CEYLON COCONUT QUARTERLY

Volume XXX **January - June 1979** **Nos. 1/2**

ANNUAL REPORT FOR 1978

CONTENTS

Price :

Local : Rs. 2.50

Overseas : £ 0.53

Annual Subscription :

Local : Rs. 4.50

Overseas : £ 1.05

Ceylon Cocon. Q. (1979) **30**, 01 - 11
Printed in Sri Lanka

REPORT OF THE COCONUT RESEARCH BOARD - 1978

The present report is the seventh 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.

1. BOARD MEETINGS :

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

Professor B. A. Abeywickrama (*Chairman*)
Mr. A. J. W. Balthazaar
Mr. J. Primson Fernando
Mr. H. D. Moses
Mr. S. C. Kahawita
Mr. K. F. J. Perera
Dr. J. W. L. Peiris

Twelve meetings of the Board were held during the year.

2. STAFF MATTERS :

A. Appointments and Promotions

Mr. B. K. D. S. Samarasinghe was appointed Deputy Director (Administration and Finance) with effect from 24.01.78. Mr. P. B. Madurapperuma was appointed Engineering Assistant with effect from 16.03.78. Mr. R. T. Shanmuganathan was appointed Research Assistant with effect from 27.03.78. Messrs. K. S. Jayasekera, K. R. R. A. Peries, S. L. Talagala, Miss C. W. Ekanayake and Miss P. R. Bandara were appointed Research Assistants with effect from 07.04.78. Mr. J. A. Cadelis was appointed Assistant Manager (Nurseries) with effect from 10.02.78. Mr. S. M. P. Subasinghe was appointed Extension Officer with effect from 10.02.78.

B. On Training Abroad

Research Assistants, Messrs A. S. Amarasinghe, M. P. L. D. Martin, P. Kanagaratnam and Mrs. L. V. K. Liyanage continued to be on overseas training.

Mr. V. U. de Silva Jayasuriya left the island on 27.01.78. on a Colombo Plan Scholarship to engage in postgraduate research in Plant Physiology at the University of Queensland, Australia. Mrs. S. M. Karunaratna left the island on 02.02.78. on a Colombo Plan Scholarship for postgraduate research in Plant Tissue Culture at the University of Queensland, Australia.

Mr. M. de S. Liyanage left the island on 22.02.78 on a Colombo Plan Scholarship for a postgraduate training in Crop Agroclimatology at the University of New England, Australia.

Mr. M. N. M. Ibrahim left the Island on 17.02.78 on a Colombo Plan Scholarship for Postgraduate research in Animal Nutrition at the University of Melbourne, Australia.

Messrs S. V. Sinnathamby and A. M. Chandrasena left the Island on 27.09.1978 and 22.11.1978 respectively under an FAO training programme for study tours of three months each in Biological Control of weeds and insects. The training programmes were in Australia.

Fellowships granted by the International Atomic Energy Agency enabled Technical Assistants, Messrs B. J. A. F. Mendis and P. P. Atputharajah to undergo six months' training in the use of Radio Isotopes in Agriculture at the Bhabha Atomic Research Centre and the International Atomic Energy Agency, India. They commenced their programmes on 04.03.1978 and 05.10.1978 respectively. Mr. B. J. A. F. Mendis resumed duties at the Institute on 03.09.1979.

C. Returned from Training Abroad :

Dr. S. Mohandas resumed duties on 5.10.78 after successfully completing his training in Plant Biochemistry at the Waite Agricultural Research Institute, University of Adelaide, Australia.

Mr. P. A. C. R. Perera, Senior Technical Assistant, resumed duties on 26.6.78 at the conclusion of his postgraduate studies in Entomology at the Imperial College, London.

Mr. B. H. Rohitha resumed duties on 2.11.78 at the end of his postgraduate studies in Agricultural Entomology at the University of New Zealand.

Mr. M. J. C. Perera resumed duties on 21.07.78 after one year's pre-project training in Library Science in U.K. under a grant from the International Development and Research Centre (Ottawa, Canada).

D. Conferences and Visits Abroad :

On the invitation of the Canadian Soil Science Society, the Soil Chemist, Dr. P. Loganathan attended the International Soil Science Society Meetings at Edmonton, Canada in July 1978.

The Soil Chemist, Dr. P. Loganathan visited Institutions carrying out research on the use of nuclear techniques in soil-plant-water studies in India, Malaysia and the Philippines during September 1978. This visit was supported by the International Atomic Energy Agency.

Dr. R. Mahindapala, Crop Protection Officer, attended the COCOTECH Meeting of the Asian and Pacific Coconut Community from 28th February to 3rd March in Bangkok, Thailand and served as a member of the production panel which discussed plant quarantine in relation to coconut.

E. Resignations :

Mr. M. H. C. Ariyaratna, Assistant Accountant and Miss P. R. Bandara, Research Assistant, resigned from the service of the Board, with effect from 04.01.78 and 31.12.78 respectively.

3. VISITORS :

During the year the Institute received 4,459 students from 50 schools, 164 from the University and other Institutions and 92 visitors from overseas.

4. PUBLICATIONS :

One issue of the Sinhala Journal - Pol Pawath (Vol. 6 No. 4) was published during the year.

5. 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.

A. DIVISION OF SOILS

(1) Twelve long term fertilizer field experiments were maintained at Bandirippuwa, Ratmalagara, Pothukulama, Bingiriya, Andigedera, Pallai, Makandura and Kakkapalliya.

The first sixteen years' data of the response curve experiment at Pothukulama Research Station were analysed. The results showed that nitrogen increased girth, height and leaf production in the pre-bearing period. In contrast to the results of other experiments, phosphorus had no effect up to 6½ years, on any vegetative growth parameters. Soils and leaf analysis indicated that this was due to high native soil phosphorus. Similarly potassium had no effect up to 3½ years. Copra and nut yield for the initial bearing period (13 to 16 years) showed that the rates of fertilizers for optimum yield are 0.35, 0.73 and 0.64 kg N, P_2O_5 and K_2O/palm/year respectively.

(2) A new experiment was commenced to determine the yield response of adult palms to the application of urea and muriate of potash and to assess the optimum rates of these fertilizers required on a gravelly soil at Kobeigana estate, Hettipola.

(3) A pot experiment on the relative efficiencies of Eppawala apatite and saphos phosphate using *Paspalum commersonii* as an indicator plant was carried out on the alluvial soil from the field experiment at Makandura, where different levels of the two sources of phosphorus are tested.

As in the previous year, the results indicated that Eppawala apatite is much inferior to saphos phosphate.

(4) Soil samples (surface and sub) covering most of the soil series where coconut is cultivated were collected and the different forms of soil potassium were determined by chemical analysis. Leaf samples collected from selected sites were also analysed for potassium. Pot experiments were carried out using *Paspalum commersonii* on these soils. The results showed that almost all the soils of the Wet and Intermediate rainfall zones are deficient in potassium.

(5) Soil and leaf samples were collected from all the field experiments in order to determine the optimum levels of nutrients in the soil and leaf for the growth of coconut. Analyses are being carried out.

(6) An experiment on the effect of husk burying on the conservation of soil moisture was commenced at Ratmalagara estate. Tensiometers and the Neutron Moisture Probe supplied by the International Atomic Energy Agency (IAEA) are being used to monitor the soil moisture tension and moisture content respectively.

(7) A Pressure Bomb apparatus was also supplied by the IAEA and preliminary studies on the determination of leaf water potentials of coconut were commenced.

(8) Detailed soil surveys and soil maps of Kuda-Galgamuwa and Tabbowa for a project on small holder practices were completed.

(9) Analyses of several samples of soils, leaf and fertilizers were carried out for Government Organisations.

B. DIVISION OF BOTANY AND PLANT BREEDING

Breeding and Selection

With the phased closing down of the controlled pollination stations, only the Horrekelly Seed Garden unit functioned this year. 36,000 female flowers were pollinated with *typica* (prepotent) pollen and although 1978 was a drought year it is anticipated that about 12,000 nuts can be harvested next year. Twenty-five thousand *typica* × *typica* seednuts were harvested from 108,700 female flowers pollinated in 1977. Public and private sector estates received 354 ampoules of *typica* (prepotent) and 207 ampoules of *pumila* pollen.

Nurseries

The nurseries at Bandirippuwa and Ambakelle received 32,500 *typica* x *typica* seednuts and 68,800 *pumila* x *typica* seednuts. Hybrid seednuts were also issued to the Planting Division for planting in Walpita, Ibbagamuwa, Eraminigolla and Koggala nurseries. 27,442 *typica* x *typica* and 12,757 *pumila* x *typica* seedlings were issued this year from Bandirippuwa and Ambakelle.

Inter-varietal F_1 hybrids

Three of the earliest experimental plots planted with hybrids (Ratmalagara 1950, 1958, Bandirippuwa 1963) have given a mean yield of 108, 107 and 103 nuts/palm respectively in a drought year. If we consider the Ratmalagara 1958 planting, 55 per cent of the progeny population have yielded over 100 nuts/palm/year with 90 per cent of the progeny population yielding over 60 nuts/palm/year when averaged over a four year period, 1975 — 1978.

Typica x *nana* form *regia* F_1 hybrids and their reciprocals planted at Pothukulama Research Station in 1972 were in their first full year of production. They compare very favourably in regard to nut characters with the CRIC 65 hybrids, as indicated below.

Type of hybrid	*Wt./nut (g)*	*Wt. of copra/nut (g)*	*Conversion ratio*
Typica x *nana* form *regia*	648	204	31%
Nana form *regia* x *typica*	645	198	31%
Typica x *nana* form *pumila*	561	180	32%
Nana form *pumila* x *typica*			
(CRIC 65 hybrids)			

Based on the early data it would appear that the *typica* x *nana* form *regia* F_1 hybrid and its reciprocal deserve a place along with the tried and tested CRIC 65 hybrid. This hybrid has the additional advantage in that the red colour of the *regia* provides a striking genetic marker to screen hybrids from accidentally selfed *regia* seedlings which would show red petiole colour. 30 ha of the Second Seed Garden, Horrekelly is being planted up with the *regia* form of dwarf for ultimate production of *regia* x *typica* F_1 hybrids.

Hybrid Performance

The survey of hybrid performance in the hands of small holders was extended to the Northern Province where the results are disappointing. It would appear that hybrids would live up to known standards of performance only under controlled irrigation, sporadic hand watering being insufficient for even their initial establishment.

Mother Palm Seed Supply

This year 2,498,530 selected seednuts from 32 private sector and public sector estates were supplied to the nurseries. An additional 13,977 palms were identified and the total collection of mother palms now stands at 54,732.

Seed Gardens

1032 'elite' *typica* palms were identified at the First Seed Garden, Ambakelle. These should be capable of producing about 100,000 *typica* x *typica* seednuts thus replacing the CRIC 60 produced by hand pollination.

18,217 inflorescences on palms in fields 5, 9, 10A, 10B, and 11A at Ambakelle were emasculated and 94,944 button nuts are developing. 118,000 hybrid seednuts were harvested out of which 96,681 *pumila* × *typica* and 8,826 *eburnea* × *typica* were issued to the nurseries. Only 1859 mm of rain were received in 81 rain days with 1202 mm falling during the period October-December. There may be a serious shortfall in seed nut production in 1979.

The Second Seed Garden Horrekelly received even less rainfall of only 1586 mm. This seriously affected the establishment of the dwarf plantation. 1346 *pumila* seedlings were used to supply vacancies in fields 1—5. Poly-bagged seedlings are being used for the first time to replant 'difficult' areas.

Laboratory and Field Investigations

The investigations on colour inheritance of inter-varietal hybrids, coconut tissue and coconut embryo culture are being continued.

C. CHEMISTRY DIVISION

1. Plant Chemistry

Experiments to ascertain the domains of variability in leaf sampling of coconut which commenced in 1977 were concluded during the year.

2. Variation in nutrient composition of leaves, kernel and nut water between harvests

An empirical trial was carried out at Walpita on the variation in nutrient composition of leaves 1 and 14, the kernel and nut water at the time of each harvest and extending through a period of one year and six harvests. The results indicate very wide variations.

3. Nutrient composition of the first and the 14th frond from coconut varieties grown in Sri Lanka

An inventory of the nutrient composition of the 1st and 14th frond in some of the coconut varieties grown in Sri Lanka was commenced during the year.

4. Leaf scorch affected palms

Preliminary studies were conducted on the inorganic (macro elements) and organic (carbohydrate) composition of healthy and affected palms from a leaf scorch affected area.

Product Technology — Sap Products

5. Fermentation of Coconut Sap

Studies were continued on the succession of microbial flora in fermenting toddy. Large scale collection of sweet toddy for controlled fermentation was initiated and trial runs were successfully concluded at the State Distilleries Corporation on samples of the control-fermented toddy. Studies showed increased alcohol production and reduced cost of distillation.

6. Golden syrup from sweet toddy

An appropriate method for the preparation of golden syrup from coconut sap has been successfully evolved.

7. "Rabath" in Sap

Investigations on methods of purification and reprecipitation of "rabath" from coconut sap were concluded and analysis for structural components is in progress.

NON-SAP PRODUCTS

8. Isolation and identification of glycerides and fatty acid components in coconut oil using chromatographic techniques

Initial studies using chromatographic techniques for identification and separation of the glyceride and fatty acid components were successfully carried out.

9. Quality characteristics of coconut shell charcoal

Preliminary studies on quality characteristics of coconut shell charcoal have been commenced.

D. DIVISIONS OF AGROSTOLOGY AND INTERCROPPING

General

During the year under review new experiments were set up on management and ecological studies. Rainfall during the year was satisfactory and all long term pasture trials were managed to schedule.

1. PASTURE AND FODDER TRIALS

Bandirippuwa Estate

(P95) Levels of fertilizer and frequency of defoliation on *Brachiaria ruziziensis* indicate an increase in yield with more frequent defoliation and at higher levels of fertilization.

(P97) The virus resistant strain of *Digitaria decumbens* confirmed its resistance to the disease normally prevalent on non-resistant strains. This grass responds very well to added nitrogen.

(P94) The legume/grass trial was sampled thrice during the year and it is too early to make any comments.

(P100) The comparative study of milk yields of cows fed on mixed pasture (*Brachiaria miliiformis* and *Centrosema pubescens*) with that of cows fed on grass and concentrates is at its preliminary stages.

Ratmalagara Estate

(P101) This trial on animal production from two pasture legumes ('Centro' and 'Siratro') and one shrub legume (*Gliricidia*) combined with grass and compared with grass only is at its initial stages.

(P102) This is an ecological trial set up this year on nine varieties of grasses.

(P103, P104 & P105) These are management trials on Pangola, Green panic and *Brachiaria brizantha* planted during this year.

SIRIKANDURA ESTATE

(P98) This is a detailed study of the two species — *Brachiaria ruziziensis* and *Brachiaria dictyoneura.* So far the latter is superior.

WALPITA ESTATE

(P99) This is a fertilizer study on nine grasses commenced during Maha last year and it is yet too early to make any comments.

CROPS OTHER THAN GRASSES

i. Project at Mulleriyawa and Ingiriya in new and old coconut plantations respectively were discontinued during the year.

ii. **Walpita Project**

(a) A long term trial to study the effect of 4 planting densities and 3 levels of fertilizer on the growth and yield of coffee and the effect of coffee on the production of coconut is being continued.

(b) Another long term experiment to study the performance of 4 cocoa selections at 3 levels of fertilizer is being carried out.

(c) **Mixed planting trial of Coffee, Cocoa and Pepper**

This again is a long term trial to study the agronomic feasibility of growing coffee, cocoa and pepper (mixed) under coconut.

The scheme of planting is cocoa as a single row spaced 8 ft. apart in the row, between two coconut rows.

Coffee spaced 8 ft. in the row planted 8 ft. apart on either side of the cocoa row.

Pepper on the coconut and also on live supports.

iii. **Sirikandura Estate**

(a) An experiment on coffee, cocoa, cloves, cinnamon, pineapple and pepper on live supports, to study the effect on the yield of coconut is in progress.

(b) A three year experiment in an extent of one acre to study the effect of rotation on the yield of Turmeric and Kiriala under coconut is being continued.

iv. **Bandirippuwa Estate**

(a) A long term experiment expected to last at least 5 years on a 15 acre block to study the economics and feasibility of growing several different crops under coconut. These will also serve as demonstration plots to the public. The following crops are being established. Coffee, cocoa, passion fruit, pineapple, papaw, banana, pepper, dioscorea yams, cinnamon, fruit trees and vegetables.

(b) **Coffee**

A trial to study the effect of 3 levels of fertilizer on 10 coffee selections is in progress.

(c) **Cocoa**

An experiment to study the performance of 10 cocoa selection under coconut is in progress.

v. **Kirimetiyana Estate**

(a) **Mulberry**

An experiment on Mulberry under coconut was laid out during the latter half of 1978 to study the following :

Response to fertilizer, performance of two varieties, performance under two different shadings and economics of fertilizer use. The experiment is being continued.

vi. **Animal Husbandry**

The rotational cross breeding programme between Sindhi, Jersey and Friesian (with the Sinhala breed as the foundation) was continued during the year. There were 114 births and 36 deaths during 1978. 10 deaths were due to the cyclone in November. 98 animals were sold during the period under review.

The entire herd was vaccinated against H.S. and Foot and Mouth diseases and the health of the herd was satisfactorily maintained.

E. CROP PROTECTION DIVISION

A. PESTS

1. Promecotheca cumingi

During the latter part of the year, the FAO/UNDP Project on "Strengthening Biological Control Activities on Coconut and Other Crops" was terminated. The Leaf Miner persisted in three localities (Galle, Katunayake, Ambalangoda), where the activity of parasites was evident. Monthly surveys were carried out in these localities to study the fluctuations of pest and parasite populations. Towards the latter part of the year, a sudden resurgence of the pest was noted at Galle and action was taken to bring this outbreak under control.

2. The Coconut caterpillar (Nephantis serinopa)

In the Southern Province, the pest remained within the previously infested areas. A new approach was tested combining both insecticides and parasites to control this pest. Using such techniques, severe outbreaks of this pest at Ja-ela and in the Southern Province were brought under control.

The parasite breeding programme was continued at the two insectaries at Headquarters and at Mylambaveli. The latter was damaged by the cyclone in November. Breeding of *Eriborus trochanteratus, Perisierola nephantidis, Trichogramma brasiliensis* and *Spoggosia bezziana* was carried out. Breeding of the pupal parasite, *Trichospilus pupivora* was recommenced at Lunuwila.

3. The Coconut Scale (Aspidiotus destructor)

A few reports of the presence of this pest were received. In most of the localities the pest was brought under control by naturally occurring indigenous predators *Chilocorus nigritus* and *Pullus xerampelinus.*

4. The Red Weevii, (Rhynchophorus ferrugineus)

A few reports of this pest were received. Laboratory studies on the use of three systemic insecticides were carried out.

5. The Black beetle (Oryctes rhinoceros)

Results of the field experiment designed to evaluate the efficacy of Rhabdionvius were erratic. Serological techniques were employed to detect the virus in apparently infected larvae.

