli to reduce their dormancy period. They include smoke treatment, treating with "ethrel" and also treating the yams with Billing and Keppetiya leaves. All treatments reduced the dormancy period and the yams sprouted readily when planted.

Schedule "X"

Intercropping project at Sirikandura Estate — Dodanduwa.

ACCOUNTS — 1977

Crop	No. of Coconut squares planted											1977 Total
		March	April	May	June	July	August	Sep.	Oct.	Nov.	Dec.	
Coffee	72	—	55.55	460.63	174.20	140.73	196.78	28.37	127.60	82.45	144.32	1410.83
Cocoa	72	—	9.26	72.87	329.07	79.30	207.28	73.74	63.34	140.81	120.86	1096.53
Pepper (on live stakes)	72	—	—	—	—	—	—	88.96	94.64	131.02	322.29	336.91.
Pepper (on dead stakes)	72	—	—	—	—	—	—	21.43	58.24	30.65	15.40	125.72
Cloves	72	—	—	—	—	—	—	4.50	55.42	226.02	15.40	301.34
Cinnamon	72	—	—	—	—	—	134.92	24.52	52.07	—	11.52	223.03
Control	72	—	—	—	—	—	—	—	58.20	—	11.52	69.72
Turmeric	32	—	—	86.39	249.90	—	52.01	29.77	—	110.70	79.64	608.41
Kiri ala	32	—	—	449.01	5.40	24.68	2.29	112.79	12.26	67.44	5.78	679.65
Sugar cane	36	—	—	158.84	12.44	128.75	—	41.70	—	144.12	—	485.85
Other expenses	—	1010.14	120.29	57.84	154.77	204.03	442.97	350.48	89.39	299.98	138.81	2868.70
Grand Total											8506.69	
Expenses on Pasture experimental area — 1977								232.87	306.11	4.59	17.28	560.85

IX. Experiments on mulching of yams

An experiment was laid down to study the effect of organic matter and 3 kinds of mulching, viz. Coconut leaves, Salvinia and Paddy straw on the yield of *Xanthosoma* sp. (Kiriata).

It was observed that increased yields were obtained with the use of a mulch irrespective of the type of mulch used.

X. Campus project — Bandirippuwa Estate

A trial was planted in January to evaluate 10 coffee selections at 3 levels of fertilizer application.

The design is split plot.

The Selection were :

- | | | |
|--------------|---|---------|
| 1. C 36 | — | robusta |
| 2. S 5 | — | arabica |
| 3. C111 | — | robusta |
| 4. I. M. Y. | — | robusta |
| 5. S. E. M. | — | robusta |
| 6. K 7 | — | arabica |
| 7. S 274 | — | robusta |
| 8. BO 72 | — | arabica |
| 9. C 96 | — | robusta |
| 10. G. C. R. | — | robusta |

Observations of the growth vigour in the early period indicate that the arabica selections were comparatively poor. Of the robusta selections G, C. R., S 274 and C 111 were superior to the others.

There was no marked response to levels of added fertilizer.

XI. Animal Husbandry

The rotational cross breeding programme was continued during the year.

A total of 124,689 pints of milk was produced at the 2 stations. There were 114 births and 22 deaths during the year. The herd strength at the end of the year was as follows :

	<i>Bulls</i>	<i>Cows</i>	<i>Heifer calves</i>	<i>Bulls calves</i>	<i>Total</i>
B/E -	1	137	85	63	286
R/E -	2	31	55	13	101
K/E -	-	2	152	2	156
				<i>Grand total</i>	<u>543</u>

The entire herd was vaccinated against HS and Foot and mouth and the health of the herd was maintained satisfactorily.

D. E. F. FERDINANDEZ
Officer-in-Charge

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Report of the Crop Protection Division (1977)

1. With the successful completion of the project on the control of *Promecotheca cumingi* in 1976, attention was diverted to surveillance and study of the pest and parasite complex.

The incidence of the pest at the three localities (viz. Katunayake, Ambalangoda and Galle) continued to fluctuate during the course of the year. The pest was least noticeable at Katunayake, where satisfactory natural control was observed. During the period under review, monthly surveys were carried out at the three localities to study the population dynamics of the pest and parasites. These observations are presented in Fig. 1 where the fate of 100 eggs has been regularly evaluated at Katunayake, Ambalangoda and Galle. From these observations it is noted that the pest incidence in Katunayake area has been brought down primarily through heavy parasitization, often reaching as high as 60%. In Katunayake area, pest death was heavy during certain months due to natural factors such as moisture, fungus etc. Parasitization at other two localities was not as high, and parasitized material was collected and redistributed in areas where parasitization was low. With this method it was possible to establish the active parasite, *Dimmockia javanica*, in Ambalangoda and Galle areas, and by the end of the year, parasitization had increased to about 40%. It is hoped that there will be a further increase.

The spread of the pest in these localities was extremely slow, due mainly to parasites and other natural factors. Complete control of the pest was achieved in certain areas which were badly affected by the pest in 1976.

A complete survey was carried out in an area of about 1,500 ac to ascertain the presence or otherwise of *Promecotheca* in and around Katunayake area. The area was mapped out and boundaries were marked during the early part of 1977. The pest remained within these boundaries during the course of the year.

