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Activities of the Coconut Research Institute During 1967

(**Summary**)

Dr. W. R. N. NATHANAEL

General

1. Dr. W. R. N. Nathanael was confirmed in the post of Director during the year.

2. The Coconut Research Board granted study leave to Mr. V. Abeywardene, Biometrician to follow a course of training (under the Colombo Plan) in Applied Statistics at the East Malling Research Station (U.K.), for a period of eight months from 28.3.67. After satisfactorily completing his course, he resumed duties on 24th November.

3. Dr. U. B. M. Ekanayake was appointed Head of the Crop Protection Division with effect from 18th November on his return from U.K., after successfully completing his Ph.D. degree course in entomology at the University of Oxford.

4. Mr. M.A.T. de Silva, Senior Technical Assistant, Soil Chemistry Division left for U.K. on 18th November for a year's course of training (under the Colombo Plan) in the field of Soil Science at the Long Ashton Research Station, Bristol.

5. Applications were made through the usual channels to secure the services of Expert Consultants each in Plant Pathology and Physiology under the Aid Schemes to advise the Coconut Research Board on the future search plans in connection with the "Leaf Scorch" decline of coconut in the Southern Province.

Dr. Jurgen Kranz, Mycologist of the Tropeninstitut, Justus Liebig-Universitat, Giessen was assigned by the Government of the Federal Republic of Germany from October 9th to December 21st to go into the "Leaf Scorch" problem from the mycological angle and to advise on future lines of research. At the close of the assignment Dr. Kranz submitted a report to the Coconut Research Board embodying his observations and recommendations.

6. Reports regarding the favourable progress of the Research Assistants in Botany and Agrostology who continued to be away on overseas training have been received during the period under review.

A summary of the activities of the Institute is as follows:—

I. Chemistry Division

(1) *Coir Technology.* A series of quantitative trials were carried out at a fibre mill in the vicinity of the C.R.I., in order to test the efficiency of the traditional 'Fibre Drum'. This work was necessitated consequent on certain claims made for an imported machine of Austrian manufacture that has been installed in Ceylon for the processing of coir fibre.

(2) *Studies on the Coconut Endosperm.* Chemical studies on the coconut kernel were continued during the year. Oil gradients in the endosperm during its early developmental stages have been established on the basis of six separate experiments.

(3) *Arrack.* Twelve palms were continued to be tapped for toddy during the year. The samples collected were used for laboratory studies on fermentation efficiencies and the preparation and examination of experimental samples of arrack.

(4) *Pot Culture Experiment.* The chemical examination of plant samples prepared from the previous pot culture experiments was continued.

Work on leaf-disc sampling as a prelude to foliar diagnosis of coconut seedlings grown in sand pot culture was continued during the year. Quantitative experiments were carried out to compare the chemical composition of leaves of different ranks from seedlings grown under the seven treatments (+ ALL, — ALL, — N, — P, — K, — Ca and — Mg) when sampling is done by the disc technique side by side with the gross method.

II. Botany Division

(1) *Field Experiments,* All the Field Experiments laid down by the former Botanist were maintained throughout the year.

(2) *Hybridization Work.* Controlled pollination work for the production of Tall x Tall and Tall x Dwarf seed-material was continued at the five stations — Bandirippuwa, Ratmalagara, Isolated Seed Garden, Marandawila and Achchithotam. Two new stations were opened at Kiniyama and Andigedera Estates for controlled pollination work on 250 palms each.

(3) *Seed-nuts.* 15,882 Tall x Tall, 11,000 Dwarf x Tall and 409 open pollinated seed-nuts were harvested from the Isolated Seed Garden, Bandirippuwa, Ratmalagara, Marandawila and Achchithotam Estates.

(4) *Seedlings.* In all 18,634 Tall x Tall, Dwarf x Tall and open pollinated seedlings were issued to the industry. This is higher than the issues in 1966 by 6,781 seedlings.

(5) 17 private estates (as against 12 in 1966) were assisted in carrying out their own controlled pollination work. In all 506 tall and 359 dwarf pollen tubes (as against 269 and 328 tubes respectively in 1966) were supplied to these estates.

(6) *Mother Palm Seed supply*. 1,694,241 mother palm seed-nuts were supplied to the Planting Division during the year. This is higher than the issue in 1966 by 209,465 nuts.

III. Soil Chemistry Division

Field Experiments

1. The long term field experiments (seven) on the NPK requirements of young and adult palms, fertilizer placement frequency of manuring, liming acid soils, ploughing, and the efficiency of different sources of nitrogen and phosphorus were continued in 1967. The observation trials on the problems of "leaf scorch", immature nutfall and yellowing palms were maintained.

2. The first differential manuring of the 5^4 NPK Mg experiments at Naiwala and Marandawila Estates and the experiment on the quality of nitrogen and phosphorus and frequency of manuring at Pothukulama were carried out at the appropriate times. Just before manuring at Pothukulama a leaf count of the seedlings was taken.

3. Premanurial yield recording of the Boron/zinc/sulphur experiment at Monrovia Estate was continued.

4. A contract to carry out isotope studies on the efficiency of fertilizer utilization by coconut palms was signed with the International Atomic Energy Agency. A preliminary trial was carried out using P 32 and Rb 86. Preparations are under way to carry out an experiment with 48 palms.

5. Field Experimental results of interest are:

(i) The experiment at Bandirippuwa, Ratmalagara and Pothukulama continue to show significant responses to each of the nutrients N, P, and K.

(ii) At Pothukulama 89% of the young palms treated with complete NPK mixture were in flower at the end of the 7th year compared to 67% of the untreated palms.