6. Biological control of Eupatorium

Successful defoliation of the weed by *Ammalo* was observed in a number of localities.

B. DISEASES

Only a few reports of bud rot and stem bleeding diseases were received. Studies were conducted on the biology of fungi implicated in leaf blight disease. Studies were also carried out on phylloplane fungi of coconut.

In connection with leaf Scorch Decline of coconut, studies on soil mycoflora were carried out. Action was also taken to check affected tissue for the possible presence of mycoplasma - like organisms (MLO's).

Leaf Scorch Decline was shown not to affect the oil content of copra.

F. BIOMETRY UNIT

1. Statistical service

Statistical work for all the research divisions was attended to. Designs too were provided for a number of new experiments.

2. Research

The following experiments were maintained satisfactorily.

2.1 Calibration trial

The recordings of vegetative and yield characters of the palms in this experiment were carried out without interruption.

2.2 Watering experiment

As scheduled, watering of palms was done at various intensities and frequencies, during periods of drought.

2.3 Copra conversion factor experiment

This experiment where copra was cured at different periods after harvest was continued uninterrupted.

2.4 Bunch thinning

This experiment carried out at Bandirippuwa Estate had to be prematurely stopped as some experimental trees were struck by lightning. A preliminary study showed a significant increase in female flower production in the inflorescence produced subsequent to the thinning.

Based on these findings a further two experiments were commenced at Ratmalagara Estate in order to get further confirmation of the above findings.

3. Crop Forecasting

C.R.B. forecast for the year 1979 is 1680 million nuts. This is 28.7% less than the production in 1978.

4. Agri-meteorology

The three agri-meteorological stations at B/E, R/E and I.S.G. were maintained satisfactorily.

General

The Biometrician continued to function as Consultant to the Rubber Research Institute of Sri Lanka and the Sri Lanka Sugar Corporation and also functioned as a visiting lecturer at Vidyalankara Campus, Colombo Campus and Bureau of Standards.

G. PLANTING DIVISION

1. Seednuts:

The Planting Division maintained 15 nurseries during the year. 8½ acres of crown jungle land was obtained at Kilinochchi to open a new nursery.

A total of 1,850,270 seednuts was planted in the nurseries for the issue of seedlings during May/June and October/November 1978 seasons as follows :

Season	*Seednuts*
May/June 1978	518,355
October/November 1978	1,331,915
Total	1,850,270

The Planting Division also established 13 other nurseries for Government Institutions and supplied 94170 seednuts to these nurseries.

2. Seedlings:

Orders were booked in 1978 for 3,02,761 seedlings for the undermentioned issue seasons:

Season	*Seedlings*
October/November 1976	3,951
May/June 1977	17,195
October/November 1977	59,513
May/June 1978	222,102
Total	302,761

As from October/November 1978 season the allocation and booking of seedlings were handled by the Coconut Cultivation Board.

3. The actual number of seedlings issued during 1978 from the 15 nurseries amounted to 948275 and their distribution in respect of the various seasons is as follows :

Season	*Seedlings*
October/November 1976	15,297
May/June 1977	6,636
October/November 1977	163,824
May/June 1978	265,549
October/November 1978	496,969
Total	948,275

H. PUBLICATIONS/PUBLICITY UNIT AND LIBRARY

1. **Journals.** Vol. 6 No. 4. of the 'Pol Pawath' was published during the year:

2. **Advisory Leaflets :** The 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.

3. **LIBRARY:**

During the year under review 70 new books were added to the stock making a total of 3690 books in stock at the end of the year. The number of Journals subscribed to was 63 while 95 were obtained on exchange.

Dr. U. PETHIYAGODA
Director

Ceylon Cocon. Q. (1979) 30,12-19
Printed in Sri Lanka

REPORT OF THE DIVISION OF SOILS - 1978

A. FIELD EXPERIMENTS

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

As in the previous years very highly significant responses to phosphorus and potassium were obtained. The main effects are shown in Table A 1.

The experiment was closed down at the end of 1978. Yield record of few plots were maintained to determine (a) the rate of decline in production of palms which have received regular application of fertilizers, on stoppage of fertilizers and (b) the rate of recovery of palms which have not received fertilizer for a long time, on resumption of fertilizer application.

Table A 1. *Yield data for 1978 — kg copra/ha — 163 palms/ha. Copra yields adjusted by covariance analysis*

Treatment palm/year		*kg Copra/ ha*	%	*Difference kg Copra/ha*
N_0	(0.000 kg ammonium sulphate)	728	100	—
N_1	1.103 ,,	684	94	-44
N_2	2.206 ,,	679	93	-49
N_3	3.309 ,,	639	88	-89
P_0	0.000 kg saphos phosphate	483	100	—
P_1	0.826 ,,	730	151	247*
P_2	1.652 ,,	700	145	217*
P_3	2.478 ,,	817	169	334*
K_0	0.000 kg muriate of potash (60%K_2 0)	345	100	—
K_1	0.376 ,,	623	181	278*
K_2	0.752 ,,	837	243	492***
K_3	1.128 ,,	924	268	579**

Significant difference P 0.05 = 140.9 kg/ha.
*,**,*** Significant at P 0.05, P 0.01 and P 0.001 respectively

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

The annual manuring was done in December 1978. As in the previous years potassium showed significant response at P 0.05. The main effects are shown in Table A 2.

Table A 2. *Yield data for 1978 — kg copra/ha — 136 palms/ha*

	Treatment/ palm/yr.	*kg copra/ ha*	*%*	*Difference kg copra/ha*
N_0	0.681 kg ammonium sulphate	2404	100	—
N_1	1.362 ,,	2286	95	-118
N_2	2.043 ,,	2257	94	-147
P_0	0.454 kg saphos phosphate	2234	100	—
P_1	0.908 ,,	2391	107	157
P_2	1.362 ,,	2323	104	89
K_0	0.681 kg muriate of potash (60 % K_2 0)	2220	100	—
K_1	1.362 ,,	2269	102	49
K_2	2.043 ,,	2459	111	239*

Significant difference at P 0.05 = 183.7 kg/ha
* Significant at P 0.05

3. 4 × 4 × 4 NPK Experiment on Young Palms — Pothukulama Research Station, Pallama (Commenced December 1961)

Annual application of fertilizer was done in December, 1978.

The first 16 years data on the effects of NPK fertilizers on the vegetative growth, nut and copra yield was analysed. Nitrogen increased girth, height and leaf production during the pre-bearing period but had no influence on the initial flowering of the palms. Potassium had no effect on the vegetative growth upto 4½ years. In contrast to the results of other experiments, phosphorus had no effect, upto 6½ years, on any vegetative growth parameters. Soil and leaf analysis showed that this was due to the high native soil P at Pallama.

Copra and nut yield data for the initial bearing period (13 to 16 years) showed that the rates of fertilizers for optimum yield are 0.35, 0.73 and 0.64 kg N, P_2O_5 and K_2O/palm/year respectively. The high P requirement was due to the low solubility of the saphos phosphate in the Pallama sandy soils. Soil analysis showed that sulphate of ammonia decreased the soil pH significantly and thereby increased the available P in the soil, whereas saphos phosphate significantly increased the soil pH. A positive NP interaction was also observed.

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

Annual application of fertilizer was done in December, 1978.

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

This Experiment was closed down in 1977. Detail analysis of the results obtained from the commencement of the experiment are being carried out.

6. 5 × 5 × 5 × 5 NPK Mg Experiment on Adult Palms — Marandawila Estate, Bingiriya (Commenced November 1967)

The annual manuring was done in November 1978. As in the previous years the response to phosphorus was significant at P 0.05.

The main effects are shown in Table A 3.

Table A 3. *Estimated yield for 1978 — kg copra/ha — 148 palms/ha*

	Treatment/ palm/yr.	*kg copra/ ha*	*%*	*Difference kg copra/ha*
N_0	0.000 kg ammonium sulphate	2561	100	—
N_1	1.103 ,, ,,	2483	97	–78
N_2	2.206 ,, ,,	2401	94	–160
N_3	3.309 ,, ,,	2313	90	–248
N_4	4.412 ,, ,,	2221	87	–340
P_0	0.000 kg saphos phosphate	2102	100	—
P_1	0.826 ,, ,,	2299	109	197
P_2	1.652 ,, ,,	2446	116	344
P_3	2.478 ,, ,,	2543	121	441
P_4	3.304 ,, ,,	2590	123	488
K_0	0.000 kg muriate of potash (60% K_2 0)	2316	100	—
K_1	0.454 ,, ,,	2390	103	74
K_2	0.908 ,, ,,	2430	105	114
K_3	1.362 ,, ,,	2436	105	120
K_4	1.816 ,, ,,	2409	104	93
Mg_0	0.000 kg kieserite	2181	100	—
Mg_1	0.681 ,,	2351	108	170
Mg_2	1.362 ,,	2456	113	275
Mg_3	2.043 ,,	2501	115	320
Mg_4	2.724 ,,	2485	114	304

7. Comparison of Eppawela Apatite with Saphosphosphate — Mahayaya Estate, Makandura and Andigedera Estate, Bingiriya (Commenced June 1975)

At Mahayaya the third application of fertilizer was done in November 1978. At Adnigedera, due to unavailability on time, the fourth application was done in January 1979.

No significant response to phosphorus was observed.

8. Magnesium Experiment on Young Palms — Bandirippuwa Estate, Lunuwila (Commenced October 1972)

For the first time CRI mixture "C" was given to all palms at 4½ kg/palm as a basal dosage in January 1979. Kieserite was also applied at the same time as follows :

Mg_0	0	kg kieserite/palm
Mg_1	0.5	,,
Mg_2	1.0	,,

Analysis of variance showed a significant effect of magnesium on the number of leaves produced and the percentage of palms in flower. Difference between the varieties and magnesium x variety interactions were not significant.

Table A 4. *Effects of magnesium on leaf production and flowering in 1978*

	leaves/palm/yr	*% palms in flower*
Mg_0	9.54	26.10
Mg_1	10.45	40.60*
Mg_2	11.13*	41.68*

Significant difference at P 0.05 = 0.98 leaf/palm/yr and 11.71% palms in flower
*Significant at P 0.05

9. Fertilizer Experiment on Young Hybrid Palms — Bandirippuwa Estate (Commenced December 1973)

Biannual supply of fertilizer ceased with the application due in December 1977. Manuring for the year 1978 was completed in January 1979. The composition of the fertilizer mixture was 113.5 kg ammonium sulphate, 34 kg saphos phosphate and 56.8 kg muriate of potash (60% K_2 0). The rates of application were :

Levels	*kg/seedling/yr*
0	0.000
1	2.722
2	5.444
3	8.166

Leaf counts were done in March and September. No significant difference between the treatments was obtained. This may be due to the uneven growth resulting from water logged condition in a section of the field during rainy season.

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

Owing to unavailability of fertilizers on time, the second manuring was done in January 1979.

11. 3 x 3 NK Experiment at Kobeigane Estate, Hettipola

A new experiment was commenced to determine the yield response curves of adult palms to the application of sulphate of ammonia and muriate of potash and assess the optimum rates of these fertilizers required on a gravelly soil.

The experimental layout consists of a fully randomized design with 9 treatments replicated thrice. Each plot consists of 8 palms and the plots are separated by single guard rows. The rates of application are given below :

N_0	0	kg sulphate of ammonia
N_1	1	" "
N_2	2	" "
K_0	0	kg muriate of potash (60% K_2 0)
K_1	1	" "
K_2	2	" "

All plots received a basal dose of 1 kg saphos phosphate/palm/yr.

Pre-manurial yields were recorded commencing February, 1978. The first differential manuring was carried out in December 1978.

12. Experiment on Ammonium Chloride, Ammonium sulphate and Urea at Manakkulama Estate, Kakkapalliya (Commenced July 1976)

An experiment on the comparison of ammonium chloride, ammonium sulphate and urea as nitrogen fertilizers for adult coconut on sandy soils was commenced in 1976.

The experimental layout is a fully randomized design. There are 9 treatments, each replicated thrice. Each plot consists of 12 palms. The plots are separated by single guard rows. The rates of application (kg/palm/yr) are given below.

	ammonium sulphate	*ammonium chloride*	*urea*
N_0	0	0	0
N_1	1.000	0.824	0.448
N_2	2.000	1.648	0.896

Basal doses of 0.8 kg/palm/yr of saphos phosphate and 1.5 kg/palm/yr of muriate of potash (60% K_2 0) were also given.

The first differential application of fertilizer was carried out in August 1977 and the second in December 1978.

13. Comparison of Saphos Phosphate and Concentrated Superphosphate at Pallai (Commenced July 1977)

An experiment on the comparison of saphos phosphate and concentrated superphosphate as sources of phosphorus for adult palms on sandy soils of the dry zone was commenced at the Coconut Demonstration Centre, Pallai. Palms were selected in fields A and B of the extreme end of the estate and pre-manurial yield records were maintained from July 1977. Based on this record, 12 plots each were selected from the two fields. Each plot consists of 6 effective palms. The plots are separated by a single guard row of palms. The first differential manuring was done in May 1978. The treatments are :

Control — no phosphorus		
Concentracted superphosphare	—	0.54 kg/palm/yr
Saphos phosphate	—	0.83 kg/palm/yr

A basal treatment of 1.10 kg urea and 1.36 kg muriate of potash/palm/yr was given to all palms.

B. POT EXPERIMENTS

1. Comparison of Eppawala Apatite with Saphos Phosphate Using Paspalum *Commersonil*

The series of glasshouse experiments was continued during the year. The soil samples for the experiment were taken from the differentially treated plots of the field experiment at Mahayaya Estate, Gonawila, where Eppawala apatite (EP) at 2, 4 and 6 lb/palm/year and saphos phosphate (SP) at 1, 2 and 3 lb/plam/year are being tested. Within the manure circle of each treated palm 4 borings were taken to a depth of about 18 inches. The soils from the borings around similarly treated palms were bulked, air-dried and sieved (2 mm). From each lot about 7 kg soils were taken for the pot experiment.

Each treatment was replicated 4 times and a randomized block layout was used. Nitrogon and potassium were provided as basal doses. Two harvests, at 71 and 121 days, were taken. Weight of dry matter, uptake of phosphorus, available phosphorus and pH of the cropped soils were determined.

Dry Matter: Significantly higher yield than control was given by SP at all levels tested whereas EP did so only at the third level. Excepting at level 3, the yields from SP treatments were significantly higher than from EP treatments. At the second harvest the same pattern of performance was reported.

Levels	*Weight of dry matter (g/pot)*			
	First harvest		*Second harvest*	
	EP	*SP*	*EP*	*SP*
1	11.65	11.05	5.20	5.08
2	11.65	14.15	5.50	6.78
3	12.85	13.33	6.13	6.53
4	11.15	12.63	5.18	6.13

Uptake of phosphorus: At the first harvest the uptake of phosphorus from SP treatments at level 2 and 4 were greater than from EP treatments. At level 3 the uptake from both sources was nearly the same. But the quantity of EP applied at level 3 was double that of SP. At the second harvest no clear difference between the two sources was evident.

Levels	*Uptake of phosphorus (mg P_2O_5/Pot)*			
	First harvest		*Second harvest*	
	EP	*SP*	*EP*	*SP*
1	32.77	29.84	14.14	12.00
2	31.31	38.74	16.30	17.29
3	37.84	38.70	22.09	20.16
4	30.94	35.12	12.88	14.58

2. Potassium status of Coconut-Growing Soils

Pot experiments to determine the yield response to potassium were carried out on five selected soils having wide range of exchangeable potassium, using an indicator plant *Paspalum Commersonii*. Three levels of potassium were tested, and each treatment was replicated thrice. The rates of potassium were zero, 225 mg and 450 mg of muriate of potash (60% K_2O) per pot (a pot containing 1500 g soil). The results showed that the response to potassium was very low or nil in soils having exchangeable potassium $\geq$ 36 ppm.

C. LABORATORY INVESTIGATIONS

1. Potassium status of Coconut-Growing Soils

Water soluble, exchangeable, difficulty exchangeable and total potassium contents of sixty four profiles covering twenty soil series were correlated with percent clay, percent silt, percent sand, pH, per cent organic carbon, cation exchange capacity and exchangeable bases. All forms of potassium in the surface soil were negatively correlated with percent clay. Water soluble, exchangeable and difficultly exchangeable potassium contents were positively correlated with pH, cation exchange capacity and total exchangeable bases in both surface and subsoils. The water soluble and exchangeable potassium significantly decreased with depth. The corresponding forms of potassium in surface soils and subsoils were positively correlated.

Among total, difficultly exchangeable, exchangeable and water soluble potassium there was a positive correlation between two adjacent forms.

Coconut leaf samples collected from soils having wide range of exchangeable potassium showed that when the exchangeable potassium and difficultly exchangeable potassium $\geq$ 75 ppm, the potassium concentrations in the 14th leaf were higher than the critical level.

The data indicate that most soils in the Intermediate and Wet zones are deficient in potassium.

2. Leaf Water Potential Measurements

A Pressure Bomb apparatus was supplied by the International Atomic Energy Agency and preliminary studies on the determination of leaf water potentials in coconut were conducted. Experiments on leaf sampling techniques, effects of irrigation on leaf water potential and relationship of leaf water potential to soil water tension were commenced.

3. Analysis of Soil Samples from Fertilizer Experiments

Soil Samples from the manure circles of the fertilizer experiments were collected and analysis for different forms of K and P, total N, exchangeable Ca and Mg, Cl and pH were commenced.

4. Analysis of Leaf Samples from Fertilizer Experiments

Leaf samples (6th and 14th leaf) were collected from the fertilizer experiments in September and analysis for N, P, K, Ca, Mg and Cl were commenced.

D. SOIL SURVEY

Detailed soil surveys and soil maps of Kudagalgamuwa (Kurunegala District) and Tabbowa Nattandiya (Puttalam District) for a UNDP project were carried out for interpretation of land capability for planting intercrops.

Tabbowa

The following soils were identified:

(i) Boralu series, moderately deep phase (340 acres)
(ii) Boralu series, shallow phase (250 acres)
(iii) Pallama series, upper slope phase (400 acres)
(iv) Pallama series, lower slope phase (850 acres)
(v) Madampe series (460 acres)

Kudagalgamuwa

(i) Kurunegala series (530 acres)
(ii) Kiriwana series (450 acres)
(iii) Rock-knob plain (70 acres)

Detailed soil survey of Kottawila area at Kamburugamuwa (Matara District) was commenced.

E. MISCELLANEOUS

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

(1) Loganathan, P. and Fernando, T. W. (1978). Surface charge characteristics of some acid soils of Sri Lanka. *Trop. Agric.* (In press).

(2) Loganathan, P. and Balakrishnamurthi, T. S. (1978). Effects of NPK fertilizers on coconut (*cocos nucifera L.*) on a sandy soil in Sri Lanka. Paper presented at the *Annual Sessions, Sri Lanka Association for the Advancement of Science*, Dec., 6th 1978. (Accepted for publication in *Expt. Agric.* 1980).

(3) Loganathan, P. (1978). Some recent developments in fertilizing coconut. Paper presented at the Seminar on Research and Development Programme for Coconut Production. A. R. T. I. Colombo (Submitted for publication in *Ceylon Cocon. Q*).