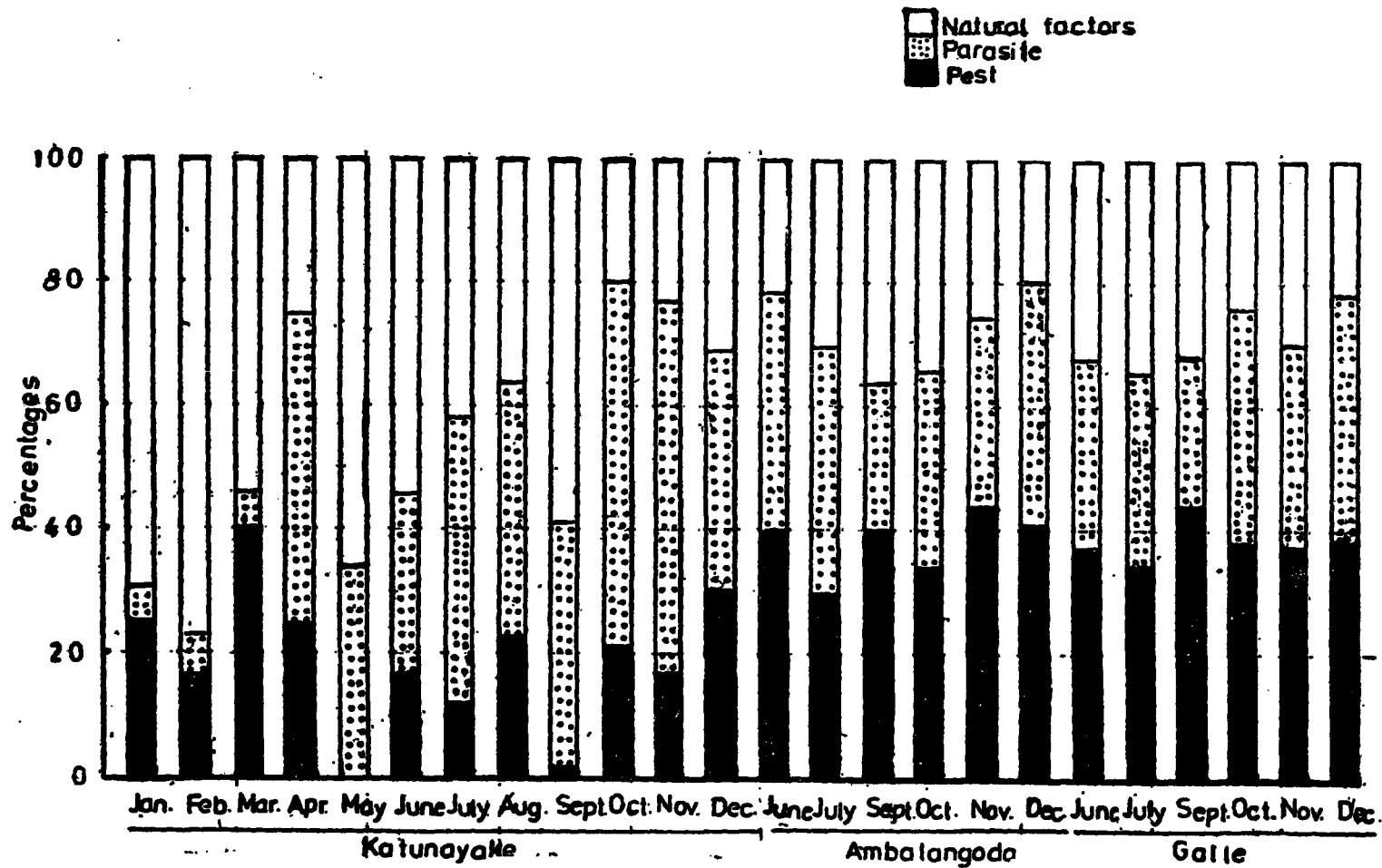
During the year under review, no new reports of this pest were received.

2. Coconut Caterpillar — *Nephantis serinopa*

Several outbreaks involving a total of about 100 acres were reported from Vitharandeniya area in the Southern Province. This pest had been present in this area for several years but at sub-economic level. Regular parasite releases have not been effective in controlling the pest.

Under these circumstances, spraying of an insecticide (Trichlorphon at 1 fl oz in 4 gls of water) was carried out on an experimental scale to arrest the spread and to bring down the pest population to a manageable level. Very satisfactory results were obtained with these sprayings, which were followed up with releases of large numbers of parasites, namely *Eriborus trochanteratus* and *Perisierola nephantidis*. Monthly population counts were made to evaluate the efficacy of a single spray in bringing down the pest population. The results of these experiments will be reported in detail later.

A similar spraying programme was carried out at Akkaraipattu where the pest had been persistent for the last 7 years. By the end of the year, most of the palms had recovered and collected data are being analysed with a view to using insecticides to complement the on-going biological control programme.



Though this pest caused much alarm during the last two decades in the north eastern border of the coconut triangle, namely Ganewatta and Nikadalupotha areas, no reports were received from these areas during 1977. It is very likely that the pest is now under complete control in this area through regular releases of parasites. Several minor outbreaks of this pest were reported from Colombo area, and these were brought under control by the release of parasites.

In the Eastern Province, plantations north of Batticaloa were free of the pest. However localities south of Batticaloa, namely Kallar and some areas of Akkaraipattu were heavily affected by this pest. Unfortunately, regular releases of parasites have failed to produce the desired result, and in certain parts of Akkaraipattu, insecticidal spraying was carried out on an experimental scale as described earlier.

During the course of the year, the two insectaries continued to function satisfactorily. Breeding was restricted to the following parasites.

Eriborus trochanteratus
Perisierola nephantidis
Trichogramma brasiliensis
Ptychomyia remota
Spoggosia bezziana.

The numbers of parasites released in different provinces are presented in Table 1. The tachinid parasite, *Spoggosia bezziana*, was released only in the Eastern Province. Although the other tachinid *Ptychomyia remota*, has not yet been recovered, this was bred at the Parasite Breeding Station, Mylambavelly and released in the Eastern Province. Depending on the results of the recovery studies, it is hoped to take a decision regarding further breeding of *P. remota* during 1978.

Table 1. Number of parasites of the coconut caterpillar released in 1977

	<i>Spoggosia bezziana</i>	<i>Eriborus trochanteratus</i>	<i>Ptychomyia remota</i>	<i>Perisierola nephantidis</i>	<i>Trichogramma brasiliensis</i>	<i>Bracon brevicornis</i>	Total
EP	7365	6970	5115	3780	3464600	56990	3544820
WP	—	8180	800	34320	166400	—	209700
SP	—	1871	—	42600	—	—	44471
NWP	—	2010	—	20440	360800	—	383250
Total	7365	19031	5915	101140	3991800	56990	4182241

Use of insecticides

As indicated earlier, the insecticide Trichlorphon was used at three levels of concentration (1 fl oz in 4 gls of water, 1 fl oz in 5 gls, 1 fl oz in 6 gls) on an experimental basis in the Eastern and Southern Provinces. Spraying was done at the rate of about 3 gls. of spray fluid/palm using power sprayers. Since spraying, monthly population counts of the pest have been taken, and it is evident that one oz. in four or five gallons is sufficient to bring down the pest population to a manageable level.

3. The Coconut Scale — *Aspidiotus destructor*

During the year under review, 17 new reports of this pest were received; 4 from the N. W. P., 1 from the W. P., 11 from the S. P., and 1 from the Sabaragamuwa Province. In all localities, the pest was brought under control by the indigenous predators *Chilocorus nigritus* and *Pullus xerampelinus*. Whenever necessary, collection and redistribution of predators were done to expedite their establishment.

In some of the localities, heavy mortality of the scale insect was achieved by the fungus *Fusarium equisetum*.

4. Red Weevil — *Rhynchophorus ferrugineus*

Several new reports of this pest were received, which were referred to the Coconut Development Officers for inspection and necessary action.

During the course of the year, three systemic insecticides viz. Azodrin, Folimat and Bidrin were tested with a view to recommending them. The results from these tests were very promising, and it is hoped that we shall be able to recommend these chemicals once further studies are completed during early 1978.

5. The Black Beetle — *Oryctes rhinoceros*

Occasional infestations of this pest were recorded during the year under review.

The work on a nuclear polyhedrous virus, *Baculovirus oryctes*, which was multiplied and released during 1976 (Mahindapala, 1977) was continued. A series of field observations was initiated to test the efficacy of the virus in the field. Eight localities were selected where *Baculovirus* had been released previously. In these localities, the point of release was marked and 4 further points, 100 m away from the point of release, in the 4 major compass directions were chosen. From each site, 5 palms were chosen and the damage to the first 10 fronds was assessed. This was repeated every 6 weeks. The results of these observations are presented in Table 2 where the percentage fronds damaged (out of the first 10 fronds) for 5 assessment dates at 8 localities are given.

From the results, it is evident that the introduction of the virus has not appreciably reduced the incidence of the pest, at least at the sites where observations were taken. It must, however, be emphasized that the black beetle is not a major pest of coconut, and its incidence is evident only near breeding grounds such as coconut fibre heaps etc. It is possible that the virus existed in Sri Lanka before its introduction, keeping the pest under check, but is unable to bring down the population to a sub-economic level at places where there is an unusually large population.

6. Biological control of *Eupatorium*

As a very large number of *Ammalo insulta* had been released in areas infested with *Eupatorium*, laboratory breeding was suspended and more emphasis was directed towards field collection and redistribution.

This insect was found to cause heavy damage to *Eupatorium* in certain areas but the inability of the insect to establish itself poses problems with its use. Observations taken during the year indicate that *Ammalo* can rapidly defoliate *Eupatorium* in the vicinity of its release-point, but *Eupatorium* eventually rejuvenates largely through intact roots, and by this stage, *Ammalo* has disappeared from the localities.

On several occasions, larvae were collected from heavily infested localities and redistributed at localities in Puttalam, Malwana, Nattandiya and Attanagalla.

No recoveries of the flower-attacking weevil, *Apion brunneonigrum*, released in 1976, were made.

Table 2. *Percentage fronds damaged (out of the first ten) at 8 localities where Baculovirus had been released.**

Serial No.	Locality	Position	1st Assessment	2nd Assessment	3rd Assessment	4th Assessment	5th Assessment
1	MADAMPE	X	98	100	100	100	98
		N	74	72	74	78	72
		W	92	94	98	96	96
		E	100	100	98	96	96
		S	90	88	88	90	92
2	UDUBADDAWA	X	96	96	96	100	100
		N	100	100	100	100	100
		W	90	88	90	92	92
		E	70	66	68	68	64
		S	82	90	84	76	80
3	KIMBULAPITIYA	X	72	78	78	86	90
		N	70	84	80	78	72
		W	60	56	56	54	62
		E	76	78	82	82	83
		S	92	86	66	64	76
4	GIRIULLA	X	96	100	100	100	100
		N	100	100	100	100	100
		W	86	88	92	86	88
		E	100	98	96	94	92
		S	82	80	76	76	78
5	RAJAKADALUWA	X	98	100	100	98	100
		N	96	98	90	80	78
		W	96	100	98	92	94
		E	92	96	98	98	100
		S	98	100	100	98	100
6	KAKKAPALLIYA	X	90	88	80	82	84
		N	94	90	90	90	86
		W	96	100	90	90	90
		E	78	94	90	88	88
		S	82	76	68	62	80
7	HETTIPOLA	X	76	82	84	84	82
		N	100	100	100	100	100
		W	100	100	100	100	100
		E	86	90	88	86	86
		S	98	98	100	100	100
8	KOBEGANE	X	100	98	92	90	86
		N	76	80	76	74	68
		W	94	100	100	100	98
		E	100	100	98	98	98
		S	86	88	90	88	84

* X Refers to the release point, N, W, E and S refer to the positions 100 meters away from the release point on North, West, East and South respectively.

7. Other pests

Several outbreaks of the nettle grub pest, *Parasa lepida*, were reported and these were brought under control by spraying insecticides.

8 Diseases

(a) *Bud Rot*: Several reports of the occurrence of this disease were received. As done in the past, prophylactic measures using fungicidal bags and soap cubes were recommended.

(b) *Stem Bleeding*: Several reports of the occurrence of this disease caused by the fungus *Ceratocystis paradoxa* were received and the usual control measures were recommended.

Another form of stem bleeding was recorded at two localities viz. Malabe and Agalawatta. In these localities, a bark rot was noticed, and upon close investigation it was observed that the tissues beneath the bark were water-soaked and rotten. Subsequent laboratory examination revealed the fungus as *Ceratocystis paradoxa*.

In these instances, no oozing of liquid was noticed though the tissue was rotten. However, with very careful observations, it was possible to demarcate areas of tissue degeneration by the presence of slightly darker patches. As in the normal stem bleeding disease, the deteriorated tissue was removed, and application of coal tar and fungicide was recommended.

(c) *Leaf Scorch Decline*: Data collected from field experiments conducted in the Southern Province were analysed. According to the results, significant reduction in yield and drupe components have been observed in palms showing moderate and advanced Leaf Scorch Decline while the difference in these characteristics between healthy palms and those showing mild Leaf Scorch Decline was not significant (Mahindapala and Chandrasena, 1975). However, the oil content of copra from healthy palms and those affected by Leaf Scorch Decline was found to be similar (Mahindapala and Subasinghe, unpublished data). A study was initiated to gather basic knowledge on the composition and fluctuation of soil mycoflora in areas affected with Leaf Scorch Decline. Monthly sampling was carried out and it is hoped to finish this work in 1978.

Staff :

Dr. R. Mahindapala was appointed Crop Protection Officer with effect from 13.12.1977.

Mr. W. L. B. Silva was appointed Field Assistant on 25.07.1977.

Mr. M. S. Velu, TA was transferred to be in-charge of the Parasite Breeding Station, Mylambavelly in September, 1977 and Mr. S. J. Fernando, FA reverted back to the Head Office.

Mr. P. Kanagaratnam left the island in February 1977 on a Scholarship awarded by the Colombo Plan to read for the M. Sc. degree at London University. Mr. Kanagaratnam is working on insect pathology at the Glasshouse Crops Research Institute, Sussex.

Mr. P. A. C. R. Perera was awarded the M. Sc. by the University of London.

References :

Mahindapala, R. (1977). Report of the Crop Protection Division (1976). *Ceylon Cocon. Q.* 28, 44-48.

Mahindapala, R. and Chandrasena, A. M. (1975) Yield and drupe characteristics of Conout Palms affected with Leaf Scorch Decline. *Ceylon Cocon. Q.* 26, 73-76.

R. MAHINDAPALA
Crop. Protection Officer.

Report of the Biometry Unit (1977)

1. Statistical Service

Routine analysis of experimental data of the Research Divisions was attended to. Designs too were provided for a number of new experiments.

Assistance was given to a number of other Institutions regarding design of experiments, and analysis of experimental data.

2. Research

(i) Calibration Trial

The recordings of vegetative and yield characters of the palms in this experiment at R/E were maintained as per schedule.