(4) Jayasekera, K. S., Tennakoon, D. T. B. and Gunawardene, R. P. (1978). Acidulation studies on Eppawela apatite, Part I. The conversion of Eppawela apatite to a citrate soluble fertilizer using Paranthan hydrochloric acid. Paper presented at the 34th Annual Sessions of the *Sri Lanka Association for the Advancement of Science, Dec.*, 6th 1978.

(5) Jayasekera, K. S., Tennakoon, D. T. B. and Gunawardene, R. P. (1978). Precipitation of dicalcium phosphate from acidic phosphate solution. Paper presented at the 34th *Annual Sessions of the Sri Lanka Association for the Advancement of Science.* Dec., 6th 1978.

(6) Amarasinghe, A. S. (1978). Effect of minimum cultivation on the nitrogen transforming microorganisms in soil. Paper presented at the *Annual Conference, Australian Society for Microbiology, Sydney.*

F. PERSONNEL

1. The Soil Chemist continued to serve in the Board of study for Agriculture Chemistry and as a Visiting Lecturer at the Post Graduate Institute of Agriculture, University of Sri Lanka.

2. On the invitation from the Canadian Soil Science Society, the Soil Chemist attended the International Soil Science Society Meeting at Edmonton, Canada in July 1978.

3. The Soil Chemist visited Institutions carrying out research on the use of nuclear techniques in soil-plant-water studies in India, Malaysia and the Philippines during September 1978. This visit was supported by the International Atomic Energy Agency.

4. Mr. Atputharajah, Technical Assistant left on 4th October, 1978 to India on an International Atomic Energy Fellowship to undergo a six months training in Nuclear techniques in Agriculture at Bhabha Atomic Research Centre, Bombay.

5. The following recruitments were made during 1978.

Mr. R. T. Shanmuganathan, Research Assistant, on 27th March, 1978.
Mr. K. S. Jayasekera, Research Assistant, on 7th April, 1978.
Mr. V. L. K. Ratnaweera, Technical Assistant, on 1st, August, 1978.

Mr. D. Panditharatna, Technical Assistant, on 15th August, 1978.
Mr. N. O. S. Pinidiya, Technical Assistant, on 20th November, 1978.

P. LOGANATHAN
Soil Chemist

Ceylon Cocon. Q. (1979) **30**, 20-25
Printed in Sri Lanka

REPORT OF THE DIVISION OF BOTANY AND PLANT BREEDING – 1978

1. BREEDING AND SELECTION

1.1 Controlled Pollination Work

Subsequent to the decision to stop controlled pollination work as a source of commercial planting material with effect from January 1978, pollination units were progressively closed down. During the period under review the only unit to function was that at the Horrekelly Seed Garden, where 36,000 female flowers were pollinated with *typica* (prepotent) pollen for production of *typica* x *typica* planting material. Although 1978 was a 'drought year' it is anticipated that about 12,000 nuts can be harvested from these crosses.

Controlled pollination work in 1977 was restricted to three stations — the Seed Gardens at Ambakelle and Horrekelly and the Progeny Trial, Walpita. About 25,000 *typica* x *typica* seednuts were harvested from 108,700 female flowers pollinated between January — December 1977, (Annual Report of the Botanist, 1977).

Private and public sector estates continue to receive processed pollen from the Institute and this year 354 ampoules of *typica* (prepotent) and 207 ampoules of *Nana* form *pumilla* pollen were supplied to them.

1.2 Research Nurseries and issues of planting material

The undermentioned numbers of seednuts were planted in the two nurseries at Bandirippuwa and the Seed Garden, Ambakelle.

Type of planting material	*Nursery location*	
	Bandirippuwa	*Ambakelle*
Typica x *typica*	18,643	13,870
Pumila x *typica*	42,480	26,403

In continuation of the policy of making hybrid seedlings available for collection in distant localities, small quantities of *pumila* x *typica* hybrid nuts were issued to the Nurseries Division for planting in Walpita, Ibbagamuwa, Eraminigolla and Koggala nurseries.

Seedling issues from Bandirippuwa and Ambakelle nurseries were as follows:

Type of Planting Material	*Nursery location*	
	Bandirippuwa	*Ambakelle*
Typica x *typica*	20,624	6,818
Pumila x *typica*	6,289	6,468

1.3 Inter-varietal F_1 hybrids

The growth, flowering and yield of different inter-varietal combinations have been reported in previous annual reports. The yield pattern of hybrids of different ages at Bandiripuwa and Ratmalagara over a 4 year period (1975 — 1978) is given in Table 1.

Table 1. *Yield of Typica x pumila* F_1 *hybrids*

Location	*Year of Planting*	*No. of progenies*	*Mean yield/palm*			
			1975	*1976*	*1977*	*1978*
Ratmalagara	1950	21	—	111	113	108
Ratmalagara	1958	141	100	84	117	101
Bandirippuwa	1963	124	104	105	92*	103*

* (Some of the best palms are being used for a tapping trial by the Chemistry Division and nut yields are therefore not available from about 20 palms).

Typica × *pumila* F_1 hybrid and its reciprocal have been widely used in experimental work at the Institute, and constitutes the base on which hybrid planting material is issued to growers. The yield pattern of the 141 progeny planted at Ratmalagara Research Station in 1958, and now in its 20th year, presents the following trend.

Table 2. *Mean yield of nuts/palm/year — Ratmalagara Research Station (1975 — 1978)*

Yield Class	...	≤20	21-40	41-60	61-80	81-100
No. of palms in each class	...	01	03	10	24	25
Yield class	...	101-120	121-140	141-160	≥161	
No. of palms in each class	...	47	18	09	04	

Fifty five percent of the progeny population have yielded over 100 nuts/palm/year, with 90% of the progeny population yielding over 60 nuts/palm/year when averaged over a four year period. Considering the rainfall patterns of the area and the nature of the soil which is sticky when moist and tending to 'cake-up' when subjected to the slightest moisture stress, the yield pattern is satisfactory.

The performance of F_1 hybrids produced by using all three colour forms of the variety *Nana viz.* dwarf green (form *pumila*), dwarf ivory yellow (form *eburnea*) and dwarf red (form *regia*) was briefly mentioned in the Annual Report for 1977 where the period for flowering (approximately 48 months for all types of hybrids) was reported.

This year, nuts from the 4th, 5th and 6th harvests of two types of hybrid with reciprocals were cured and the results are given in table 3.

Table 3

Type of hybrid	*Harvest No.*	*No. of nuts sampled*	*Wt. of husked nuts (kg)*	*Wt. of copra (kg)*
(a) *Typica* × *Nana* form *regia*	4th	207	138.00	41.875
	5th	224	136.00	42.250
	6th	144	98.75	33.000
	Total	575	372.75	117.125

Weight/nut 648 g., weight of copra/nut 204 g.,
Conversion ratio-weight of nuts: weight of copra 31%

Type of hybrid	Harvest No.	No. of nuts sampled	Wt. of husked nuts (kg)	Wt. of copra (kg)
(b) *Nana* form *regia* × *Typica*	4th	596	413.00	120.375
	5th	687	401.25	124.500
	6th	345	236.75	77.000
	Total	1628	1051.00	321.875

Weight/nut 645 g., weight of copra/nut 198 g.
Conversion ratio—weight of nuts: weight of copra 31%

(c) *Typica* × *Nana* form *pumila*	4th	368	232.75	74.250
	5h	370	210.35	64.500
	6th	214	130.75	44.000
	Total	952	574.05	183.750
(d) *Nana* form *pumila* × *typica*	4th	523	306.75	101.700
	5th	445	225.00	66.250
	6th	256	155.25	52.850
	Total	1224	687.00	220.800

Weight/nut 561 g., weight of copra/nut 180g.,
Conversion ratio—Weight of nuts: weight of copra 32%

These hybrids are only in their first full year of productivity. It would appear that reciprocal differences for such characters as weight of husked nuts and weight of copra are of a small order of magnitude. It would be necessary to process the nuts of at least three more harvests before any meaningful data can be obtained. However, it would appear that the *Nana* form *regia* × *Typica* F_1 hybrid which yields slightly more copra than the *Nana* form *pumila* × *Typica* F_1 hybrid, deserves a place along with the latter (CRIC 65) hybrid in planting programmes. In the field these hybrids have been observed to be prolific bearers, and a few more years yield data may confirm this view. Dwarf Red × Tall F_1 hybrids have been well tried out in India and to a lesser degree in Jamaica. They have the advantage that the red colour of the dwarf form *regia* provides a useful genetic marker to screen hybrids from accidentally selfed dwarf reds. About 30 ha of the Second Seed Garden, Horekelly is being planted up with the *regia* form dwarf for ultimate production of *Nana* form *regia* × *Typica* F_1 hybrids.

1.4 Assessment of hybrid performance in the different planting districts. The survey was extended to the Northern Province where hybrid performance in terms of growth, precocity in bearing and yield was not adequate when compared with known performance elsewhere, except in two well managed farms, where the plants had been subjected to regular irrigation practices. It would appear that they had failed to establish altogether without irrigation, sporadic hand watering being insufficient.

The hybrid trial with controlled irrigation at Maha Illuppalama Research Station is showing excellent growth for one year olds. Vegetative characters — leaf number and stem girth will be recorded at six monthly intervals from January 1979 where half the plantation will now be without supplemental irrigation and the other half regularly irrigated.

1.5 Mother Palm Seed Supply Scheme

During the year 2,498,530 selected seednuts from 32 private sector and public sector estates were supplied to the nurseries.

Selection of mother palms led to the identification of an additional 13,977 palms on the following estates:

Randeniya Estate	...	...	...	...	2,175
Dispensary Estate	...	...	...	...	513
Midland Estate	...	...	...	...	1,361
Walpolayaya Estate	...	...	...	...	5,914
Malsiripura Group	...	...	...	...	3,996

The total collection of mother palms now stands at 54,732

2. SEED GARDENS

2.1.1. Seed Garden, Ambakelle

Rogueing of all fields planted with *typica* × *typica* planting material (fields 1, 2, 3, 4, 6, 7, 8 & 9) was completed this year. Further palm selection led to the identification of very desirable parent palms using nut yields over a eight year period, nut shape and weight of husked-nuts, as well as desirable vegetative characters as the basis of selection. The distribution of these palms according to fields is given in table 4.

Table 4. *Distribution of 'elite' typica palms at the Seed Garden, Ambakelle*

Field No.	*No. of progenies planted*	*No. of 'elite' palms identified*
1	330	142
2-3	757	80
4	2,562	102
6	1,379	309
7	1,416	203
8	1,555	62
9	mixed field of *typica* and *pumila*	134
		1,032

These palms are banded for identification. Open pollinated nuts from these palms will be used for an additional study of seedling quality. All elite palms which pass the 'nursery test' would be sources of *typica* × *typica* improved planting material. The selfed progeny of 'prepotent' palms as well as the progeny of pre-potents crossed *inter-se* have been interplanted in the Seed Garden to supply pollen. In addition, pollen collected from the original prepotents will be released daily *en masse* at the Seed Garden.

Production of natural cross *pumila* x *typica* hybrid seed continued at the Seed Garden. In addition to fields 5, 9, 10A and 10B about 900 palms in field 11A were available for emasculation for the first time. Details are given in tables 5 & 6.

Table 5. *Summary of emasculation work for production pumila* × *typica natural cross hybrid seed*

Field No.	*No. of inflorescences emasculated*	*No. of button nuts developing 12 weeks after emasculation*
5	3,438	16,537
9	2,787	15,623
10A	8,396	25,417
10B	2,690	33,427
11A	906	3,940
Total	18,217	94,944

Table 6. *Harvest of pumilla x typica hybrid seed from emasculations done in 1977*

Month	HYBRID NUTS HARVESTED		
	Field No. 5	*Field No. 9*	*Field No. 10A & B*
January }	3,847	2,255	1,369
February }			
March	3,899	3,898	4,392
April	5,118	3,306	
May	5,464	6,812	5,372
June	3,675	3,365	4,028
July	4,746	5,359	2,902
August	4,981	6,395	3,549
September	2,944	4,488	3,995
October	4,041	5,404	3,914
November	1,386	1,501	1,740
December	1,568	844	1,420

Thus, about 118,000 hybrid seednuts have been harvested. Hybrid seednut issues to all nurseries consisted of 96,681 *pumila* x *typica* seednuts and 8,826 *eburnea* × *typica* seednuts making a total of 105,507. The seed garden received only 1,859 mm of rain in 81 rain days with 1,202 mm falling during the deluge in October to December. There may be a substantial shortfall in crops, both *typica* x *typica* and *pumila* x *typica* in 1979, although this may be arrested somewhat in the second group as more dwarf (*pumila*) palms are now coming into flower and would be emasculated for the first time.

2.1.2 Seed Garden Horrekelly

This plantation is still plagued with rather erratic rainfall. Although it received 1586 mm 924 mm fell during the period October to December. Establishment of seedings is affected due to prolonged dry spells. 1346 *pumila* seedlings were used to supply vacancies in fields 1—5. The planting of seedlings already established in poly bags has been very favourable when compared to ordinary nursery seedlings, particularly for fields with white 'cinammon' soils with very poor water retention capacity. Regardless of cost, polybag seedlings will be used to plant up the rest of the fields. The *regia* colour form of dwarf is being introduced to field 5.

3. LABORATORY AND FIELD INVESTIGATIONS

3.1. Colour inheritance in inter-varietal hybrids

As reported in the Annual Report for 1977, the green and reddish brown colour forms of the variety *Typica* form *typica* grown at Marandawila Progeny Trial and Walpita Progeny trial were crossed with:

(a) Variety *Nana* forms *pumila eburnea* and *regia*
(b) Variety *Aurantiaca* form *thembili* (king coconut)
(c) Variety *Typica* form *typica* (green epicarp)
(d) Variety *Typica* form *typica* (reddish-brown epicarp)

Nuts resulting from pollinations done in 1977 were harvested this year and planted in the nursery. Table 6 gives the summary of nuts harvested.

Table 7. *Colour inheritance in inter-varietal hybrids*

Type and No. of female parents used*	*Male parent* used and number of nuts harvested*						
	TG	*TR*	*DG*	*DY*	*DR*	*KC*	*OP*
Population A (Walpita)							
Tall (green) — 25 palms	121	104	135	105	33	176	532
Tall (reddish brown) 23 palms	105	79	76	94	32	109	442
Population B. (Marandawila)							
Tall (green) — 26 palms	58	58	74	24	101	46	496
Tall (reddish brown) 10 palms	33	24	12	04	31	14	151

*** key to parent palms**

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 red epicarp
KC — King coconut, Variety *Aurantiaca* form *thembili*

Petiole colours of resulting seedlings are being recorded with a Munsell colour chart for Plant Tissue. It may be necessary to carry out pigment extraction & chromatography for finer resolution of "colour."

3.2. Plant Tissue Culture

Work on tissue culture of floral and vegetative parts of the palm, as well as embryo culture is in progress.

3.3. Field Experiments

Bandirippuwa, Ratmalagara and Pothukulama Routine cultural operations, pick and recording of nuts, weighing of husked nuts etc. were carried out on the field experiments located at the above stations.

4. Publications, Conferences etc.

Manthriratna, M.A.P. "Intra-specific hybridization of the coconut palm, *Cocos nucifera* L. in Sri Lanka" Philippine Journal of Coconut studies 3 (3) : 29 — 38.

Manthriratna, M.A.P. "The choice of planting material and methods in a National Replanting Programme — Paper presented at the Seminar on "Research and Development Programme for Coconut Production", March 17th, 1978.

5. PERSONNEL

Mr. R. R. A. Peries, B.Sc. (Hons.) Agric. and Miss C. W. Ekanayake B.Sc. (Hons.) were recruited as Research Assistants.

Mr. W. P. B. Fernando and Miss M. C. L. Fernando, Technical Assistants, resigned from their respective posts.

Mr. H. Samarakoon Technical Assistant who was appointed to fill the first vacancy, resigned from his post on receiving an award for under-graduate studies in the People's Republic of China.

Dr. M. A. P. MANTHRIRATNA
Botanist

Ceylon Cocon. Q. (1979) **30**, 26-28
Printed in Sri Lanka

REPORT OF THE CHEMISTRY DIVISION – 1978

PLANT CHEMISTRY

1. Ascertain the domains of variability in leaf sampling of coconut

A comprehensive experiment to ascertain the domains of variability in leaf sampling of coconut commenced in 1977 was concluded during the year. The main objective of the study is to :—

(a) determine the pattern of nutrient concentration with age of leaf.

(b) to assess the domains of variation by means of a hierachical analysis of variance leading to an estimation of variance components.

and (c) to determine an optimum stratified sample to secure an estimate of nutrient content within a specified percentage error.

Chemical analysis of the samples for the major nutrients N,P,K, Ca and Mg was completed and the results have been submitted to the Biometrician for statistical analysis.

2. Variation in nutrient composition of leaves, kernel and Nut water between harvests

An empirical trial was carried out at Walpita on variation in nutrient composition of leaf 1 and 14, the kernel and nut water from a representative sample of the bimonthly picks. The results indicated very wide variations.

A statistically designed experiment is being planned to carry out a comprehensive study between harvests and between harvests of different years, spread out over a period of years incorporating weather factors.

3. Nutrient composition of the 1st and 14th fronds from coconut varieties grown in Sri Lanka

An inventory of the nutrient composition of the 1st and 14th fronds in the coconut varieties grown in Sri Lanka was commenced during the year.

Sampling was completed and chemical analyses of the samples are in progress.

4. Leaf Scorch affected palms

Sampling of the 14th leaf from 10 palms each of healthy and leaf Scorch affected palms from Srikandura Estate, Dodanduwa was done. Chemical analysis for the macronutrients N,P,K, Ca and Mg together with carbohydrate analysis of samples from the rachis from the same leaf rank was done.

The mean values of the chemical analyses are as follows :—

	Healthy Palms	*Affected Palms*
Nitrogen (as N)	2.16	1.99
Phosphorus (as P)	0.148	0.132
Potassium (as K)	1.012	0.771
Calcium (as Ca)	0.519	0.511
Magnesium (as Mg)	0.181	0.188

It would be observed that the values for N,P and K in the affected palms are lower than those of healthy palms. Potassium shows a distinctly lower value for affected palms. Ca and Mg do not indicate any difference between the healthy and affected palms although both are much below the expected critical values as defined by IRHO. Paris of 0.5 for Ca and 0.3 for Mg.

Carbohydrates analyses did not indicate any difference between the healthy and affected palms.

A more detailed sampling is being done on younger fronds for the macroelements and the stem for carbohydrate studies.

PRODUCT TECHNOLOGY — SAP PRODUCTS

5. Fermentation of Coconut sap

Studies on the succession of microbial flora in fermenting toddy is drawing to a close. A wide range of micro-organisms belonging to different genera of bacteria, yeasts and fungi were observed. About 50% of the microbial population appear not to take part in the normal fermentation, but assimilate the sugars in sap resulting in other products.

Large scale collection of sweet toddy for controlled fermentation was initiated. The sap was heated to about 80°C. in 45 gal capacity metal drums and was allowed to cool overnight. An inoculum of selected yeasts was introduced. After 3 days of fermentation, alcohol levels upto 9—10% were observed. Addition of 0.08% ammonium chloride increased the rate of fermentation. Trial runs conducted at the State Distilleries Corporation on the controlled fermented toddy showed increased alcohol production and reduced cost of distillation. The authorities indicated the possibility of paying a higher price for this toddy if it could be done on a large scale. Unfortunately, the large scale toddy suppliers do not seem to be interested in this because of the initial cost involved in purchasing barrels and in collecting sweet toddy. The tappers generally have an aversion to tap for sweet toddy as this involves additional work in sterilizing pots etc. If some other technique could be adopted in obtaining sweet toddy, instead of the sterilizing procedure the chances of success are assured.

6. Coconut sap as a source of sugar

The method for the preparation of golden syrup on a large scale from coconut sap was worked out. The colour reaction developed last year to detect the suitability of sap for the preparation of sugar and jaggery is extended to include golden syrup. By this method it is possible to decide in advance what end product could be obtained from sap.

7. "Rabath" in sap

The method of purification and reprecipitation of rabath from the sap was worked out. Analysis of rabath for its structural components is in progress. (Projects 5 to 7 submitted by Dr. U. Samarajeewa).

8. Isolation and identification of monoglycerides, diglycerides, and triglycerides and fatty acid components using chromatographic techniques

Initial studies using chromatographic techniques for the identification and separation of the glycerides and fatty acid components were successfully achieved. Owing to the non availability of chemicals the project has been temporarily suspended.

9. Studies on quality characteristics of coconut shell charcoal

Preliminary studies on the quality characteristics (moisture, volatile matter, ash and carbon content) of charcoal from coconut shell have been completed. (Projects 8 and 9 submitted by Mr. S. L. Talagala).

PERSONNEL

(1) Mr. S. Mohanadas, Research Assistant, resumed duties from 5th October 1979, after successfully completing his training in plant Biochemistry at the Waite Agricultural Research Institute, University of Adelaide, Australia.

(2) Mr. S. L. Talagalla, assumed duties as Research Assistant from 7th April 1978. His field of research is on product technology—non-sap products.

(3) Mr. B. J. A. F. Mendis, Technical Assistant, resumed duties from 3rd September 1978 after completing his training on the use of tracer techniques in Plant Physiological studies at the Bhabha Atomic Research Centre, Trombay, India.

(4) Mrs. J. D. Atputharajah, Technical Assistant, has been registered for an M.Sc. degree in Microbiology at the University of Kelaniya, Sri Lanka.

(5) Misses P. K. K. Croos and K. C. P. Perera assumed duties as Technical Assistants from 1st August 1978 and Miss N. H. R. M. de Silva from 15th August 1978.

M. JEGANATHAN
Acting Chemist

Ceylon Cocon. Q. (1979) **30**, 29—34
Printed in Sri Lanka

REPORT OF THE AGROSTOLOGY DIVISION—1978

A. GENERAL

A new pasture/fodder evaluation trial was set up at Walpita. This area represents the boundary between the wet and intermediate rainfall zones. The rainfall during the year was satisfactory. All long term pasture trials were managed to schedule.

B. Pasture Studies

1. Experiment P95 (B/E)

To study the effect of four levels of nitrogen application and three frequencies of defoliation on the dry matter production, persistence and quality of *Brachiaria ruziziensis* growing under coconut.

During the year two cycles of defoliation have been completed and the dry matter production data are presented in Table 1.

The data indicate a progressive increase in yield due to increase in the levels of added nitrogen while there appears to be an increase in production at higher frequencies of defoliation (short intervals of defoliation).

Table 1. *Total dry matter production of two cycles in gm/m² (mean of 4 replicates)*

	3 weeks	*4 weeks*	*6 weeks*	*Total*
N_0	364.5	342.0	314.7	1021.2
N_1	503.1	379.1	363.5	1245.7
N_2	496.5	431.6	390.8	1318.9
N_4	537.4	520.1	408.7	1466.2
Total	1901.5	1672.8	1477.7	

Ammonium sulphate applied four times a year as No.—O Kg/ha., N_1—62.5 kg/ha. N_2—125 kg/ha; N_4—250 kg/ha. A basal application of P and K at the rate of 125 kg/ha each of Saphos phosphate and Muriate of potash was made in September.

2. Experiment P97 (B/E)

To study the yield and persistence of a virus resistant strain of *Digitaria decumbens* (Pangola grass) at four levels of nitrogen application. As there was no incidence of virus disease it reveals that the strain is resistant to that virus disease appearing in ordinary *Digitaria decumbens.*

Four samplings were taken during the year and the total yield of the four samplings are presented in Table 2.

Table 2. *Total yield of Pangola grass of four samplings in gm/m² (mean of 4 replicates)*

N_0	...	...	...	325.6
N_1	...	...	...	379.7
N_2	...	...	...	624.8
N_4	...	...	...	723.5

The data indicate a high response of the grass to added nitrogen at high levels.

3. Experiment P94 (B/E)

To study the total plant protein and dry matter output from *Centrosema pubescens* and *B. miliiformis* at three levels of applied nitrogen when grown alone and in mixture.

The experiment was sampled thrice during the year and the dry matter yields are presented in Table 3. It is too early to offer any comments on the data gathered.

Table 3. *Total dry matter yield of the three samplings taken during the year in gm/m² (mean of 4 replicates)*

				Grass	*Legume*
N_0	...	...	...	589.3	—
N_1	...	...	...	532.9	—
N_2	...	...	...	494.2	—
N_0	...	...	...	—	173.0
N_1	...	...	...	—	210.5
N_2	...	...	...	—	160.6
N_0	...	...	...	606.7	54.2
N_1	...	...	...	699.0	39.7
N_2	...	...	...	592.5	57.0

(N was applied as Ammonium sulphate N_0 - Okg/ha; N_1 - 125 kg/ha; N_2 - 375 kg/ha. A basal application of P and K at the rate of 125 kg/ha each of saphosphosphate and muriate potash was made).

4. Experiment P100 (B/E)

To compare the milk yield of Jersy x Sinhala cross bred cows maintained solely on fertilized *B. miliiformis/Centrosema pubescens* mixed pastures with those fed on concentrates and estate grass. This is an unreplicated trial using a grazing paddock of 10 acres grazed by 13 cows in their first lactation. Comparison is made with 13 similar cows from the general herd. The data collected during the year are presented in Table 4.

Table 4. *Average milk yield of cows fed on B. miliiformis, concentrates and estate grass*

Average milk yield/day (in fluid oz) of cows grazing B. miliiformis pasture without concentrates			*Average milk yield/day (in fluid oz) of cows fed on concentrates and estate grass*			
J 65	—	240	J 64	—	260	
J 80	—	240	J 74	—	210	
J 68	—	220	J 72	—	220	
J 70	—	210	J 66	—	240	
J 69	—	160	J 71	—	240	
J 67	—	270	J 58	—	260	
J 153	—	210	J216	—	180	
J 85	—	240	J 79	—	200	
J 58B	—	240				
J 96	—	230	Range :	180	—	260
J 108	—	200				
J 106	—	180				
J 182	—	180				
Range :	160	— 270				

RATMALAGARA ESTATE

5. Experiment P101 (R/E)

To increase animal production from 2 pasture legumes (Centro and Siratro) and one shrub legume (Gliricidia) combined with *Brachiaria brizantha* and to compare it with *Brachiaria brizantha* pasture alone at the same level of nitrogen application.

Gross bred bull calves are used in this trial at an intensity of 2 bull calves/acre and their weights are recorded at weekly intervals. The treatments were imposed on the animals only twice during the year and thus it would not be sufficient to compare the weights of the animals at the end of this period. However the experiment was sampled twice during the year for its herbage dry matter yield and the data are presented in Table 4.

Table 5. *Herbage yield of grass and legume of the two samplings during the year 1978 in gm/m² (mean of 4 replicates)*

	Grass	*Legume*
Grass only	402	—
Grass and Centrosema	492	151
Grass and Siratro	382	145
Grass and Gliricidia	508	—

6. Experiment P102 (R/E)

To study the effects of two levels of nitrogen on the growth, yield and persistence of five pastures and four fodders.

It is a 2 × 9 × 4 factorial randomized block design of two levels of nitrogen on nine varieties of grasses with each of the treatment being replicated four times.

The experiment was planted during Maha this year.

7. Experiment P103 (R/E)

To study the effect of four levels of nitrogen fertilization on the growth and yield of a virus resistant strain of Pangola grass grown under coconut under the rainfall conditions of Ratmalagara Estate.

It is a 4 × 4 factorial randomized block design of four levels of nitrogen application replicated 4 times.

The experiment was planted during Maha this year.

8. Experiment P104 (R/E)

To study the effect of levels of nitrogen fertilization and frequencies of defoliation on the growth, yield and persistency of a strain of *Panicum maximum* fodder, Green panic established under coconut.

It is a 4 × 2 × 4 factorial randomized block design of four levels of nitrogen fertilization (0, 1, 2 and 4 cwts/acre/year) and two frequencies of defoliation (30 days and 45 days) with each of the treatment replicated four times.

The trial was planted in November but satisfactory establishment could not be obtained due to competition from *B. miliiformis.* All plots were weeded and vacancies supplied.

9. Experiment P105 (R/E)

To study the effect of levels of phosphorus and nitrogen on a mixed sward of *Brachiaria brizantha* and Siratro under coconut at Ratmalagara Estate.

It is a 4 × 3 × 4 factorial randomized block design of four levels of phosphorus and three levels of nitrogen with each of the treatment being replicated four times.

Brachiaria brizantha was planted during Maha this year and it was not possible to establish the legume Siratro. The legume will be established when conditions are satisfactory.

10. Experiment P98 (Sirikandura Estate — Dodanduwa)

To study the yield and persistence of *Brachiaria ruziziensis* and *B. dictyoneura* at four levels of nitrogen application and two frequencies of cutting. The four levels of nitrogen application are 0,125, 250 and 500 kg/ha of sulphate of ammonia applied in 2 split doses per year.

It is a 4 × 2 × 3 factorial block design of four levels of nitrogen application and two frequencies of defoliation (30 days and 45 days) with each of the treatment replicated thrice on each of the two grass varieties.

In an earlier trial where a number of pasture and fodder varieties were screened for their suitability for the high rainfall areas of the Southern Province it was found that the above two grasses were superior to the others in their dry matter production. Thus the above two grasses are being studied in detail.

The experiment was completed of four cycles during the year and total dry matter yield of the four cycles are presented in Table 6.

Table 6. *Total dry matter yield of the four cycles in gm/m² (mean of 3 replicates)*

		Brachiaria dityoneura	*Brachiaria ruziziensis*
30 days	N_0	860.6	712.0
	N_1	1095.3	1036.3
	N_2	1544.3	1109.8
	N_4	1413.8	1239.3
45 days	N_0	975.5	747.4
	N_1	1378.5	1172.0
	N_2	1824.1	1163.8
	N_4	1969.1	1196.9

The data indicate that the *Brachiaria dictyoneura* is superior to *Brachiaria ruziziensis* at all levels of nitrogen tested. However, a progressive increase in yield of both grass species observed with increased levels of nitrogen application.

11. Experiment P99 (Walpita Estate)

To study the performance of 5 pasture and 4 fodder grasses at 2 levels of nitrogen application in the wet zone—intermediate zone border areas.

It is a 9 x 2 x 3 factorial block design of nine grass varieties at two levels of nitrogen application (125 kg/ha and 250 kg/acre) with each of the treatment being replicated 3 times.

The five pastures are:
1. *B. miliiformis*
2. *B. brizantha*
3. *B. ruziziensis*
4. *B. dictyoneura*
5. *Digitaria decumbens*

and the four fodders are :
1. *Panicum maximum* (Guinea B)
2. „ „ Green Panic
3. *Pusa Giant Napier*
4. *Setaria anceps*

The experiment commenced planting last year and was completed during Yala this year. All pastures were sampled twice during the year while the fodders were sampled only once as the fodders were not fully established at the time of the first sampling.

It would be too early for an attempt to infer and however the first sampling of the entire plots are presented in Table VII for a look at its progress.

Table 7. *Herbage dry matter yield in gm/m² of the sampling of the complete trial (mean of 3 replicates)*

	N_1	N_2
Digitaria decumbens	53.3	52.6
B. brizantha	124.6	130.5
B. miliiformis	94.6	94.0
B. ruziziensis	181.9	190.0
B. dictyoneura	110.0	166.4
Green Panic	267.2	89.1
Setaria	516.7	441.8
Guinea Grass	153.4	136.1
Pusa Giant	589.8	747.4

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

Ceylon Cocon. Q. (1979) **30**, 35-40
Printed in Sri Lanka

REPORT OF THE INTERCROPPING DIVISION – 1978

INTRODUCTION

During the year under review demonstration plots were established at Head Office of coffee, cocoa, pineapple, passion fruit, pepper, cloves, cinnamon and short term crops. These plots were one acre in extent. The projects at Walpita and Dodanduwa were carried out satisfactorily.

The project at Mulleriyawa in a new coconut plantation and the project at Ingiriya in an old plantation were discontinued during the year.

Satisfactory progress was made in the cattle cross breeding programme in spite of difficulties faced owing to shortage of grazing land.

WALPITA PROJECT

(a) Coffee

Objective : To study the effect of four planting densities and three levels of fertilizer application on the growth and yield of coffee and the effect of coffee on the production of coconut.

Design : Randomized block with four replicates of all treatments.

Treatments : Four planting densities — D_1, D_2, D_3 and D_4.
Three levels of fertilizer — F_1 — ½ normal
— F_2 — normal
— F_3 — 1½ normal

Duration : Long term project, at least five years. During the year the experiment was well maintained and the measurements with regard to height, girth of stem, number of leaves and number of branches are given in Table 1.

Table 1. *Height, stem girth, number of leaves and branches of Robusta coffee under coconut due to different densities and levels of fertilizer*

Treatments	*Mean height in cm*	*Mean girth of stem in cm*	*Mean No. of leaves*	*Mean No. of branches*
D_1 F_1	62.70	4.18	25.13	3.90
D_1 F_2	63.75	4.18	24.93	3.75
D_1 F_3	64.70	4.10	24.25	4.35
D_2 F_1	62.23	4.13	22.85	3.70
D_2 F_2	62.18	4.20	25.45	4.25
D_2 F_3	68.70	4.43	23.95	4.20
D_3 F_1	61.33	4.23	22.33	3.38
D_3 F_2	54.50	3.98	21.05	3.00
D_3 F_3	58.25	4.28	28.75	4.78
D_4 F_1	186.25	12.53	70.30	10.98
D_4 F_2	180.43	12.35	71.43	11.00
D_4 F_3	191.65	12.80	76.93	13.30

(b) Cocoa

Objective: To study the performance of four cocoa selections at three levels of fertilizer application.

Design: Randomized block with four replicates of all treatments.

Treatments:

Three levels of fertilizer $\begin{cases} F_1 - \frac{1}{2} \text{ normal} \\ F_2 - \text{ normal} \\ F_3 - 1\frac{1}{2} \text{ normal} \end{cases}$

Four varieties — V_1, V_2, V_3, and V_4

Extent: (2 hectares)

Duration: Long term project, at least five years.

Selections: V_1 — ICS 1 ; V_2 — NA 32 ; V_3 — Amelonado ; V_4 — Millawana

The application of fertilizer was carried out according to schedule and measurements of heights, girth of stem, number of leaves and number of branches are given in Table 2.

Table 2. *Height, stem girth, number of leaves and branches of cocoa varieties at different levels of fertilizer application*

Treatments	*Mean height in cm.*	*Mean girth of stem cm.*	*Mean No. of leaves*	*Mean No. of branches*
V_1F_1	97.20	7.15	58.20	6.43
V_1F_2	92.53	7.76	82.20	10.92
V_1F_3	85.35	5.61	54.20	7.03
V_2F_1	86.30	7.59	94.80	8.83
V_2F_2	90.73	7.57	63.25	6.20
V_2F_3	72.43	8.86	117.15	11.08
V_3F_1	86.55	5.82	38.23	4.95
V_3F_2	92.63	7.74	40.90	6.13
V_3F_3	85.03	14.78	77.58	9.60
V_4F_1	90.48	7.31	107.55	11.28
V_4F_2	84.70	6.14	61.60	6.35
V_4F_3	72.13	4.96	48.68	6.18

(c) Mixed planting trial of coffee, cocoa and pepper

Objective: To study the agronomic feasibility of growing coffee, cocoa and pepper together as intercrops under coconut.

The scheme of planting was as follows :

Cocoa as a single row between two coconut rows. Cocoa plants spaced 2.4 metres apart in the row.

Coffee as two single rows on either side of the cocoa row 2.4 metres away from it. Coffee plants are 2.4 metres in the row.

Pepper on the coconut and also on live support along the coconut row in both directions with two pepper plants between two coconut palms.

The trial is in the second year. Coffee and pepper have come into bearing and the mixing appears to be very satisfactory at this stage.

Sirikandura Estate

Experiments in progress

(a) Objective: To study the effect of intercropping the following crops on the yield of coconut.

1. Coffee
2. Cocoa
3. Cloves
4. Cinnamon
5. Pepper on dead support
6. Pepper on live support
7. Control without any crop

Design: Randomized block with four replicates of all treatments.

Extent: (4 hectares).

Duration: Long term project, at least five years.

The above crops were maintained during the year and the expenditure incurred on each crop is tabulated below.

1.	Coffee	Rs. 1226.16
2.	Cocoa	1478.96
3.	Cloves	913.47
4.	Cinnamon	1546.87
5.	Pepper on dead support ...	1531.18
6.	Pepper on live support ...	1571.42
7.	Control without any crop ...	299.26

(b) Turmeric and Kiriala

Objective: To study the effect of rotation on the yield of turmeric and kiriala.

Extent: (0.4 hectares)

Duration: Three years.

Expenditure on the above experiment is given below.

Turmeric ...	Rs. 2319.92
Kiriala ...	724.46

BANDIRIPPUWA ESTATE

Experiments in Progress

(a) Objective:

To study the economics and feasibility of growing the following crops under coconut. They will also serve as demonstration plots to the public.

1. Coffee
2. Cocoa
3. Passion fruit
4. Pineapple — 2 methods of planting
5. Papaw
6. Banana
7. Pepper
8. Dioscorea yams
9. Vegetables
10. Cinnamon
11. Fruit trees

Extent: 6 hectares

Duration: Long term project, at least 5 years.

Of the above crops, coffee, passion fruit and banana came into bearing and some produce has been obtained.

In addition to above, the following trials are in progress.

(i) Objective:

To study the effect of 3 levels of fertilizer application on 10 coffee selections.

Extent: 0.8 hectares

Duration: Long term project, at least 5 years

The following varieties were selected for the experiment:

C 36, S 5, C 111, IMY, SEM, K 7, S 274, BO 72, C 96 and GCR.

Counts were taken on the mean percentage of surviving plants and the mean percentage of plants in flower.

Analysis of this data did not show any statistical difference with regard to the variety or fertilizer application.