(ii) Watering Experiment

This experiment was continued uninterrupted. The response to treatment in the year 1977 is shown in Table 1.

Table 1. *Yield per hectare (4 yrs after watering)*

Treatment	Nuts per hectare			Weighted average	No of waterings
	Low yielding	Mid-yielding	High yielding		
Control	6758	8785	15311	9242	Nil
Single dose weekly	8997	12462	16732	12084	27
Single dose fortnightly	8805	10468	16606	10974	13
Double dose fortnightly	8496	11555	16386	11402	13

(Single dose—123 gals per palm)

These yields have been adjusted for pre-experimental differences by means of covariance analysis. A highly significant response is shown by the mid-yielding palms. On the average it appears that there is a reasonable response to watering at all levels of yield. It would be still premature for a detailed analysis as at least 8 years' data would be necessary.

(iii) Copra Conversion Factor Experiment (B/E and R/E)

The two experiments were carried out satisfactorily according to schedule. The statistical analysis has to await a few more years of recording.

(iv) Bunch Thinning

This experiment which commenced in 1975 on a request by Director, C. R. B. was maintained very satisfactorily according to schedule. However a few experimental trees were damaged due to lightning and therefore the experiment was abandoned rather prematurely.

An analysis of the data available showed a very clear increase in subsequent female flower production as a result of thinning. Thinning at a very young stage of development gave maximum response—the youngest age tested in the experiment being 4 months since opening of inflorescence,

3. Agri-meteorology

(i) Meteorological Stations

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

(ii) Rainfall in 1977

The rainfall in 1977 in the important coconut growing areas is shown in Table 2.

Table 2. Rainfall in important coconut growing areas

Station	Total rainfall (mm)		Average for 20 years (mm)	
	1977	1976		
Lunuwila	—	2354.3	1605.3	1972.3
Madampe	—	2011.2	1360.2	1631.2
Chilaw	—	2048.0	1318.0	1532.1
Puttalam	—	1478.0	897.9	1143.5
Kurunegala	—	2335.5	1646.7	2218.2

Rainfall for 1977 appears to be higher than in 1976 and even higher than the 20 years' average in the stations considered indicating good prospects for coconuts in 1978.

(iii) Drought Indices in 1977

The drought indices for some coconut growing areas are shown in Table 3.

Table 3. Drought index in the coconut growing areas

AREA	Drought Index		Drought Index for the year		
	mean for 10 years	range	1975	1976	1977
1. Tangalla	152.0	30.1–414.6	58.5	501.5	371.6
2. Kudawewa	196.0	0.0–457.6	141.9	617.3	451.5
3. Wariyapola	213.0	0.0–526.8	43.0	361.3	256.9
4. Kuliyaipitiya	152.5	0.0–288.2	68.8	262.4	218.8
5. Madampe	320.9	0.0–569.1	282.2	413.4	234.1
6. Lunuwila	146.1	0.0–407.7	202.2	137.6	60.6
7. Palavi	536.4	43.0–885.6	599.2	902.9	745.5
8. Rajakadaluwa	278.9	0.0–465.4	160.0	661.2	369.3
9. Bathulu–Oya	447.2	167.9–754.8	363.0	711.1	705.9
10. Negombo	141.6	0.0–305.4	325.2	1091.4	73.8
11. Giriulla	60.1	0.0–127.3	43.0	334.6	49.5
12. Kurunegala	113.6	0.0–254.6	43.0	451.9	187.5
13. Polgahwela	100.0	0.0–217.1	98.1	516.6	210.9

(iv) *Crop Prospects for 1977 (area-wise)*

Drought indices for 1977 for most areas are less than for 1976 promising a distinct improvement in coconut yields in 1978 as compared with 1977.

4. **Forecast of total production in Sri Lanka for 1978**(a) *Verification of forecast for 1977*

Production forecast by C. R. B. for 1977 = 1884 million nuts

*Production actually realised for 1977 = 2050 million nuts

Error of forecast = 8.1%

(*Production based on licences issued by the Coconut Marketing Board.)

The estimate of production by the Coconut Marketing Board is lower and therefore very close to our forecast.

(b) *Forecast for 1978*

Forecast of production for 1978 = 2417 million nuts

% increase expected over 1977 = 17.9%

5. **Production and exports (1977)**

(Based on Customs Returns)

The estimated production of coconuts for the year 1977 is 2093 million nuts. This is 19.2% less than in 1976, 15.8% less than the last 5 year average and 31.1% less than the previous record production in 1964.

The nut equivalent of exports in 1977 is 281 million nuts. This is 65.4% less than in 1976, 63.2% less than the last 5 years average and 82.7% less than the previous record of 1964.

The average value of nut products per 1000 nuts in 1977 is Rs. 1192.62. This shows a 152.9% increase over the year 1976, 154.6% increase over the last 5 years average and 40.6% increase over the record price in 1974.

6. **Papers published during the year 1977**

	<i>Title</i>	<i>Author</i>	<i>Year</i>	<i>Journal</i>
(1)	Forecasting coconut production in Sri Lanka using rainfall data.	V. Abeywardena	1977	Prepared for the C. D. A. and Coconut Marketing Board.
(2)	Economics of the response of coconut to fertilizer application.	V. Abeywardena	1977	<i>Ceylon Cocon. Q.</i> 26, 73-76
(3)	The Sulphur nutrition of coconut.	M.A.T. de Silva G. M. Anthonypillai D. T. Mathes	1977	<i>Expl Agric.</i> (1977) 13,265-271

7. General

- (1) The Biometrician attended a number of meetings at the Coconut Development Authority and the Bureau of Standards.
- (2) The Biometrician gave a course of lectures on "Design of Experiment" at the management level training programme on quality control at the Bureau of Standards.
- (3) The Biometrician served on the specialist Committee on statistics and quality control at the Bureau of Standards.
- (4) The Biometrician gave a series of lectures on Biostatistics to Botany (special) students of the Vidyalkara campus and to students of the Post-graduate Institute of Agriculture.
- (5) The Biometrician continued to function as the consultant Biometrician at the Rubber Research Institute of Sri Lanka.
- (6) The Biometrician continued to function as statistical advisor to the Sri Lanka Sugar Corporation.
- (7) Mr. D. T. Mathes, Graduate Technical Assistant, returned from U.K. after an years of training at the University of Reading.

8. Personnel

The staff at the end of 1977 was as follows.

- | | | |
|-----------------------------------|---|---|
| 1. Biometrician | — | V. Abeywardena, F. I. S. (Lond.) |
| 2. Graduate Technical Assistant | — | D. T. Mathes. B. Sc. (Cey.), Dip. Stat. (Vidyodaya), Dip. Biometry (Reading) |
| 3. Technical Assistant | — | P. Sunderalingam, B. Sc. (Cey.) |
| 4. Senior Lab and Field Assistant | — | G. Karunasena |
| 5. Lab and Field Assistants | — | (1) E. Ranjith Fernando
(2) D. T. Fernandopulle
(3) L. G. Fernando
(4) I. Karunanayake |
| 6. Lab and Field Attendants | — | (1) W. E. R. Chandrasiri Fernando
— (2) W. B. Protus Fernando |

V. ABEYWARDENA
Biometrician

Ceylon Cocon. Q. (1978) 29, 49—51
 Printed in Sri Lanka

Report of the Planting Division (1977)

PERSONNEL

TRANSFERS :

Mr. K. S. Anthony Joseph, Nursery Attendant, was transferred from Wilpotha Nursery to Head Office.

Mr. G. H. M. Somaratna, Nursery Attendant, was transferred from Koggala Nursery to Ratmalagara Nursery.

Mr. N. M. Amarasiri, Nursery Attendant was transferred to Ibbagamuwa Nursery from Kalawewa Nursery.

Mr. Shelton T. Fernando, Field Assistant was transferred to Attavillu Nursery from Koggala Nursery.

Mr. W. G. Fernando, Field Assistant was transferred to Hettipola Nursery from Attavillu Nursery.

Mr. B. M. Jayanayake, Field Assistant was transferred from Hettipola Nursery to Kalawewa Nursery.

Mr. B. D. G. Weerasuriya was transferred to this Division from Inter Cropping Division and was transferred to Koggala Nursery.

Mr. M. P. Dharmadasa, Nursery Attendant, was transferred from Mylambavelly Nursery to Pallakelle Nursery.

Mr. Sunil Abeywickrama, Nursery Attendant was transferred to this Division from Agrostology Division.

Mr. A. T. Fernando, Nursery Attendant was transferred from Alampil Nursery to Mylambavelly Nursery.

Mr. Mervin Joseph, Nursery Attendant was transferred from Ibbagamuwa Nursery to Eraminigolla Nursery.

Mr. A. T. Fernando, Nursery Attendant was transferred from Alampil Nursery to Head Quarters, Planting Division.

Mr. K. C. Muththuchamy, Field Assistant was transferred to this Division from Agrostology Division and was transferred to Alampil.

INTERDICTIONS, DISMISSALS ETC.,

Mr. B. M. Jayanayake, Field Assistant was interdicted.

2. NURSERIES, Seed Coconuts, Seedling Bookings etc.,

15 Nurseries were maintained during the year 1977 and 6 nurseries were established for Yakwila, Homagama, Gabadawatte, Pambahinna, Punakari and Mulangavil Agricultural Productivity Committees.

Statement of Seed Coconuts planted for Issue of Seedlings in May/June 1977 and in October/November 1977.

Seed Coconuts Planted

<i>Name of the Nursery</i>	<i>May/June 1977</i>	<i>October/November '77</i>	<i>Total</i>
Alampil Nursery	— Nil	40,000	40,000
Attavillu Nursery	— Nil	84,985	84,985
Eraminigolla Nursery	— 31,350	38,450	69,800
Handapangala Nursery	— Nil	28,000	28,000
Hettipola Nursery	— 20,000	17,220	37,220
Ibbagamuwa Nursery	— 79,350	118,645	197,995
Kalawewa Nursery	— Nil	82,550	82,550
Kilinochchi Nursery	— Nil	35,728	35,728
Kirimetiyanana Nursery	— 75 000	65,895	140,895
Koggala Nursery	— 32,000	28,010	60,010
Mylambavelly	— Nil	33,050	33,050
Pallakelle Nursery	— 41,450	32 600	74,050
Ratmalagara Nursery	— 86,022	109 660	195,682
Walpita Nursery	— 70,460	58,255	128 715
Wilpotha Nursery	— 50,000	106,663	156,663
Total	485,632	879,711	1,365,343

The total number of seedlings booked during the course of the year 1977_a was 945,635. The distribution of the above bookings was as follows :—

Seedlings of Oct / Nov.	1975 season	—	1946	seedlings.
Seedlings of May / June	1976 season	—	2881	seedlings.
Seedlings of Oct / Nov.	1976 season	—	59944	seedlings.
Seedlings of May / June	1977 season	—	263916	seedlings.
Seedlings of Oct / Nov.	1977 season	—	616948	seedlings.
Total bookings for 1977		—	945635	seedlings.

The above bookings were scheduled according to the different nurseries which were as follows :—

<i>Nursery</i>	<i>Oct/Nov. 1975</i>	<i>May/June 1976</i>	<i>Oct/Nov. 1976</i>	<i>May/June 1977</i>	<i>Oct/Nov. 1977</i>	<i>Total</i>
Alampil Nursery	nil	nil	1,120	nil	22,657	23,777
Attavillu Nursery	300	nil	11,476	600	51,782	64,158
Eraminigolla Nursery	nil	nil	11,088	15,540	31,252	57,880
Handapangala Nursery	nil	nil	8,690	nil	14,002	22,692
Hettipola Nursery	nil	nil	1,155	18,193	19,824	39,172
Ibbagamuwa Nursery	nil	181	2,725	22,200	113,599	138,705
Kalawewa Nursery	nil	nil	4,844	nil	48,280	53,124
Kilinochchi Nursery	nil	nil	30	nil	16,906	16,936
Kirimetiyanana Nursery	nil	nil	4,327	42,882	30,989	78,198
Koggala Nursery	nil	520	5,750	29,393	19,842	55,505
Mylambavelly Nursery	nil	nil	886	nil	19,686	20,572
Pallakelle Nursery	nil	nil	158	18,921	34,934	54,013
Ratmalagara Nursery	40	nil	3,463	43,804	72,834	120,141
Walpita Nursery	nil	nil	2,895	53,944	47,752	104,591
Wilpotha Nursery	1606	2180	1,337	18,439	72,609	96,171
Total	1946	2881	59,944	263,916	616,948	945,635

Summary of Bookings for the year 1977.