However variety fertilizer interaction was highly significant. Also the mean percentage of flowering showed no statistical significance with regard to either the variety or fertilizer application. Here again the variety fertilizer interaction was highly significant.

(ii) Objective:

To study the performance of 10 cocoa selections.

Extent: 0.4 hectares

Duration: Long term project, at least five years.

The selections are : ICS 95 × ICS 95 ; ICS 1 × ICS 1 ; ICS 95 × NA 32 ; NA 32 × PA 35 ; ICS 6 × PA 35 ; ICS 1 × NA 32 ; ICS 6 × ICS 95 ; ICS 8 × ICS 8 ; NA 32 × PA 7 ; ICS 95 × PA 7.

The experiment was looked after according to schedule throughout the year and is in progress.

KIRIMETIYANA ESTATE

Experiment on Mulberry under coconut

Objectives: To study the

(i) Response to fertilizer
(ii) Performance of two varieties
(iii) Performance under two different shadings
(iv) Economics of fertilizer use

Season: Maha 1978.

Extent: 64 coconut squares

Treatments: (a) **Varieties** (i) V_1 — Local
(ii) V_2 — Kanwa

(b) **Fertilizer** F_0 — 100 : 50 : 50 N.P.K.
F_1 — 200 : 50 : 50 N.P.K.
F_2 — 300 : 50 : 50 N.P.K.
F_3 — 400 : 50 : 50 N.P.K.

(c) **Shading** (i) S_1 — Tall palms
(ii) S_2 — Medium palms

Design: 4 × 2 Factorial design with 4 replicates under each shading.

Plot size: 7.2 m × 5.4 m

Planting distance: 90 cm x 60 cm

The above experiment was planted in November-December 1978 and is in progress.

ANIMAL HUSBANDRY

1. Rotational cross breeding project

Objective: To stabilise the hybrid vigour of Tropical × Temperate cross bred cattle by rotationally crossing them to Temperate and Tropical breeds. The foundation breed is Sinhala. The breeds selected for this rotational cross breeding programme are Sindhi, Jersey and Fresian.

In this exercise it is hoped to produce a stable high yielding breed suitable for the coconut growing areas.

The project was started in 1969. The first generation Jersey × Sinhala cross bred cows have been crossed to Sindhi. Some second generation cows have been crossed to Fresian. The first cross bred generation cows have recorded over 200% increase in milk yield over their Sinhala parents and in the second generation when the Sindhi was brought in, this hybrid vigour has been maintained adding certain other desirable characters like heat tolerance etc. At the end of the cycle the resulting progeny will be selfed to determine stability.

The trial will have to be carried out for at least two cycles of rotational cross breeding.

2. . Objective:

To measure the live weight gains by the different cross bred bull calves resulting from the rotational cross breeding programme under normal estate management without any concentrate feeding.

The project was started at Ratmalagara Estate and is in progress.

Milk production and herd strength

A total of 68383 litres of milk was produced at the two stations. There were 114 births and 36 deaths during the year. Ten of these deaths were due to the cyclone in November. Ninety-eight animals were sold during the year. The herd strength at the end of the year was as follows:

		Bulls	*Cows*	*Heifer Calves*	*Bull Calves*	*Total*
B/E	...	1	129	54	64	248
R/E	...	–	8	9	70	87
K/E	...	6	6	159	—	166
					Grand Total —	501

The entire herd was vaccinated against H.S. and Foot and Mouth and the health of the herd was maintained satisfactorily.

D. E. F. FERDINANDEZ
Officer-in-Charge
Division of Intercropping

Ceylon Cocon. Q. (1979) 30, 41-52
Printed in Sri Lanka

REPORT OF THE CROP PROTECTION DIVISION – 1978

During the latter part of the year, the FAO/UNDP project on strengthening biological control activities of coconut and other crops was terminated. The project activities had a resounding success in controlling the coconut leaf miner pest, *Promecotheca cumingi*. The Adviser, Dr. P. R. Dharmadhikari, left the island after six years of service in Sri Lanka.

A cyclone towards the end of the year caused heavy damage in the North Central Province and the Eastern Province. The insectary and other buildings at Mylambavely, Chenkaladi, were severely damaged, and services were suspended indefinitely.

1. The Coconut leaf miner — *Promecotheca cumingi*

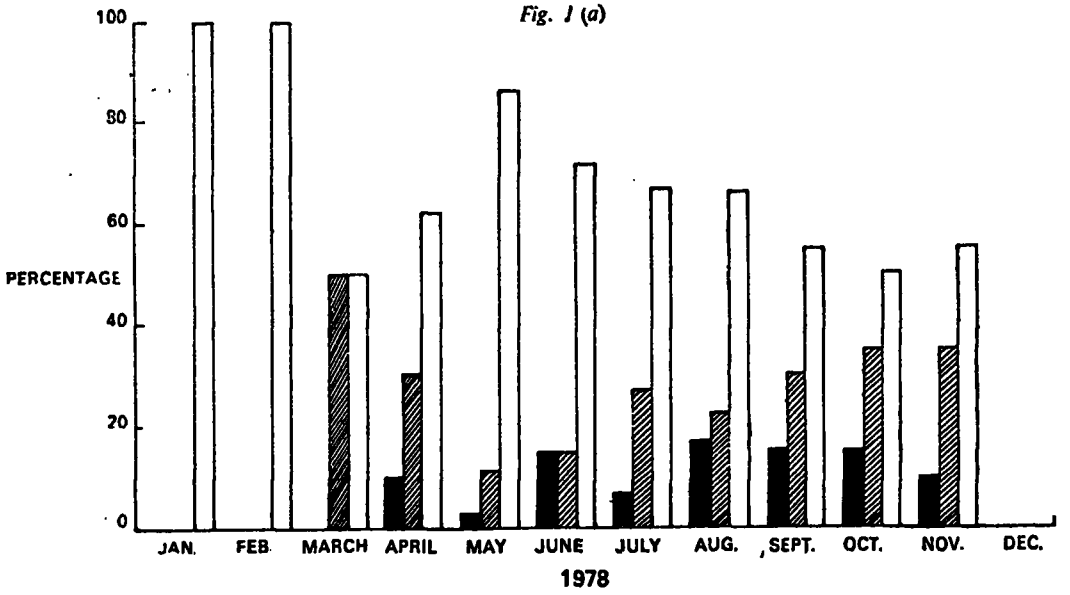
After the successful control in 1976, this pest was present on three localities (Galle, Katunayake, Ambalangoda). The program of surveillance carried out by officers of this division paid dividends when an outbreak of the pest at Galle was detected early.

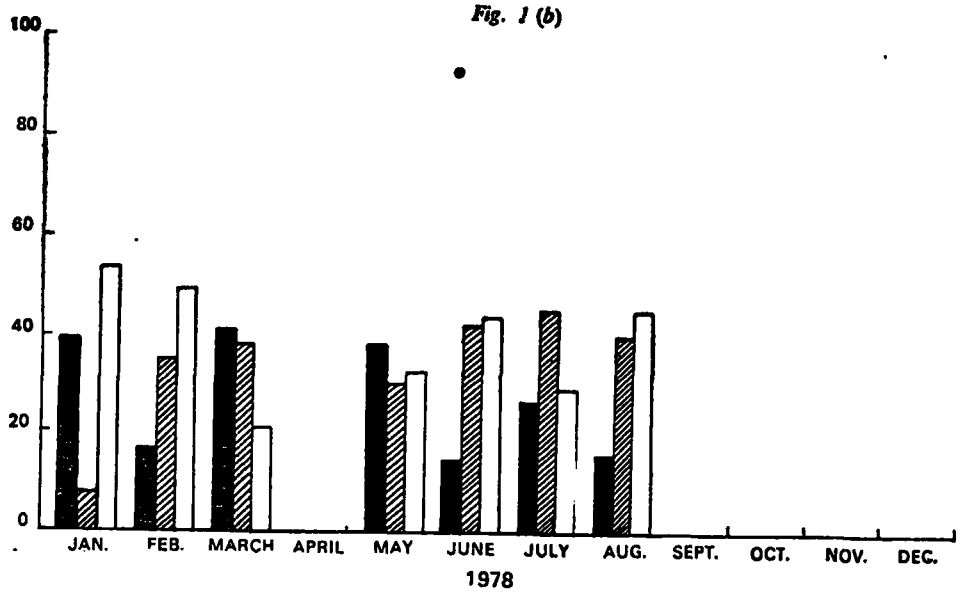
During the period under review, monthly surveys were carried out at the three localities, where the incidence of the pest continued to fluctuate. The data on population fluctuation of the pest and the parasite at these localities are presented in Fig. 1, where the fate of 100 eggs has been evaluated. Out of the three localities, heaviest parasitization during 1977 was observed at Katunayaka (Mahindapala, 1977). During the year under review, the pest at Katunayake was brought under complete control, primarily through the activities of the parasite *Dimmockia javanica*. Other contributing factors to this control had been excessive moisture in the mines and fungi which colonized the larvae.

At Ambalangoda too, the pest was brought under control, as evident from Fig. 1. At this locality, the parasitization had been about 50%. In contrast, a much lower parasitization and control were evident at Galle, where an outbreak occurred during the latter part of the year. The reasons for this outbreak are rather obscure, but there had been a gradual decrease in the parasite population, as evident in Fig. 1. An apparent "one-stage condition" was observed at Galle and the consequent loss of parasite populations under such conditions may have contributed to the sudden resurgence of the pest in this locality. This aspect of the problem is being investigated in detail in order to find out the causative agent, if any, for this apparent one stage condition. However, it was rather fortunate that the spread of the pest at Galle had been extremely slow, but the emergence of a new adult population might enhance the spread. An extensive survey of the area was carried out and the area under infestation mapped out in early November, 1978 (Fig. 2). Subsequent surveys in late November and early December indicated that the progress of the pest had been rather slow; and the boundaries of the area of infestation had not been breached. This had been mainly due to the population build-up of the larval parasite, *Dimmockia javanica*. It would have been most useful if the larval/pupal parasite *Pediobius parvulus* had been available as this parasite with its long adult life would have bridged the gap (adult life period) under a one stage condition.

In Galle, parasitization at different localities was monitored during the last two months of the year, and these data are given together with the map in Fig. 2 and the total mortality/survival of the different stages is presented in Table 1.

FIG. 1. Population fluctuations of *Promecotheca cumingi* and its parasites. at Katunayake (a), at Ambalangoda (b), and at Galle (c).





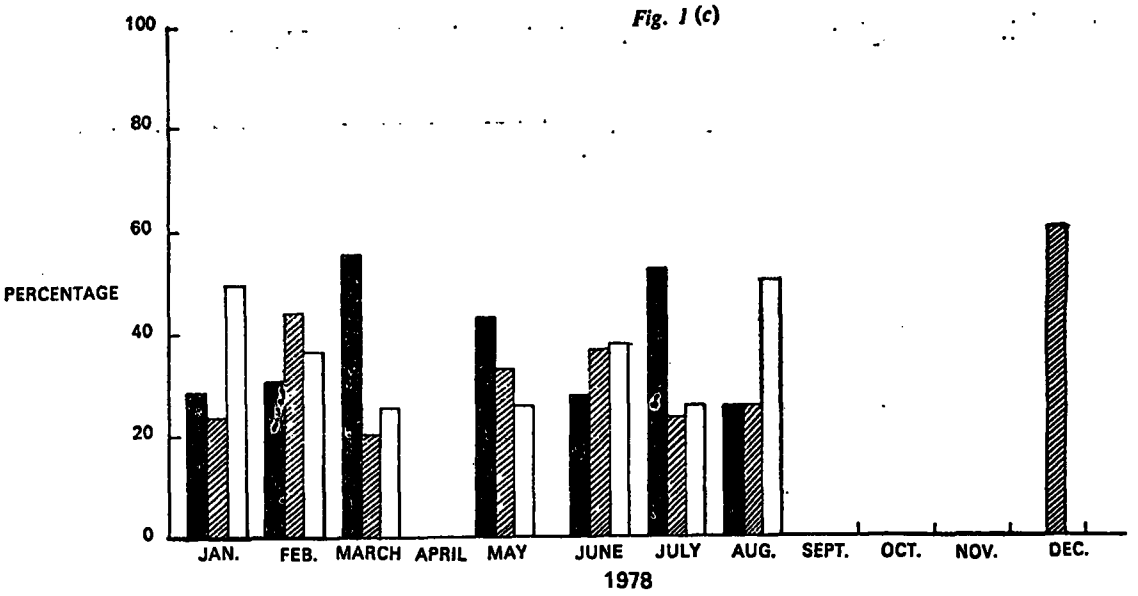


FIG. 2. *Promecotheca cumingi*—area under infestation in Galle area. Percentage parasitism at sampling points 1. Cheenakoratuwa 22.2; 2. Cheenakoratuwa 45.2; 3. Talapitiya 16.7; 4. Dangedere 28.6; 5. Kanampitiya 66.7; 6. Makuluwa 50.0; 7. Closenberg 27.8; 8. Nugaduwa 43.2.

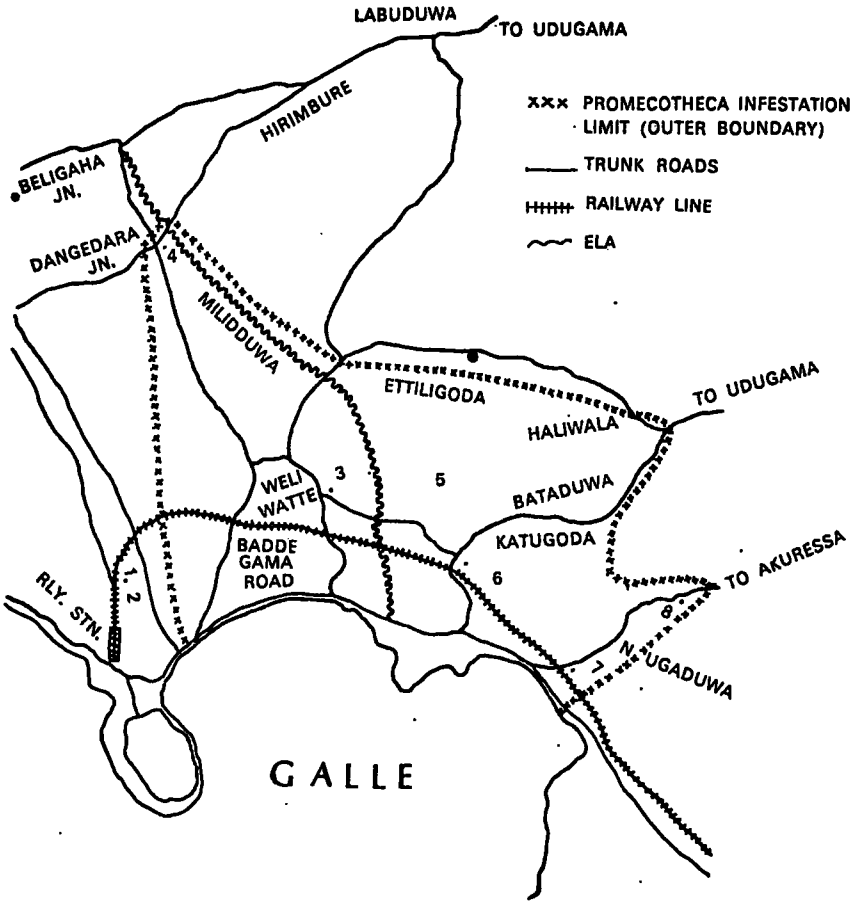


Table 1. *Results of population studies (P. cumingi) conducted on 07.12.1978*

	Eggs	*Larvae*			*Pupae*	*Adult*
		1st instar	*2nd instar*	*3rd instar*		
Per cent mortality due to Natural factors	22.6	4.9	10.1	13.9	1.2	0
Per cent mortality due to parasitism	0	6.4	9.9	12.2	0	0
Per cent adult pest emergence	—	—	—	—	—	18.8%

Total pest mortality due to natural factors	—	52.7%
Total pest mortality due to parasitism	—	28.5%
Total mortality	—	81.2%

These studies reveal a pest mortality of 52.7% due to natural factors and a pest mortality of 28.5% due to parasitism, giving a total pest mortality of 81.2%. Only 18.8% of the pest emerged as adults to go into the next generation.

2. The Coconut Caterpillar—*Nephantis serinopa*

Pest position in 1978

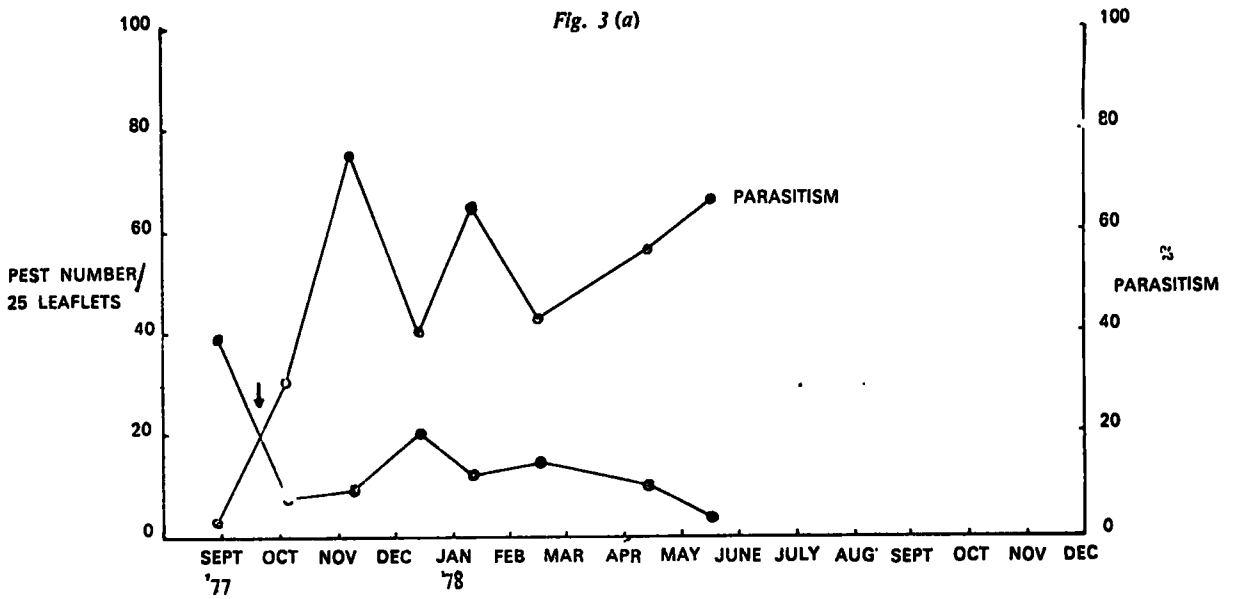
During the year under review, this pest was not observed in the north eastern border of the coconut triangle, namely Ganewatta and Nikadalupotha areas, where coconut palms were heavily damaged by this pest during the period 1960 — 1970.

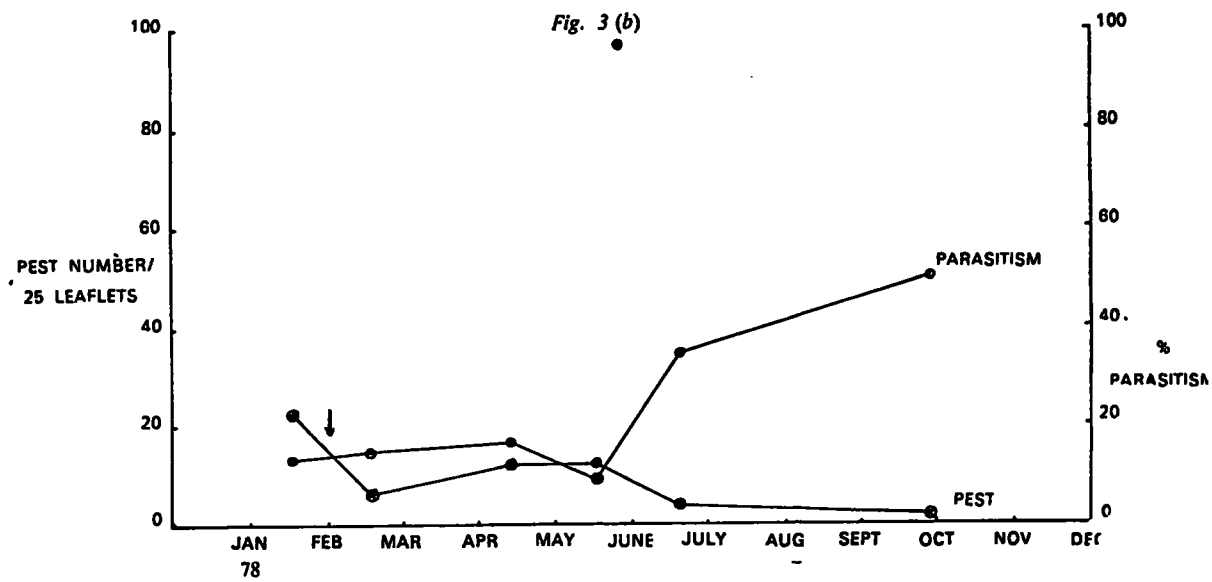
In the Southern Province, the pest remained within the previously infested areas. A severe outbreak occurred in the Jaela area, and this was brought under control using insecticides and parasites, as indicated below. A slight infestation of this pest was noticed in Chilaw, which was brought under control by parasites.

An outbreak of this pest in the Southern Province at Vitharandeniya and Dematawela, reported earlier (Mahindapala, 1977), was brought under control by the judicious use of insecticides and parasites (*Eriborus trochanteratus*, *Perisierola nephantidis*, *Trichospilus pupivora*). Trichlorophon was sprayed (28 cm^3 of insecticide in 18.1 of water; About 18 litres of spray fluid per palm were sprayed using power sprayers with a fine nozzle attachment to a bamboo pole) to reduce the pest population so that subsequent parasite releases would have maximum effect on the remaining pest. After spraying, parasites were released in large numbers and the results have been most encouraging. The affected areas were surveyed regularly and population counts have been taken monthly. The data collected in the three localities in the Southern Province are presented in Fig. 3.

At Vitharandeniya (Fig. 3 a), the pest caused extensive damage and could not be controlled by the use of parasites for about an year. Spraying of Trichlorophon immediately brought down the pest population from 40 pest nos. /25 leaflets to 6 pest nos. /25 leaflets. Several consignments of parasites were then liberated and the reduction in the incidence of the pest and the increase in the parasite population were evident in Fig. 3 a. By June, 1978 this locality was free of pest. A similar trend was observed at Sitinamaluwa (Beliatta) (Fig. 3.b), where spraying of Trichlorophon in January, 1978 immediately brought down the pest population which was subsequently kept in check by the use of parasites.

FIG. 3. Population fluctuations of *Nephantis serinopa* and its parasites since spraying. (a) Vitarandeniya; (b) Sitinamaluwa. (c) Dematawela. Arrow indicates the time of spraying.





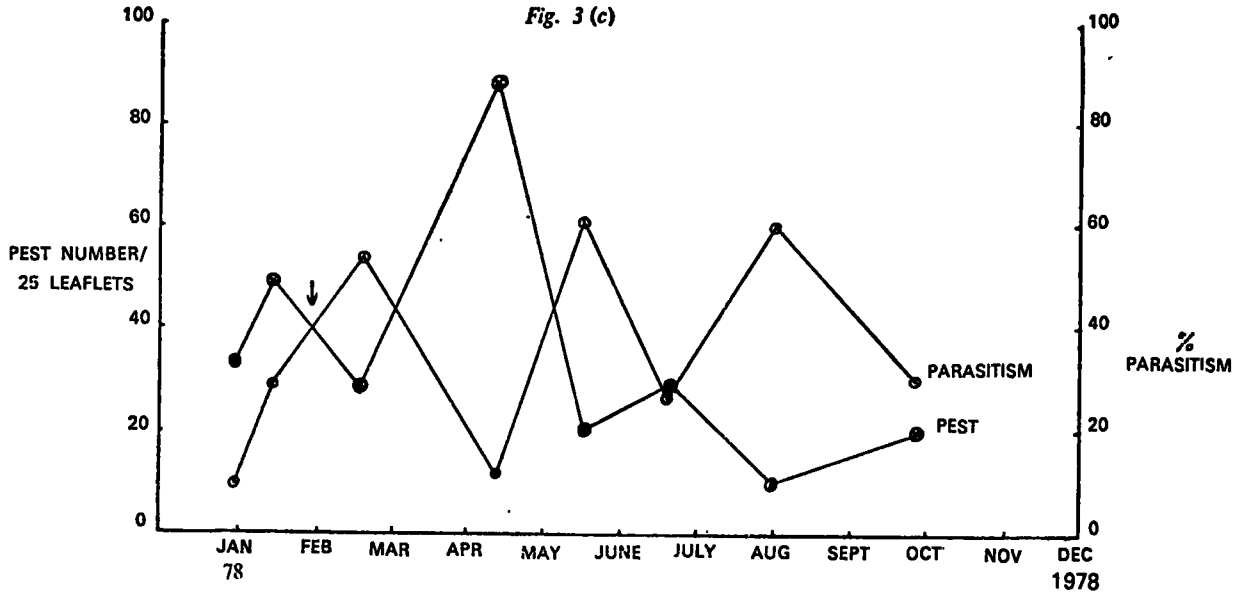
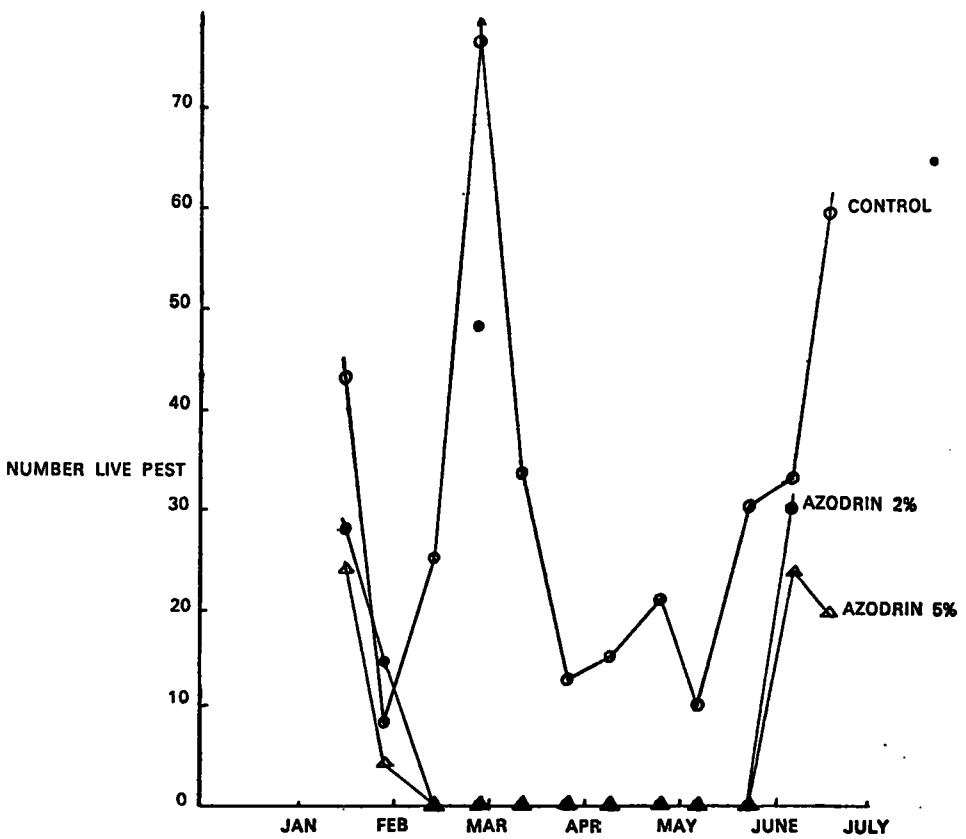


FIG. 4. Population fluctuation of *Nephantis serinopa* after the injection of systemic insecticide.



Control achieved at Dematawela (Fig. 3 c) was not as marked as in other localities Subsequent to spraying of Trichlorophon, the pest population had increased but towards the end of the year the pest had decreased while the parasite population had increased. It appears that the recorded increase of the pest after spraying was due to the lack of parasites. Unlike in the other two localities, parasite liberation has not been carried out at this locality owing to a breakdown in the parasite supply. The insecticide spray would have killed most of the naturally available parasites and since no liberations were done after spraying, the pest would have increased unchecked. Although parasites were liberated after sometime, they were unable to bring down the population as in other two localities.

The results of these preliminary trials indicate the usefulness of an integrated control programme for the Coconut Caterpillar. The maximum benefit in the use of insecticides can only be achieved by liberating parasites in fields shortly after spraying. Delayed liberation, as evident in Fig. 3 c, does not appreciably contribute towards the control of the pest.

Since then, this integrated control method was gainfully used to control an outbreak of coconut caterpillar in Jaela area. This method appears to be of promise and value in the control of Coconut Caterpillar, where parasites have been traditionally employed with varied success.

Use of Systemic Insecticides

Results of a laboratory trial carried out earlier (Kanagaratnam and Pethiyagoda, 1976) indicated some promise in using systemic insecticides for the control of leaf eating caterpillars of Coconut. A preliminary field trial was therefore carried out in the Eastern Province using Monocrotophos.

Twenty-year-old palms, heavily infested with Coconut Caterpillar, were chosen for the experiment. The pest population was assessed using the method described by Ekanayake (1968) but pest numbers were counted only in 50 leaflets. After a pre-treatment population count, 5% and 2% Monocrotophos solutions were injected into the trunks using the gravity method. Six palms were used for each treatment, and after injection, population counts were taken regularly.

The results of this preliminary trial are given in Fig. 4. The injection of systemic insecticide immediately brought down the pest population and treated palms were free of the pest for about 4 months, inspite of the presence of the pest in neighbouring palms. The results are in agreement with the laboratory observations of Kanagaratnam and Pethiyagoda (1976). It would be reasonable to assume that non-infestation of a previously infested palm after the injection of the insecticide is due to the persistent nature of the insecticide in the leaf tissue.

Although the results are promising for the control of pests, there appears to be a possibility of the occurrence of residues in palm parts for about 4 months after injection. This makes such parts unsuitable for human consumption. It was therefore decided to investigate this matter more fully using bio-assay and analytical techniques to ascertain the period of persistence, before the method could be recommended for use in coconut pest control.

Biological Control

During the course of the year, the following parasites were bred at the two insectaries.

Eriborus trochanteratus

Perisierola nephantidis

Trichogramma brasiliensis

Spoggosia bezziana

In 1977, no recoveries of the tachinid parasite, *Ptychomyia remota* were made. This parasite was bred at the Parasite Breeding Station, Mylambavely during the year under review and released in a few localities in the Eastern Province. About 30,000 of these insects were released but no recoveries had been made. At the end of the year, it was decided to discontinue the breeding of this parasite owing to its apparent inability to establish in the field.

The breeding and release of the pupal parasite, *Trichospilus pupivora* which was discontinued several years ago, were recommenced at Lunuwila after some recoveries were made in the Southern Province. In certain localities in the Southern Province, this parasite was predominant, and proved very useful in controlling the pest after spraying. *T. pupivora* was reared in the Insectary on pupae of *Prodenia litura.*

The numbers of parasites released in different provinces are presented in Table 2.

Table 2. *Release of parasites of the Coconut Caterpillar (1978)*

	North Western Province	*Western Province*	*Southern Province*	*Sabaragamuwa Province*	*Eastern Province*	*Total*
Perisierola	5,440	35,270	84,215	2,210	4,980	132,115
Ptychomyia	—	—	—	—	23,395	23,395
Eriborus	750	11,275	875	250	8,825	21,975
Trichogramma	—	—	—	—	44,24,000	44,24,000
Trichospilus	41,500	1,25,800	27,400	—	—	1,94,700
Microbracon	—	—	—	—	29,750	29,750
Spoggosia	200	1,550	—	—	5,370	7,120
Total	47,890	1,73,895	1,12,490	2,460	44,76,320	48,13,055

3. The Coconut Scale, *Aspidiotus destructor*

During the year under review, 12 reports of this pest were received; 7 from the North Western Province, 2 from the North Central Province, 2 from the Southern Province and 1 from the Western Province. In three localities in the North Western Province, one locality in the North Central Province, one locality in the Southern Province and one locality in the Western Province, the pest was brought under control by naturally occurring indigenous predators, *Chilocorus nigritus* and *Pullus xerampelinus* and the parasite *Aphytis chrysomphali.*

In other localities, Kerosene oil/soap emulsion in water was sprayed to control the pest. In all, about 60 acres had been sprayed against this pest during 1978.

Generally, the indigenous predators are found throughout the island and they perform a useful task in keeping the scale pest under check.

4. The Red Weevil, *Rhynchophorus ferrugineus*

Several reports of this pest were received and these were referred to the Coconut Development Officers for inspection and advice.

Results of the laboratory studies on the use of three systemic insecticides will be reported separately. The results indicate that these insecticides could be effectively used to control this pest. The present recommendation of the Institute is Metasystox, which is often in short supply, and the cultivators will be able to have a choice of insecticides.

5. The Black beetle, *Oryctes rhinoceros*

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

The work on the nuclear polyhedrous virus, *Baculovirus oryctes* which was multiplied and released earlier, was continued. The results of the field experiment described earlier (Mahindapala, 1977) will be presented elsewhere. The indication is that the introduction of the virus has not appreciably reduced the incidence of the pest, as assessed by the damage to the foliage. However, when larvae from localities where the virus had been previously liberated were collected and incubated individually, some of them developed symptoms of virus infection. As the visual observations were inconclusive, it was decided to test the larvae for the presence of the virus using serological techniques.

Specimens were collected for this purpose and mailed to the Glasshouse Crops Research Institute at Sussex in England for serological analysis. The results of these investigations were not available at the time of writing this report.

A consignment of virus-infected larvae was supplied to the Sri Lanka Cashew Corporation or testing against the Cashew stem borer.

6. Biological control of *Eupatorium odoratum*

During the year under review, a large number of the defoliator insect, *Ammalo insulata* was collected from the field and redistributed in lands where profuse growth of *Eupatorium* was observed.

The insect was able to cause heavy defoliation in lands at Katunayake, Malwana, Nattandiya and Vanathavillu. The performance of the insect at Malwana had been extremely satisfactory and the insect had been detected about 10 miles away from the point of release. The public awareness of the insect is considerable, and the insect has been collected and distributed by the members of the public too.

During the course of the year, the insect had been observed causing defoliation of *Eupatorium* at Lunuwila, Colombo, Kuliyapitiya, Kalutara, Ahangama, Tissamaharama, Belihuloya, Homagama, Katunayake, Vanathavillu, Puttalam, Anuradhapura and Dambulla.

Although the insect caused heavy defoliation, it was unable to establish itself in plantations. This caused problems and necessitated periodic releases at the same point. Field experiments were started to investigate this aspect, and the available results indicate that the life cycle of the insect is interrupted by heavy pupal mortality. Further experiments are in progress and the results will be published elsewhere. No recoveries of the flower-attacking Weevil, *Apion brunneonigrum*, first released in 1976, were made.

7. Other Pests

During the year under review two reports of outbreaks of the nettle grub pest, *Parasa lepida*, were received. Although the infestation at Palugaswewa Estate, Rajakadaluwa was heavy, naturally occurring parasites were able to control the pest effectively. No spraying was carried out.

8. DISEASES

(a) Bud rot : Only two reports of the occurrence of this disease were received. As done in the past, prophylactic measures using fungicidal bags were recommended.

(b) Stem Bleeding : Several reports of the occurrence of this disease were received and the usual control measures were recommended.

(c) Leaf blight disease : Several reports about this disease were received during the year under review. These were referred to Coconut Development Officers for inspection and advice.

Research work on leaf blight disease

During the year, experiments were started to study the leaf blight complex in coconut. The biology of one of the fungi implicated in the disease complex, *Pestalotia palmarum* was studied in collaboration with the Department of Biological Sciences, Vidyodaya Campus of the University of Sri Lanka. The results of these experiments will be published elsewhere but the indications are that *Pestalotia palmarum* is unable to infect healthy Coconut leaf. It appears, therefore, that this fungus is relatively unimportant in the disease complex, establishing itself as a saprophyte in already dead tissue.

In connection with this, studies were initiated during the latter part of the year to study the phylloplane fungi on coconut leaves. Periodic sampling of coconut leaves were being done and the results of the preliminary observations indicate that *Pestalotia palmarum* may not be implicated in the initial stages of the leaf blight disease.

9. Leaf Scorch Decline

a) Oil content of copra from Coconut palms affected with Leaf Scorch Decline

An experiment was carried out in an estate in Galle District to assess the oil content of copra from palms affected with Leaf Scorch Decline. Palms showing leaf Scorch Decline were categorized into 3 groups as described elsewhere (Mahindapala and Chandrasena, 1975) viz, Mild Leaf Scorch Decline, Moderate Leaf Scorch Decline and Advanced Leaf Scorch Decline. According to this classification, 25 palms showing mild LSD, 25 palms showing moderate LSD and 50 palms showing advanced LSD were chosen from a block of palms. From the same block, 50 healthy palms were selected to be used as controls.

After the pick, nuts were allowed to wither and season in the field for 30 days before being kiln-dried to make copra. The copra from each category was cured separately and about 10% of the cups of copra were picked out at random. These cups were shredded and a sub-sample of about 10—15 g was taken for analysis. The oil content of the samples was determined by Petroleum either extraction (Bolton, 1928) and the results, expressed as % oil on wet and dry basis, are presented in Table 3, which have been subjected to analysis of variance.

The results reveal that the difference observed in oil content between healthy palms and those showing Leaf Scorch Decline is not significant ($P=0.05$). Although an earlier experiment (Mahindapala and Chandrasena, 1975) indicated a reduction of about 60% in copra production in palms showing advanced Leaf Scorch Decline, these investigations reveal that Leaf Scorch Decline has no effect on the oil content of copra.