	O/N.75	M/J.76	O/N.76	M/J.77	O/N.77	Total
Seedlings booked by A. P. C. C.	nil	nil	5500	15865	16065	37430
Seedlings booked by Govt. Depts.	nil	nil	10506	18824	181660	210990
Seedlings booked by Estate Owners	nil	700	4330	53936	110434	169400
Seedlings booked by Small-holders	1646	2181	35428	139443	246481	425179
Seedlings booked under Crop. Div. Scheme	nil	nil	nil	295	nil	295
Seedlings booked under Replanting Subsidy Sch.	nil	nil	nil	6041	nil	6041
Seedlings booked Under/New Planting Subsidy Scheme	nil	nil	2566	26916	33463	62945
Seedlings booked under Small Holdings Reh. Sub. Scheme	300	nil	1614	2596	4474	8984
Seedlings booked under New Planting Subsidy Scheme	nil	nil	nil	nil	24371	24371
Total	1946	2881	59944	263916	616948	945635

SEEDLINGS ISSUED :

874,964 seedlings were issued during the year 1977 and the distribution in nurseries for different seasons was as follows :—

Nursery	Oct/Nov.	May/June	Oct/Nov.	May/June	Oct/Nov.	Total
	1975	1976	1976	1977	1977	
Alampil Nursery	nil	nil	18249	nil	3544	21793
Attavillu Nursery	15765	nil	31088	nil	52161	99014
Eraminigolla Nursery	nil	4200	18155	18755	17975	59085
Handapangala Nursery	nil	nil	9585	nil	13080	22665
Hettipola Nursery	nil	7640	6705	13293	11501	39139
Ibbagamuwa Nursery	nil	6	32630	30663	20275	83574
Kalawewa Nursery	nil	nil	5341	nil	3405	8746
Kilinochchi Nursery	nil	nil	3225	nil	13889	17114
Kirimetiyana Nursery	nil	nil	18367	42519	26533	87419
Koggala Nursery	nil	100	19698	25045	13370	58213
Mylambavelly Nursery	nil	nil	915	nil	21488	22403
Pallakelle Nursery	nil	nil	14812	19890	15323	50025
Ratmalagara Nursery	40	4247	36654	45396	33461	119798
Walpita Nursery	nil	nil	18889	46126	35544	100559
Wilpotha Nursery	8541	9791	248	30476	36361	85417
Total	24346	25984	234561	272163	317910	874964

J. A. CADELIS
Assistant Manager (Nurseries)

Report of the Publications'/Publicity Unit and Library (1977)

1. Journals

The following issues of the Coconut Research Institute Journals were published during the year.

- 1.1 *Ceylon Coconut Quarterly*
Vol. XXV Nos. 3—4
- 1.2 *Pol Pawath*
Vol. VI No. 3
- 1.3 *Bibliographical Series on Coconut*
Series 4—7 (1971—1974)

2. Advisory Leaflets

The routine work of revising and reprinting of advisory leaflets was carried out as and when found necessary in order to update the subject matter and maintain the stock position.

The following leaflets were revised wherever necessary and reprinted during the year.

- In Sinhala— Nos. 1, 4, 5, 10, 21, 22, 28, 29, 34, 37, 44, 45 and 46
- In Tamil — Nos. 21, 37
- In English — Nos. 15, 25, 37

3. Visitors

During the year the Institute received 5878 students from 70 schools, 191 from universities and other institutes and 60 visitors from overseas.

4. Library

4.1 Additions

During the year under review 126 new books were added to the library bringing the total number to 3690. The total number of journals acquired on subscriptions and on exchange stands at 241.

In addition orders have been placed to obtain more books and past issues of Journals under the Netherland Literature Programme.

4.2 Information Service

The 'Bibliographical Series on Coconut 1971—1974, Series 4—7' was compiled by the Librarian during the year under review.

4.3 Coconut Information Centre

The International Development Research Centre (Ottawa) agreed to set up a Coconut Information Centre at the Institute's Library. Project proposals were drawn up and submitted to the IDRC Headquarters.

Mr. M. J. C. Perera, Librarian of the Institute, was awarded a practical training assignment in U. K. for a period of 10 months by the IDRC to obtain the training necessary to set up this Centre.

5. Publications

Mr. M. S. S. Fernandopulle, Publications/Publicity Officer, contributed an article entitled "India : 60 years of Coconut Research" to the "The Ceylon Observer" of February, 22, 1977 on the occasion of the completion of sixty years of coconut research in that country.

6. Personnel

Mr. M. J. C. Perera, the Librarian, left the island on 29-09-1977 to avail himself of the above-mentioned pre-project training assignment in the United Kingdom under a grant of the IDRC.

M. S. S. FERNANDOPULLE
Publications / Publicity Officer

Annual Report of the Administration Division (1977)

The Staff of the Coconut Research Board at the end of 1977 were as follows :—

Grade	<i>On Secondment</i>	<i>Special</i>	<i>Class I</i>	<i>Class II</i>	<i>Class III</i>	<i>Class IV</i>	<i>Total</i>
Executive	1		4	1	17	3	26
Technical & supervisory		9	12	21	—	—	42
Intermediate		—	2	3	—	—	5
Clerical & Allied	—	—	16	26	—	—	42
Operative	—	—	16	47	—	—	63
Minor		29	106	99	—	—	234
	1	38	156	197	17	3	412

BOARD: Dr. J. W. L. Peiris, B. Sc. (Lond.) Ph.D (Lond.) Acting Chairman Coconut Research Board ceased to be the Acting. Chairman in July 1977. Dr. B. A. Abeywickrama was appointed as Chairman of the Board in August 1977. Dr. J. W. L. Peiris, Messrs A. J. W. Balthasar, J. Primson Fernando, Oscar Fernando, and H. D. Moses were appointed to the Board in September 1977. Messrs P. W. R. de Silva, Dr. O. S. Peiris, Dr. C. R. Panabokke and Prof. M. D. Dassanayake ceased to be Directors of the Board from August 1977.

STAFF: The following internal and external appointments and promotions were made during the year.

ON SECONDMENT: Mr. K. D. D. Jinadasa, C. A. S., was appointed on secondment as Deputy Director (Administration and Finance) with effect from 21st January, 1977 until 31st December, 1977.

EXECUTIVE GRADE — CLASS I

Internal Appointments

Dr. R. Mahindapala as Crop Protection Officer with effect from 13th December, 1977.

EXECUTIVE GRADE — CLASS III

External Appointment

Mr. Y. G. de Silva as Asst. Administrative Officer with effect from 21st December, '77.

EXECUTIVE GRADE — CLASS IV

Internal Appointment

Mr. M. J. C. Perera as Librarian with effect from 28th October, 1977.

TECHNICAL GRADE — CLASS I*Internal Promotions*

Mr. G. Richard as Book-keeper with effect from 4th November, 1977.

TECHNICAL GRADE — CLASS II*Internal Appointment*

Mr. T. M. S. Peiris as Book-keeper (Additional) with effect from 4th November, 1977.

INTERMEDIATE GRADE — CLASS II*External Appointment*

Mr. K. G. G. Wijeweera as Library Asst. with effect from 16th September, 1977.

CLERICAL AND ALLIED GRADE — CLASS II*External Appointments*

Miss T. H. M. S. Peries as Casual Clerk/Typist with effect from 25-04-1977.

Miss P. C. A. Fernando do

Miss A. R. S. Hettiarachchi do

Miss K. M. B. I Fernando do

Miss M. M. M. R. Fernando do

Miss M. F. C. G. Perera as Clerk/Typist with effect from 25th April, 1977.

Internal Appointments

Mr. C. B. B. P. Fernando as Clerk/Typist with effect from 25th April, 1977.

Mrs. J. K. Fatima Perera 25th April, 1977

Mr. D. A. P. Hettiarachchi do

Mr. P. M. J. Fernando do

Mr. I. J. Fernando do

OPERATIVE GRADE — CLASS II*External Appointments*

Mr. W. A. G. Gunasiri as Field Asst. with effect from 21st February, 1977.

Mr. E. M. Gunarathbanda - do - 25th July, 1977.

Internal Appointments

Mr. W. L. B. Silva as Lab / Field Assistant with effect from 25th July, 1977.

Mr. W. Pius Fernando as Senior Mechanic with effect from 26th October, 1977.

Mr. W. M. M. J. Perera as Workshop Foreman with effect from 17th November, 1977.

MINOR GRADE — CLASS I*Internal Appointments*

Mr. J. G. Pantalian as Two-wheel Tractor Operator with effect from 15th April, 1977.
 Mr. N. A. D. Manchanayake as — do —
 Mr. W. D. Sirisena as Driver with effect from 1st February, 1977.

External Appointments

Mr. Michael Anthony as Driver with effect from 15th June, 1977.
 Mr. P. P. E. Andrew — do —

MINOR GRADE — CLASS II*External Appointments*

Mr. S. A. Danny Riched as Wacher with effect from 15th June, 1977
 Mr. A. K. Tilakaratne — do —
 Mr. J. A. D. Christopher — do —

RETIREMENTS : Mr. W. A. Sivapragasam, Field Assistant, Planting Division, retired from the services of the Board with effect from 19th April, 1977.

DEATHS : It is with regret that we record the death of Mr. W. S. A. Tissera, Clerk / Typist on 10th November, 1977.

RESIGNATION : Mrs. Swarna Pinto, Typist, resigned from the services of the Institute with effect from 5th April, 1977.

TERMINATIONS : The services of Mr. R. A. Thomas Appuhamy, Tractor Driver, was terminated with effect from 30th September, 1977.

TODDY TAPPING TRAINING SCHEME : The Toddy Tapping Training Scheme continued to function under the control of the C. R. B. The contract of the Employees renewed for a further period pending reorganisation of the scheme.

WELFARE : The Housing Committee functioned with Deputy Director (A & F) as Chairman. Plans are afoot to regrade the bungalows and to review the existing grading of bungalows and the assessment of rent payable by the occupants.

WORKMEN'S COMPENSATION : The Board continued to meet the first seven days' payments as special privilege in addition to the normal payments for temporary disablement cases for the daily paid employees. There were no partial and permanent disablement cases during the year.

FINANCIAL AID : The payment of the Provident Fund, distress and transport loans and special advances was made during the year, on the usual terms.

MEDICAL AID FUND : The medical aid committee continued to function and claims approved at the meeting were paid during the year. Loans from the Reserve Fund were made in case of special hardships.

General

Every effort was made to maintain good Employer Employee relationship during the year.

B. K. D. S. SAMARASINGHE
Deputy Director (Adm. & Finance)

Ceylon Cocon. Q. (1978) 29, 57-59
 Printed in Sri Lanka

Report on Estates (1977)

(1) BANDIRIPPUWA ESTATE, LUNUWILA.

Area Statement

<i>Area</i>	<i>Hectares</i>	<i>(A.</i>	<i>R.</i>	<i>P.)</i>
Bandirippuwa Estate (1)	61.92	(153	0	00)
Bandirippuwa Estate (2) "A"	47.85	(118	0	38)
Bandirippuwa Estate (2) "B"	24.25	(59	3	26)
Bandirippuwa Estate (2) "C"	14.08	(34	3	07)
Total	148.10	(365	3	31)
Research	58.68	(145	0	00)
Estate	82.20	(203	0	17)
Building etc.	6.88	(17	0	00)
Paddy etc.	.340	(0	3	14)
Total	148.10	(365	3	31)

Distribution of area by blocks

<i>blocks</i>	<i>Research</i>			<i>Estate</i>			<i>Total</i>		
	<i>Hectares</i>	<i>(A</i>	<i>R P)</i>	<i>Hectares</i>	<i>(A</i>	<i>R P)</i>	<i>Hectares</i>	<i>(A</i>	<i>R P)</i>
B, E. (1) 1	1.21	(3	0 0)	10.52	(26	0 0)	11.74	(29	0 0)
" " 2	0.00	(0	0 0)	5.67	(14	0 0)	5.67	(14	0 0)
" " 3	4.86	(12	0 0)	4.45	(11	0 0)	9.31	(23	0 0)
" " 4	2.02	(5	0 0)	15.02	(37	0 17)	17.04	(42	0 17)
" " 5	3.64	(9	0 0)	5.26	(13	0 0)	8.90	(22	0 0)
" " 6	2.43	(6	0 0)	2.02	(5	0 0)	4.45	(11	0 0)
B.E. (2) "A"	26.72	(66	0 0)	20.23	(50	0 0)	46.94	(116	0 0)
" " "B"	10.52	(26	0 0)	12.55	(31	0 0)	23.07	(57	0 0)
" " "C"	7.28	(18	0 0)	6.47	(16	0 0)	13.76	(34	0 0)
	58.68	(145	0 0)	82.19	(203	0 17)	140.88	(348	0 17)
Building etc.							6.88	17	0 0
Paddy etc.							0.34	0	3 14
Total							148.10	(365	3 31)

CENSUS OF PALMS ENDED (1976)

	1	2	3	4	5	6	"A,"	"B"	"C"	Total
Full Bearing	1579	705	1202	1969	1070	595	4457	1461	1414	14452
Tapping Palms	—	—	—	—	—	—	—	1093	507	1600
Duds	12	5	6	10	7	7	27	31	39	144
In Flower	6	—	17	19	1	4	172	11	—	230
Established	13	—	7	8	1	2	123	5	1	160
Seedlings	4	—	4	2	1	1	1680	445	1	2138
Vacancies	155	124	204	552	216	297	1230	533	309	3420
Total	1769	834	1440	2560	1296	706	7689	3579	2271	22144

Comparative Rainfall 1976/77 with respective wet and rainy days

Month	1976			1977			5 year (1971-75) rainfall	
	In mm	Wet days	rainy days	In mm	Wet days	rainy days	Total In mm	average In mm
January	7.11	3	—	NIL	—	—	138.68	27.74
February	0.00	—	—	108.97	3	1	253.75	50.75
March	133.35	7	—	161.80	7	2	510.03	102.01
April	114.81	10	2	99.82	7	—	1454.40	290.88
May	49.53	8	—	687.07	27	1	1292.61	258.52
June	57.15	7	1	115.57	13	1	838.96	167.69
July	38.86	7	—	17.53	5	—	688.59	137.72
August	75.18	9	—	60.45	9	—	243.84	48.77
September	68.83	6	—	40.64	6	1	781.30	156.26
October	317.25	20	2	707.64	18	3	1249.68	249.94
November	534.42	22	1	329.69	18	—	1304.54	260.91
December	166.62	7	—	11.43	3	—	793.75	158.75
Total	1563.11	106	6	2340.61	116	9	9550.13	1910.04