Table 3. *Oil content of copra from healthy palms and those affected with Leaf Scorch Decline**

	Condition of the palms			
	Healthy	*Mild LSD*	*Moderate LSD*	*Advanced LSD*
%oil Wet basis	57.5	57.2	56.9	57.2
% oil Dry basis	55.5	54.8	54.5	54.9

* The data have been subjected to analysis of variance. Any two means (within one assessment) not underscored by the same line are significantly different (P = 0.05).

Soil Mycoflora

Studies were carried out to assess the fungal populations around the roots of healthy palms and palms affected with Leaf Scorch Decline. The results indicate that higher fungal populations are present in association with both healthy and diseased roots of affected Palms. These observations will be reported more fully elsewhere.

Mycoplasma like organism

A collaborative project to investigate tissues from coconut palms affected with Leaf Scorch Decline for the presence of Mycoplasma like organisms was started with Dr. M. V. Parthasarathy of Cornell University, Ithaca. Dr. Parthasarathy visited areas in Sri Lanka where Leaf Scorch Decline is present and samples were taken for electron microscopic examination. The results of these investigations are not yet available.

Staff

Mr. B. H. Rohita and Mr. P. A. C. R. Perera returned to the island after post-graduate studies in New Zealand and England respectively. Mr. S. M. P. Subasinghe was appointed Extension Officer in February, 1978.

Mr. S. V. Sinnatamby was awarded a 3 months fellowship by the FAO and proceeded to Australia, where he is being trained in biological control of weeds.

Mr. A. M. Chandrasena was awarded a 3 months fellowship by the FAO and proceeded to Australia, where he is being trained in using fungi as biological control agents.

MISCELLANEOUS

Dr. R. Mahindapala, Crop Protection Officer, attended the COCOTECH meeting of the Asian and Pacific Coconut Community from 28th February to 3rd March in Bangkok, Thailand and served as a member of the production panel which discussed plant quarantine at length.

The Crop Protection Officer was also appointed a visiting lecturer, Department of Biological Sciences, Vidyodaya Campus of the University of Sri Lanka and conducted lectures and practical courses on Mycology and Plant Pathology.

PUBLICATIONS

Mahindapala, R. (1978) Host and environmental effects on the infection of maize by *Puccinia sorghi*. 1. Prepenetration development and penetration *Annals of Applied Biology*, 89, 411–416.

Mahindapala, R. (1978) Host and environmental effects on the infection of maize by *Puccinia sorghi*. 11. Post-penetration development. *Annals of Applied Biology* **89**, 417–421.

Mahindapala, R. (1978) Epidemiology of maize rust, *Puccinia sorghi; Annals of Applied Biology* **90**, 155-161.

Mahindapala, R. (1978) Occurrence of maize rust, *Puccinia sorghi*, in England. *Transactions of the British Mycological Society* **70**, (3) 393–399.

Read

Mahindapala, R. (1978). Observations on some simple spore traps. Read at the annual sessions of the Sri Lanka Association for the Advancement of Science, December, 1978.

REFERENCES

Bolton, E. R., (1928). *Oils, Fats and Fatty foods*, London, V & A Churchill.

Ekanayake, U. B. M. (1968). Population fluctuations of the Coconut Caterpillar, *Nephantis serinopa. Ceylon Cocon. Q.* **19**, 177–182.

Kanagaratnam, P. and Pethiyagoda, U. (1976). Use of some systemic insecticides for the control of some serious pests of coconut. Presented at the annual sessions of the Sri Lanka Association for the Advancement of Science, December, 1976.

Mahindapala, R. (1977). Report of the Crop Protection Division for 1977.

Dr. R. MAHINDAPALA
Crop Protection Officer

Ceylon Cocon. Q. (1979) **30**, 53-56
Printed in Sri Lanka

REPORT OF THE BIOMETRY UNIT – 1978

1. STATISTICAL SERVICE

Statistical work of all the research divisions were 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

2.1 Calibration Trial

The recordings of vegetative and yield characters of the palms in this experiment were carried out without interruption.

2.2 Watering Experiment

This experiment was continued uninterrupted during the year.

Steps are now being taken to improve the water supply for the experiment.

The response to treatments in the year 1978 is shown in Table 1.

Table 1. *Yield per hectare per annum*

Treatment	*Nuts/hectare/annum*			*Weighted average*	*No. of waterings*
	Low yielding	*Mid yielding*	*High yielding*		
Control	6354	9536	15458	9525	nil
Single dose weekly	9965	11301	17958	11997	29
Single dose fortnightly	8044	11577	16451	11279	15
Double dose fortnightly	9387	9843	16365	10795	15

The yields have been adjusted for pre-experimental differences, by means of covariance analysis.

2.3 Copra conversion Factor Experiment (B/E and R/E)

The two experiments were carried out according to schedule. A preliminary study appears to show that different conversion rates have to be used for different picks of the year to estimate weight of copra from the weight of husked nuts. However husking of nuts and weighing them to estimate copra content did not show any difference in the conversion rate whether weighed immediately after harvest or after keeping for one month.

2.4. Bunch Thinning

The experiment on Bunch thinning started at B/E had to be prematurely stopped due to some experimental trees struck by lightning. However the data collected showed a significant increase in the inflorescences produced subsequent to the thinning. This increase was highest in those trees where the younger bunches were cut.

Based on these findings a further two experiments were commenced on a block of land at R/E.

The objectives of these two latter experiments were:

(2.4.1) To find the age at thinning of the bunch at which the maximum response is shown when the degree of thinning was kept constant.

(2.4.2) To find the degree of thinning which gives the maximum response, keeping the age of the bunch thinned constant.

3. AGRI-METEOROLOGY

3.1. Meteorological Stations

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

3.2 Rainfall in 1978

The rainfall in 1978 in the important coconut growing areas are shown in Table 2.

Table 2.

Station	*Total Rainfall (mm)*		*Average for 20 years*
	1978	*1977*	
Lunuwila	1999.2	2354.3	1989.9
Madampe	1570.1	2011.2	1638.4
Chilaw	1212.3	2048.0	1559.0
Puttalam	1499.1	1478.0	1129.7
Kurunegala	2405.4	2335.5	2208.8

3.3 Drought Indices in 1978

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*	*1976*	*1977*	*1978*
1. Tangalla ...	152.0	30.1–414.6	501.5	371.6	103.2
2. Kudawewa ...	196.0	0.0–457.6	617.3	451.5	608.5
3. Wariyapola ...	213.0	0.0–526.8	361.3	256.9	411.7
4. Kuliyapitiya ...	152.5	0.0–288.2	262.4	218.8	349.6
5. Madampe ...	320.9	0.0–569.1	413.4	234.1	454.7
6. Lunuwila ...	146.1	0.0–407.7	137.6	60.6	402.6
7. Rajakadaluwa ...	278.9	0.0–465.4	661.2	369.3	772.4
8. Negombo ...	141.6	0.0–305.4	238.3	73.8	545.6
9. Giriulla ...	60.1	0.0–127.3	334.6	49.5	401.6
10. Kurunegala ...	113.6	0.0–254.6	451.9	187.5	160.9
11. Polgahawela ...	100.0	0.0–217.1	516.6	210.9	129.0

Forecast of total production in Sri Lanka for 1978

(a) Verification of forecast for 1978

Production forecast by C. R. B. for	1978	—	2417 million nuts
* Production actually realised for	1978	—	2356 " "
Error of forecast		—	2.59%

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

(b) Forecast for 1979

Forecast of production for 1979 — 1680 million nuts
% decrease expected in 1979 over 1978 — 28.7%

This expected sharp decline should be cushioned to some extent by the recent increase in fertilizer consumption in coconut lands.

4. PRODUCTION AND EXPORTS (Based on Customs returns)

The estimated production of coconuts for the year 1978 is 2443 million nuts. This is 16.5% more than in 1977, 5.1% more than last 5 years average and 19.7% less than from the previous record production in 1964.

The nut equivalent of exports for 1978 is 594 million nuts. This is 111.7% more than in 1977, 4.8% more than last 5 years average and 63.5% less than the previous record in 1964.

The average value of nut products per 1000 nuts in 1978 is Rs. 1635/-. This is 37.1% more than in 1977, 146.2% more than the last 5 years average and 37.1% more than last record price in 1977.

5. PUBLICATIONS

5.1	*Title*	*Author*	*Year*	*Journal*
	Investment in coconut fertilizer national potential	V. Abeywardena	1978	Paper presented at the Seminar on Research and Development Programme for Coconut production (A. R. T. I., Colombo)
5.2	Relationship between leaf length and yield in coconut (A research note)	V. Abeywardena	1978	*Ceylon Cocon. Q., 27*
5.3	Relative response of repeated N P K fertilizer application on coconut yield	D. T. Mathes	1978	Submitted for *Ceylon Cocon. Q.*

6. GENERAL

6.1 The Biometrician attended a number of meetings at the Bureau of Standards.

6.2 The Biometrician gave a series of lectures on "Design of Experiments" at the Management level training programme on quality control at the Bureau of Standards.

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

6.4 The Biometrician served the specialist committee on statistics and quality control at the Bureau of Standards.

6.5 The Biometrician continued to function as the Consultant Biometrician at the Rubber Research Institute of Sri Lanka and the Sri Lanka Sugar Corporation.

7. PERSONNEL

The Staff at the end of 1978 were as follows.

1. Biometrician	—	V. Abeywardena, F.I.S. (LOND).
2. Graduate T. A.	—	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

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REPORT OF THE PLANTING DIVISION – 1978

STAFF

Asst. Manager (Nurseries):

Mr. J. A. Cadelis

Clerk Typists:

Messrs A. E. M. Samaraweera, W. A. W. Wijesuriya, P. Premaratne Fernando, I. Joseph Fernando, Miss M. F. C. G. Perera.

Field Assistants:

Messrs H. W. Fernando, D. P. Jayamanne, C. H. de Alwis, J. L. D. Fernando, K. C. Muthuchamy, S. Nandagopal, Y. V. Sirisena, B. M. Jayanayake, P. P. Sumanatilake, W. K Kasturiarachchi, R. B. Wewelpola, Edwin Gamage, W. G. Fernando, J. S. Robert. W. B. E. Fernando, S. T. Fernando, P. P. Jayasundera, K. Austin Silva.

Field Attendants :

Messrs A. T. Fernando, J. B. Fernando, D. W. J. Jayakody, A. D. Yasaratne, B. A. L. Mendis, N. M. S. Amarasiri, D. L. Karunanayake, J. A. Sunil Lakshman, M. P. Dharmadasa, C. H. M. Somaratne, M. A. Mervyn Joseph, Sunil Abeywickrama, K. S. A. J. A. Fernando, J Mathews.

Appointments

Mr. J. A. Cadelis was appointed Assistant Manager (Nurseries).

Transfers

Mr. W. A. W. Wijesuriya was transferred to the Administration Division on 06.12.78.

Miss M. F. C. G. Perera was transferred from the Administration Division to the Planting Division on 06.12.78.

Mr. W. K. Kasturiarachchi was transferred to Kalawewa Nursery from Pallekelle Nursery on 27.02.78.

Mr. J. B. Fernando was transferred to Head Office from Mylambavely Nursery on 14.08.78

Mr. J. S. Roberts was transferred from the Inter-cropping Division to the Planting Division and posted to Mylambavely Nursery from 14.08.78.

Mr. P. George Kamal, was transferred from the Inter-Cropping Division to the Planting Division and posted to Koggala Nursery.

Mr. Henry Wijewardene, was transferred from Botany Division to the Planting Division on 28.03.78.

Mr. Sunil Abeywickrama was transferred from Head Office to Pallekelle Nursery on 27.02.78.

Mr. Lester Rajapakse was transferred from Ibbagamuwa Nursery to Kirimetiyana Nursery on 30.03.78.

Mr. H. G. Somadasa was transferred from Handapangala Nursery to Koggala Nursery on 21.01.78.

Mr. K. Weerakoon was transferred to Andigedera Estate on 11.01.78 and from there to Ratmalagara Nursery.

Interdictions

Mr. J. Mathews was interdicted.

Dismissals

Messrs Edwin Gamage, P. Sumanatilake and B.M. Jayanayake were dismissed from service.

Deaths

Mr. A. E. M. Samaraweera died under tragic circumstances on 12.07.78.

NURSERIES AND SEED COCONUTS

During the year 1978 fifteen nurseries were maintained by the Coconut Research Board (C.R.B.) and 13 nurseries were established by the Coconut Research Board for the Coconut Cultivation Board (C.C.B.), Agricultural Productivity Committees (A.P.C.) and other approved institutions.

Seed Coconuts planted for issue of seedlings in May/June 1978 and in October/November 1978 Seasons

(i) C. R. B. Nurseries:

	Nursery	*May/June'78*	*Oct./Nov. '78*	*Total*
1.	Alampil	—	61,160	61,160
2.	Attavillu	—	62,395	62,395
3.	Eraminigolla	24,550	51,870	76,420
4.	Handapangala	—	101,660	101,660
5.	Hettipola	15,800	41,900	57,700
6.	Ibbagamuwa	76,900	200,300	277,200
7.	Kalawewa	—	123,645	123,645
8.	Kilinochchi	—	92,020	92,020
9.	Kirimetiyana	82,975	100,065	183,040
10.	Koggala	31,300	52,900	84,200
11.	Mylambavely	—	87,200	87,200
12.	Pallekelle	67,800	86,805	154,605
13.	Rathmalagara	76,415	103,900	180,315
14.	Walpita	73,740	60,560	134,300
15.	Wilpotha	68,875	105,535	174,410
	Total (C.R.B. Nurseries) ...	518,355	1,331,915	1,850,270

(ii) Other Nurseries

	May/June 1978	*Oct./Nov. 1978*	*Total*
1. Homagama – A.P.C.	—	3,000	3,000
2. Homagama – L.R.C.	—	18,000	18,000
3. Katugampola – Co-op Society	—	26,220	26,220
4. Walpita – A.P C.	—	6,000	6,000
5. Badalgama – A.P.C.	—	6,300	6,300
6. Minuwangoda – A.P.C.	—	3,000	3,000
7. Manakkulama Estate – C.C.B.	—	2,000	2,000
8. Malabe – A.P.C.	—	5,750	5,750
9. Randeniya Estate – C.C.B.	—	3,000	3,000
10. Sirikandura Estate – C.C.B.	—	5,000	5,000
11. Rathgamkelle Estate – C.C.B.	—	5,000	5,000
12. Adampan – C'nut Producers' Assn. ...	—	8,000	8,000
13. Dehiwela – Maha Vidyalaya	—	2,900	2,900
Total (Other Nurseries)	Nil	94,170	94,170

Summary

(i) Coconut Research Board Nurseries	518,355	1,331,915	1,850,270
(ii) Other Nurseries	Nil	94,170	94,170
Grand Total	518,355	1,426,085	1,944,440

Seedling Bookings

The total number of seedlings booked during the course of the year 1978 was 302,761. The distribution of the above bookings were as follows :

Seedlings of Oct./Nov. 1976 season	3,951
Seedlings of May/June 1977 season	17,195
Seedlings of Oct./Nov. 1977 season	59,513
Seedlings of May/June 1978 season	222,102
Total bookings for 1978	302,761

The above bookings were scheduled according to the different nurseries.

Nursery	*Oct./Nov. 1976*	*May/June 1977*	*Oct./Nov. 1977*	*May/June 1978*	*Total*
Alampil Nursery	—	—	1,938	—	1,938
Attavillu Nursery	—	—	10,864	—	10,864
Eraminigolla Nursery ...	415	—	—	13,450	13,865
Handapangala Nursery ...	—	—	—	—	Nil
Hettipola Nursery ...	—	—	—	9,029	9,029
Ibbagamuwa Nursery ...	3,246	6,205	—	20,921	30,372
Kalawewa Nursery	—	—	2,232	—	2,232
Kilinochchi Nursery ...	—	—	1,064	—	1,064
Kirimetiyana Nursery ...	290	9,442	6,332	27,790	43,854
Koggala Nursery	—	691	2,492	23,612	26,795
Mylambavelly Nursery ...	—	—	3,788	—	3,788
Pallekelle Nursery ...	—	—	4,578	48,527	53,105
Rathmalagara Nursery ...	—	857	7,123	24,661	32,641
Walpita Nursery	—	—	939	27,801	28,740
Wilpotha Nursery	—	—	18,163	26,311	44,474
Total	3,951	17,195	59,513	222,102	302,761

Summary of Bookings for the year 1978

	O/N. '76	*M/J. '77*	*O/N. '77*	*M/J. '78*	*Total*
Seedlings booked by A.P.C's & M.P.C.S.	nil	nil	1,500	6,000	7,500
Seedlings booked by Govt. Depts. etc.	nil	nil	6,399	28,390	34,789
Seedlings booked by Estate owners	nil	nil	1,890	26,045	27,935
Seedlings booked by Small-holders	nil	7,753	10,512	78,859	97,124
Seedlings booked by C.C.B. under different Subsidy Schemes	3,951	9,442	39,212	59,682	112,287
Seedlings booked by J.E.D.B. & Janawasama	nil	nil	nil	23,126	23,126
Total	3,951	17,195	59,513	222,102	302,761

A.P.C.'s and M.P.C. Societies	7,500
Govt. Depts., and Institutions	34,789
Estate owners	27,935
Small-holders	97,124
C.C.B. under different Subsidy Schemes	112,287
J.E.D.B. and Janawasama	23,126
Total	302,761

N.B. As from October/November 1978 season, bookings and allocation of seedlings were taken over by the Coconut Cultivation Board.

SEEDLINGS ISSUED :

948,275 seedlings were issued during the year 1978 and the distribution in nurseries was as follows :

Nursery	*O/N '76*	*M/J '77*	*O/N '77*	*M/J '78*	*O/N '78*	*Total*
1. Alampil ...	—	—	1,472	—	14,548	16,020
2. Attavillu ...	—	—	14,290	—	35,274	49,564
3. Eraminigolla ...	1,372	—	3,955	12,010	19,073	36,410
4. Handapanagala ...	—	—	—	—	60,368	60,368
5. Hettipola ...	—	—	3,191	9,075	18,111	30,377
6. Ibbagamuwa ...	—	750	52,454	42,788	94,034	190,026
7. Kalawewa ...	13,925	—	27,295	—	39,907	81,127
8. Kilinochchi ...	—	—	706	—	10,320	11,026
9. Kirimetiyana ...	—	—	791	12,241	35,874	48,906
10. Koggala ...	—	641	8,673	25,489	25,616	60,419
11. Mylambavely ...	—	—	—	—	4,316	4,316
12. Pallekelle ...	—	—	5,935	38,476	31,714	76,125
13. Rathmalagara ...	—	5,245	15,338	23,273	49,875	93,731
14. Walpita ...	—	—	—	60,588	6,204	66,792
15. Wilpotha ...	—	—	29,724	41,609	51,735	123,068
Total ...	15,297	6,636	163,824	265,549	496,969	948,275

J. A. CADELIS
Assistant Manager (Nurseries)

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REPORT OF THE PUBLICATIONS/PUBLICITY UNIT AND LIBRARY – 1978

1. Journals :

The following issue of the Pol Pawath was published during the year : Vol. 6 No. 4.