CROPS

Total crops from 1973 to 1977 within respective averages

Crops	1973	1974	1975	1976	1977	Total	5 years Average
1st crop	63006	65817	91103	70288	50943	341157	68231
2nd crop	94330	93628	155473	172179	108876	624486	124897
3rd crop	148488	154725	135874	167115	115968	722170	144434
4th crop	143812	141426	162357	150254	118944	716793	143359
5th crop	81106	91250	122364	85741	90024	470485	94097
6th crop	56231	86948	60126	51560	59365	314230	62846
Total	586973	633794	727297	697137	544120	3189321	637864

DISPOSAL OF CROPS (6 Crops 1977)

Sold to contractors	—	389068
Sold to coconut Processing Board	—	38239
Converted into copra	—	54717
Sold to T. T. T. S.	—	10850
Sold to Staff	—	20
Sold to Research	—	2100
Nut Allowance	—	31696
Sold to Canteen	—	570
Missing	—	970
Empties	—	15890
		<hr/>
Total	—	544120
		<hr/>

The reduction of the crop was due to the removal of palms for experiments.

Field Notes

The Following field operations have been carried out during the year.

Weeding

Weeds have been effectively controlled in the estate.

Fencing

Fencing was done in Block "A" and Block "3".

Manuring

The entire estate was manured during the year.

D. C. ELLAWELA
Superintendent,
Bandirippuwa Estate.

(2) RATMALAGARA ESTATE, MADAMPE (1977)

Area Statement

Area	Hectares	(A R P)
Research Station	65.15	(161 0 0)
Estate Section	30.35	(75 0 0)
Nurseries	5.26	(13 0 0)
Roads and Buildings	2.02	(5 0 0)
Jungle and Waste Land	7.69	(19 0 0)
Total	110.48	(273 0 0)

Distribution of area by Research Divisions

Division	Hectares	(A R P)
Botany Division	15.59	(38 2 0)
Division of Soils	22.26	(55 0 0)
Agrostology Division	20.23	(50 0 0)
Intercropping Division	6.07	(15 0 0)
Biometry Division	1.01	(2 2 0)
Planting Division	5.26	(13 0 0)
Estate Section	30.35	(75 0 0)
Roads & Buildings	2.02	(5 0 0)
Jungle & Waste Land	7.69	(19 0 0)
Total	110.48	(273 0 0)

Census of Palms

Particulars	Field								Botany	
	1	2	3	4	5	6	7	8	Blocks	Total
Full Bearing	1500	203	742	1345	1105	1509	2621	320	2800	12,145
In flower	15	—	—	27	—	—	57	—	77	176
Young Palms	—	—	—	20	—	—	18	—	46	84
Duds	96	22	37	66	53	96	41	16	13	440
Vacancies	20	15	45	65	13	84	57	19	199	517
	1631	240	824	1523	1171	1689	2794	355	3135	13,362

Comparative rainfall 1976 / 77 with wet days

Month	1976		1977		5 years (1972-75) rainfall	
	In m.m.	wet days	In m.m.	wet days	Total In m.m.	average In m.m.
January	18.2	5	1.02	1	89.41	17.88
February	—	—	49.53	4	245.87	49.17
March	139.70	5	182.12	6	239.52	47.90
April	154.43	12	157.48	11	1348.99	269.80
May	134.87	10	646.43	26	1030.99	206.20
June	61.21	8	64.17	12	612.90	122.58
July	30.48	7	19.00	2	389.13	77.82
August	34.80	7	35.40	9	200.41	40.08
September	36.58	8	46.20	5	651.26	130.25
October	217.93	20	579.20	26	1233.68	246.74
November	437.64	25	168.50	17	920.50	184.10
December	114.55	8	70.80	7	586.99	117.40
Total	1380.21	115	2019.82	126	7549.65	1509.92

Total crops from 1972 to 1977

Pick No.	1972	1973	1974	1975	1976	1977
1	153,485	46,072	54,434	133,532	55,240	81,584
2	203,711	76,893	97,956	150,920	109,755	136,050
3	198,611	114,695	141,785	160,380	142,305	138,365
4	218,160	173,025	198,568	174,531	163,944	171,919
5	126,332	114,464	95,908	142,026	147,414	149,312
6	104,521	72,314	135,588	68,631	78,444	75,885
Total	1,004,820	597,463	724,239	830,020	697,102	753,115

Crop disposal for 1977

Nuts cured into copra	—	214,719
Nuts sold on contract	—	478,364
Nuts issued for Research	—	9,951
Nuts issued to Staff	—	11,186
Empties and Rejections	—	30,871
Nuts missing	—	8,024
Total	—	753,115

Copra

The 214,719 nuts converted to copra resulted as follows :

No. 1 copra	—	18,283 kg	200 g	being 66.40 %
No. 2 copra	—	5,257 kg	850 g	being 19.09 %
No. 3 copra	—	3,994 kg	700 g	being 14.51 %

Total — 27,535 kg 750 g equal to 108.4 candies

The copra out-turn was 1980, inclusive of the Botanist's Dwarf Palm nuts and Buyer's rejections. The empties and rejections percentage was 4.10 %.

Field notes

Research Divisions namely, Botany, Soil Chemistry, Agrostology, Intercropping and Animal Husbandry and Biometry continue to conduct their field experiments at Ratmalagara. Other than the Biometry Division, resident officers continue to be in charge of their respective Research programmes.

A cattle herd of 100 animals was maintained by the Intercropping and Animal Husbandry Division. The herd particulars are given below :—

1.	1	Bull
2.	10	Cows
3.	28	Heifers
4.	61	Bull calves
Total	<u>100</u>	

General

All estate palms were manured with 4.53 kg (10 lbs) of CRI 'C' mixture per palm. The fertilizer was mixed manually in the ratio of 2.27 kg (5 lbs) of sulphate of ammonia + 0.91 kg (2 lbs) of saphos phosphate + 1.36 kg (3 lbs) of muriate of potash 60%.

The manure was broadcast in an area of 2.27 cm (6 ft.) round the base of the palm and the soil was turned with mammoties.

All field works estimated for the year were carried out. Drains and drain bunds were well maintained. The estate fence was in good repair. Weeds were controlled manually. No harrowing was done owing to the lack of tractor. There was no outbreak of any pests or diseases.

All buildings and estate roads were well maintained. Water service and electricity were provided to the resident staff without any interruption.

The most urgent need at the moment is to provide this Research Station with a new tractor. The present one is unserviceable and the replacements sent from Head Office are in worse condition.

R. M. DE SILVA
Supintendent,
Ratmalagara Estate.