2. Advisory Leaflets :

The 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. 16, 24, 36, 47 and 48
In English — Nos. 10, 21, 44, 46, 48 and 50

3. Visitors :

During the year the Institute received 4004 students from 47 schools, 75 University students and 87 visitors from overseas.

LIBRARY

Publications

During the year no publications were issued by the library as the Librarian was away from the island.

The Library actively participated in the inter-library loan scheme and also contributed material for the Technical Index at the National Science Council.

The Librarian, Mr. M. J. C. Perera, returned to the island at the end of July after undergoing training in the U. K. on a scholarship offered by the IDRC to take charge of the Coconut Information Centre to be set up at the Institute's Library.

During the year under review 70 new books were added to the stock making a total of 4,060 books in stock at the end of the year. The total number of journals subscribed to and obtained on exchange was 230.

Action was taken to revise the exchange mailing list. During this revision eleven addresses were taken off as the publications received were less useful for the Library.

M. S. S. FERNANDOPULLE
Publications/Publicity Officer

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REPORT OF THE ADMINISTRATION DIVISION – 1978

The staff of the Coconut Research Board as at 31. 12. 1978 were as follows:

Grade	*On Secondment or Contract*	*Special Class*	*Class I*	*Class II*	*Class III*	*Class IV*	*Total*
Executive ...	nil	1	5	2	28	3	39
Technical & Supervisory	nil	7	11	24	—	—	42
Intermediate ...	nil	—	3	3	—	—	6
Clerical & Allied ...	nil	2	13	28	—	—	43
Operative ...	nil	3	11	42	—	—	56
Minor ...	nil	36	95	117	—	—	248
		49	138	216	28	3	434

BOARD

Prof. B. A. Abeywickrama continued to be the Chairman of the Board. Mr. S. C. Kahawita, retired Chief Administrative Officer of the Coconut Research Board, was appointed as Director of the Board in terms of the Coconut Development Act No. 46 of 1971.

Staff

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

Executive Grade, Class I: Mr. B. K. D. S. Samarasinghe was appointed as Deputy Director (Adm. & Finance) with effect from 24.01.1978 in succession of Mr. K. D. D. Jinadasa, C.A.S., who was on secondment.

Executive Grade, Class II: Mr. M. Jeganathan was promoted to Class II.

Internal: as research Officer with retrospective effect from 01.01.77.

Clerical and Allied Grade, Class II:
The following casual employees were made permanent.

Miss P. C. Asuntha Fernando, Clerk/Typist with effect from 17.11.78.
Miss A. R. S. Hettiarachchi, — do — 17.11.78.
Miss M. M. M. R. Fernando, — do — 17.11.78.
Mrs. C. M. B. I. Fernando, — do — 17.11.78.

Mr. S. Rasaiah, Sanitory Labourer with effect from 01.02.78.

Executive Grade, Class III:

The following external new appointments were made.

Mr. P. B. Madurapperuma	Engineering Assistant	with effect from	16.03.78.
Mr. R. T. Shanmuganathan	Research Assistant		27.03.78.
Mr. K. R. R. A. Peries	,, ,,	— do —	07.04.78.
Mr. S. L. Talagala	,, ,,	— do —	07.04.78.
Mr. K. S. Jayasekera	,, ,,	— do —	07.04.78.
Miss P. R. Bandara	,, ,,	— do —	07.04.78.
Miss C. W. Ekanayake	,, ,,	— do —	07.04.78.

The following internal appointments were made during the year.

Executive Grade Class III:

Mr. S. M. P. Subasinghe, as Extension Officer with effect from 10.02.78.
Mr. J. A. Cadélis, as Assistant Manager Nurseries with effect from 10.02.78.

Technical Grade, Class II:

Mr. W. S. C. Perera, Lab & Field Assistant as estate Superintendent with effect from 01.10.78.

The following internal promotions were made during the year with effect from 1st January, 1978.

1. **Technical Grade, Special Class**
   - Mr. J. K. F. Kirthisinghe — Technical Assistant from Class I.
   - Mr. A. B. A. Jayamaha — Senior Field Assistant from Class I

2. **Technical Grade, Class I**
   - Mr. K. S. O. Perera — Technical Assistant from Class II.
   - Mr. P. A. D. G. Appuhamy — Technical Assistant from Class II.

3. **Clerical and Allied Grade, Special Class**
   - Mr. J. E. A. Dalpadadu — Clerk/Typist from Class I.
   - Mr. W. A. W. Wijesuriya — Clerk/Typist from Class I.

4. **Clerical and Allied Grade, Class I**
   - Mr. T. Gunadasa — Clerk/Typist from Class II.

5. **Operative Grade, Special Class**
   - Mr. H. W. Fernando — Field Assistant from Class I
   - Mr. D. P. Jayamaha — Field Assistant from Class I
   - Mr. J. H. C. Wirekoon — Field Assistant from Class I

6. **Operative Grade Class I**
   - Mr. E. R. Fernando — Field Assistant from Class II
   - Mr. K. V. W. de Silva — Field Assistant from Class II
   - Mr. D. M. Pathirage — Field Assistant from Class II
   - Mr. A. Albert Fernando — Field Assistant from Class II

7. **Minor Grade Special Class**
   - Mr. R. A. Navathelis Appuhamy — Office Attendant from Class I
   - Mr. H. H. J. E. Appuhamy — Office Attendant from Class I
   - Mr. W. W. H. R. A. Fernando — Lab/Field Attendant (Estate) Class I
   - Mr. A. M. P. Arthanayake — Lab/Field Attendant from Class I
   - Mr. B. C. E. Perera — Lab/Field Attendant from Class I

8. **Minor Grade, Class I**
Mr. S. A. Vincent Appuhamy — Lorry Cleaner from Class II

Technical Grade — External (Class II)

The following external appointments were made during the year.

Miss W. P. K. K. Croos	—	Technical Assistant with effect from	01.08.78.
Miss K. P. C. Perera	—	— do —	01.08.78.
Mr. S. M. Samarakoon	—	— do —	01.08.78.
Mr. V. L. K. Ratnaweera	—	— do —	01.08.78.
Miss N. N. R. M. de Silva	—	— do —	01.08.78.
Mr. D. P. Panditharatne	—	— do —	15.08.68.
Mr. M. D. S. Pinidiya	—	— do —	20.11.78.

RETIREMENTS

Mr. T. M. William Singho, Watcher retired from the services of the Board during the course of the year.

RESIGNATIONS

The following officers resigned from their posts during the course of the year.

Executive Grade, Class III
Miss P. R. Bandara, Research Assistant.

Executive Grade, Class IV
Mr. M. H. C Ariyaratne, Assistant Accountant.

Technical Grade, Class I
Mr. W P. Bertie Fernando, T.A., Mr. T. M. F. Gunawardena, Estate Superintendent.

Technical Grade, Class II
Miss M. C. L. Pernando, T.A., Mr. S. M Samarakoon, T.A.

Mr. M. D. N. W. William was appointed as T. A. but did not report for duty.

Mr. A. M. R. L. Dias was appointed as T.A. but resigned after a few days he reported for duty.

TERMINATIONS

The services of the following officers were terminated with retrospective effect from the date of their interdiction.

Mr. Harischandra Samarasinghe, T.A.; Mrs. Pearl Samarasinghe, Book-keeper; Mr. B. M. Jayanayake, Field Assistant; Mr. H. W. Molligoda, Translator; Mr. M. Rasamany,. Cattle-keeper; Mr. J. Mathews, Field Attendant.

Toddy Tapping Training Scheme

The toddy tapping training scheme continued to function the training of tappers and the contract of the staff was extended for a further period of 6 months. Meanwhile the Board is negotiating with state Distilleries Corporation regarding the future of the scheme.

Financial Aid Provident Fund and Workmen's Compensation

The employees Provident Fund came under the management of a Committee consisting of three ex-officio members and two members elected of the employees.

The Board operated loan schemes for the employees and granted distress and transport loans and paid festival and special advances.

WELFARE

The Board continued to give the annual grants and other assistance to the C. R. I. Recreation Club, C.R.I. Multi-purpose Co-operative Society Ltd., and the C.R.I. Art Circle.

Industrial Relations

A Committee of inquiry appointed by the Hon. Minister of Plantation Industries probed into the alleged corrupt practices and irregularities of the Board from 1970 to 1977.

B. K. D. S. SAMARASINGHE
Deputy Director (Administration and Finance)

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REPORT ON ESTATES – 1978

(1) BANDIRIPPUWA ESTATE, LUNUWILA

Area Statement		*Hectares*	*A R P*
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)
Buildings etc.		6.88	(17 0 00)
Paddy etc.		0.34	(0 3 14)
Total		148.10	(365 3 31)

Distribution of Area by blocks

Blocks	*Research*		*Estate*		*Total*	
	Hectares	*A R P*	*Hectares*	*A R P*	*Hectares*	*A R P*
B/E (1) 1	1.21	(3 0 00)	10.52	(26 0 00)	11.74	(29 0 00)
,, 2	0.00	(0 0 00)	5.67	(14 0 00)	5.67	(14 0 00)
,, 3	4.86	(12 0 00)	4.45	(11 0 00)	9.31	(23 0 00)
,, 4	2.02	(5 0 00)	15.02	(37 0 17)	17.04	(42 0 17)
,, 5	3.64	(9 0 00)	5.26	(13 0 00)	8.90	(22 0 00)
,, 6	2.43	(6 0 00)	2.02	(5 0 00)	4.45	(11 0 00)
B/E (2) "A"	26.72	(66 0 00)	20.23	(50 0 00)	46.94	(116 0 00)
,, "B"	10.52	(26 0 00)	12.55	(31 0 00)	23.07	(57 0 00)
,, "C"	7.28	(18 0 00)	6.47	(16 0 00)	13.76	(34 0 00)
Total	58.68	(145 0 00)	82.19	(203 0 17)	140.88	(348 0 17)
Building etc.					6.88	(17 0 00)
Paddy etc.					0.34	(0 3 14)
Grand Total					148.10	(365 3 31)

Census ended 1977

	1	*2*	*3*	*4*	*5*	*6*	*'A'*	*'B'*	*'C'*	*Total*
Full Bearing	1,596	727	1,254	1,611	1,064	608	4,094	1,508	1,381	13,843
Tapping Palms	—	—	—	—	—	—	—	1,027	443	1,470
Duds	2	—	5	45	3	6	62	89	63	275
Inflorescence	13	—	7	16	2	6	224	42	—	310
Established	7	—	11	4	—	5	556	177	2	762
Seedlings	5	—	1	2	2	6	1,004	186	—	1,206
Vacancies	216	147	233	487	238	113	1,698	508	266	3,906
Total	1,839	874	1,511	2,165	1,309	744	7,638	3,537	2,155	21,772

199 Palms were affected by the cyclone in November.

Comparative rainfall 1977-1978 with respective wet and rainy days

Month	1977		1977		1978		1978		5 year Total Rainfall 1972 / 1976		5 year average Rainfall 1972 / 1976	
	mm	Inches	Wet days	Rainy days	mm.	Inches	Wet days	Rainy days	mm.	Inches	mm.	Inches
January	NIL	NIL	—	—	NIL	NIL	NIL	—	12.4	0.49	2.5	0.10
February	109.0	4.29	3	1	2.0	0.08	1	1	156.2	6.15	31.2	1.23
March	161.8	6.37	7	2	189.7	7.47	8	—	500.9	19.72	100.2	3.94
April	99.8	3.93	7	—	135.1	5.32	10	—	1319.8	51.96	264.0	10.39
May	687.1	27.05	27	1	577.1	22.72	20	—	1201.9	47.32	240.4	9.46
June	115.6	4.55	13	1	60.2	2.37	10	—	629.2	24.77	125.8	4.96
July	17.5	0.69	5	—	NIL	NIL	NIL	—	589.8	23.22	118.0	4.65
August	60.5	2.38	9	—	29.2	1.15	4	—	269.5	10.61	53.9	2.13
September	40.6	1.60	6	1	65.5	2.58	8	—	585.7	23.06	117.1	4.61
October	707.6	27.86	18	3	240.0	9.45	14	—	1308.4	51.51	201.7	10.30
November	329.7	12.98	18	—	442.5	17.42	11	—	1783.3	70.21	356.7	14.04
December	11.4	0.45	3	—	162.3	6.39	8	1	801.6	31.56	160.3	6.31
TOTAL	2340.6	92.15	116	9	1903.6	74.95	94	2	9158.6	360.58	1831.8	72.12

Total crops from 1974 to 1978 within respective averages

Crops	*1974*	*1975*	*1976*	*1977*	*1978*	*Total*	*5 year Average*
1st Crop	65,817	91,103	70,288	50,943	84,015	362,166	72,433
2nd Crop	96,628	155,473	172,179	108,876	91,549	621,705	124,341
3rd Crop	154,725	135,874	167,115	115,968	128,339	702,021	140,404
4th Crop	141,426	162,357	150,254	118,944	84,601	657,582	131,516
5th Crop	91,250	122,364	85,741	90,024	81,320	470,699	94,140
6th Crop	86,948	60,126	51,560	59,365	84,082	342,081	68,416
Total	633,794	727,297	697,137	544,120	553,906	3,156,254	631,250

Disposal of crops (6 Crops 1978)

Sold to contractors	437,064
Converted into copra	43,931
Nut Allowance	34,493
Sold to T. T. T. S.	5,650
Sold to staff	40
Sold to research	2,707
Sold to canteen	1,040
Missing	30
Empties	28,951
Total	553,906

Field Notes

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

Weeds

Weeds have been effectively controlled in the Estate.

Fences

All fences have been maintained in good condition.

Draining

All drains have been maintained in good order. 7,922 meters (1,444 fathoms) of new drains were opened in Blocks 3, 4, A and C during the year.

Manuring

The entire Estate was manured during the year.

D. C. ELLAWELA
Superintendent, Bandirippuwa Estate

Ceylon Cocon. Q. (1979) 30, 69-71
Printed in Sri Lanka

(2) RATMALAGARA ESTATE, MADAMPE — 1978

Area statement

Area	*Hectares*	*A*	*R*	*P*
Research Section	46.942	(116	0	0)
Estate Section	48.56	(120	0	0)
Nurseries	5.26	(13	0	0)
Roads and Buildings	2.02	(5	0	0)
Jungle and Wasteland	7.69	(19	0	0)
Total	110.48	(273	0	0)

Distribution of area by Section

Section	*Hectares*	*A*	*R*	*P*
Botany Division	15.58	(38	2	0)
Division of Soils	20.23	(50	0	0)
Agrostology Division	6.07	(15	0	0)
Intercropping Divsion	4.05	(10	0	0)
Biometry Unit	1.01	(2	2	0)
Planting Division	5.26	(13	0	0)
Estate Section	58.27	(144	0	0)
Total	110.48	(273	0	0)

Census of palms

Particulars	*FIELDS*								*Botany*	
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Block*	*Total*
Bearing palms ...	1,471	196	755	1,476	1,110	1,622	2,894	469	1,857	11,850
Young palms ...	11	—	—	7	—	—	9	—	417	444
Dud palms ...	104	22	15	—	31	23	—	7	—	202
Vacancies ...	25	22	54	40	30	44	47	23	870*	1,155
Total ...	1,611	240	824	1,523	1,171	1,689	2,950	499	3,144	13,651

*N.B. 409 vacancies in the Hedge Plantation will not be supplied.

Comparative Rainfall 1977/78 with Wet Days

Month	1977 mm	1977 Wet days	1978 mm	1978 Wet days	5 year (1972/76) rainfall Total mm	5 year (1972/76) rainfall Average mm
January ...	1.02	1	NIL	NIL	19.3	3.9
February ...	49.53	4	NIL	NIL	152.4	30.5
March ...	182.12	6	89.3	9	355.1	71.0
April ...	157.48	11	69.7	11	1343.9	268.8
May ...	646.43	26	410.0	23	1039.4	207.9
June ...	64.17	12	15.1	4	458.5	91.7
July ...	19.00	2	6.5	4	394.9	79.0
August ...	35.40	9	27.5	7	173.8	34.8
September ...	46.20	5	54.0	8	543.1	108.6
October ...	579.20	26	302.0	19	1069.5	219.3
November ...	168.50	17	540.3	18	1340.4	268.1
December ...	70.80	7	55.7	10	635.3	127.1
Total ...	2019.85	126	1570.1	113	7552.6	1510.7

Total crops from 1973 to 1978

Pick No.	1973	1974	1975	1976	1977	1978
1	46,072	54,434	133,532	55,240	81,584	102,898
2	76,893	97,956	150,920	109,755	136,050	119,322
3	114,695	141,785	160,380	142,305	138,365	128,867
4	173,025	198,568	174,531	163,944	171,919	150,027
5	114,464	95,908	142,026	147,414	149,312	98,838
6	72,314	135,588	68,631	78,444	75,885	86,177
Total	597,463	724,239	830,020	697,102	753,115	686,129

Crop disposal for 1978

Nuts cured into copra	203,697
Nuts sold on contract	423,291
Nuts issued for research	16,516
Nuts issued to Staff	15,053
Nuts issued for Cyclone relief nurseries ...	1,047
Empties and rejections	19,598
Nuts missing	6,927
Total	686,129

Copra

The 203,697 nuts converted to copra resulted as follows:

No. 1 Copra	—	25,326 kg. 400 gm being	81.5%
No. 2 Copra	—	3,786 kg 900 gm being	12.2%
No. 3 Copra	—	1,968 kg 500 gm being	6.3%
Total		31,081 kg 80 gm equal to 122.4 candies	

The copra out-turn was 1664, inclusive of Botanist's Dwarf Palm nuts and buyers' rejections. The percentage of empties and rejections was 2.85.

Field notes

Research sections, namely, Botany, Soil Chemistry, Agrostology, Intercropping and Biometry continue to conduct their field experiments at Ratmalagara. Resident officers of these Divisions/Units except the Biometry Unit continue to be in charge of their research programmes.

A cattle herd of 87 animals was maintained by the Intercropping Division. The herd particulars are as follows:

Cows	—	8
Heifers	—	9
Bull Calves	—	70
Total	—	87

General

All field activities estimated for the year were carried out. Weeds were controlled both by mammoty and harrowing. All estate roads, drains and drain bunds were well maintained. The estate fence was in good repair. There was no outbreak of any pest or disease.

All buildings were well maintained and water service and electricity were provided to the resident staff without any interruption. An exorbitant sum of money was spent on diesoline used as fuel for the generators. It would be very economical to make use of the 230 A.C. power line running alongside the estate boundary.

The estate palms were manured with 4.55 kg (10 lbs) of C.R.I.'C' mixture per palm. The fertilizers were mixed manually in the ratio of 2.27 kg (5 lbs) of sulphate ammonia, 0.91 kg of (2 lbs) Saphos phosphate and 1.36 kg (3 lbs) of muriate of potash 60%. The manure was broadcast in a 1.82 metres (6 ft) area round the palm and the soil turned over with mammoties.

On Director's request an extensive replanting programme was submitted. Fifty hectares (125 acres) of the old plantation are to be replanted within the next five years.

R. M. de SILVA
Superintendent,
Ratmalagara Estate