(iii) At Nattandiya 3 applications of lime at the rate of 10 cwts. per acre and 4 applications at the rate of 15 cwts per acre to an acid lateritic soil have raised the pH of the top soil from 4.2 to values between 7.16 and 11.32 and the subsoil between 6.05 and and 8.08.

(iv) At Nattandiya the surface application of fertilizer round the palms continues to be as effective as trench manuring.

(v) On a light sandy soil at Bingiriya inorganic fertilizers continue to give yields comparable to those with organic fertilizers.

(vi) A plot of the Response Curve Experiment at Bandirippuwa has given a yield equivalent to 6000 nuts per acre per annum.

B. Laboratory Investigations

Laboratory investigations were mainly concerned with analyses of leaves, nut water and soil samples from field experiments.

(i) At Iranaville Estate the total carbon content of the soil has been found to be progressively increasing. The ammoniacal and nitrate nitrogen contents however contine to be low.

(ii) The nutrient composition of nut water (N. P. K) and leaflet samples (N. P. K. Ca, Mg) from the 4^3 NPK Experiment at B/E and the 3^3 NPK Experiment at Ratmalagara Estate has been determined. This has been done with the object of comparing the relative merits of nut water and leaf analyses as a guide to fertilizer response and also for developing a method for making quantitative manurial recommendations to individual lands.

(iii) Determinations of radioactivity in leaf samples from palms treated with P32 showed that the activity in leaves 3 to 9 was fairly constant. For sampling purposes leaf 6 has been found a convenient one to select.

(iv) Leaf analysis has also been done for advisory purposes.

C. Soil Surveys

(i) The main project for the year was the survey of the Eastern province covering Batticaloa, Kalkudah and Kuthiravelli.

(ii) At the request of Government Agents soil surveys were carried out in the Kalutara and Hambantota Districts.

(iii) At the request of planters, soil surveys were done in Kegalle, Deniyaya and Madampe.

(iv) Soil mapping of the Puttalam 1" sheet was commenced and a major portion of it has been completed. The hydrological survey of Vanatavillu was continued.

IV. Agrostology Division

(1) *Soil Fertility Studies.* No soil fertility studies as such were done during the year. The re-roofed glass house however was used to carry out physiological studies on paddy. These studies were centred on the determination of the effect of forms of nitrogen, light intensity and levels of water on some of the promising varieties of highland paddy.

(2) *Pasture Studies.* In the field of pasture under coconuts, the management studies of the two pasture grasses *Brachiaria miliiformis* and *Brachiaria brizantha* and the fodder grass *Panicum maximum* were continued. In addition to this a number of varieties of fodder and pasture grasses obtained from abroad were established in small plots to observe their performances under coconuts.

Of these varieties Brachiaria brizantha (Tanganyika) appeared to be very promising. Detailed evaluation of this grass was undertaken during the latter part of the year.

(2) *Subsidiary Food Crops.* Studies on subsidiary food crops under coconuts were continued with the addition of several varieties of yams during the year. Of the yams tested sweet-potato appeared to be very promising and yields of approximately 80 cwt/acre have been recorded with moderate applications of fertilizers. The data so far recorded indicate that short term varieties of paddy can be successfully cultivated under coconuts during *Yala only.* The agronomic requirements for the successful cultivation of maize and groundnuts under coconut have been more or less established.

(4) *Cattle.* The cross-breeding of Sinhala cows to Jersey was continued during the year.

V. Crop Protection Division

(1) *Pests*

(a) *The Red Weevil* (*Rhyncophorus ferrugineus*)

Surveys started during the previous year were continued to gather more information on the distribution, infestation potentiality and the economic aspects of the control of this pest.

Where there were pest outbreaks, the loss of palms was found to vary from locality to locality. In general the average mortality rate was of the order of 2 per cent of the affected palms.

(b) *The Coconut Caterpillar* (*Nephantis serinopa*)

The biological control project was continued during the year.

Parasites of the coconut caterpillar were bred in the insectaries at Lunuwila and Batticaloa and they were despached on request, to the plantations where the pest occurred.

On a few selected estates, where parasites were liberated, population records of the pest and parasites have been kept.

(c) *The Coconut Scale* (*Aspidiotus destructor*)

There were 15 reported infestations of the coconut scale pest. Of these 7 were found to be declining at the time of inspection and they were left for natural control, whilst 8 were brought under control with kerosene oil emulsion.

(d) *Other Pests*

Nettle grub (*Parasa lepida*). A mild incidence was observed in the Isolated Seed Garden, Rajakadaluwa.

Locust (*Aularchis miliaris*). Four infestations were reported, but only two needed insecticidal treatment. Endrex and Bidrin were sprayed with satisfactory results.

Bag Worm (*Psyche albipes*). On one estate an outbreak which occurred on adult palms was controlled effectively with D.D.T.

Reports were received of damage to seedlings from termites, wild boar and porcupine.

(2) *Diseases*

(a) *Bud Rot.* The trial in which packetted fungicides are placed in the axils of leaves was continued during the year and the incidence of the disease has been found to be low in the experimental area.

(b) *Leaf Scorch Decline.* In collaboration with Dr. O. S. Peries, Plant Pathologist, the microbiological studies initiated in 1966 were continued during the year.

A technical conference attended by research officers from the R.R.I., T.R.I. and the Department of Agriculture was held during the year, in order to consider the future lines of research on the Leaf Scorch problem.

An indication has been given in the report by Dr. Kranz, that *Fusaria* fungi probably cause root decay of the diseased palms and accelerate their decline, once they have been affected by a primary unknown cause.

VI. Biometry

In the absence of the Biometrician on overseas training, the work of the division was restricted mostly to routine work.

(1) *Statistical Service*

(i) The routine analysis of the experiments of the research divisions of the Institute were carried out.

(ii) Statistical summaries of production and exports of coconut products and also charts and diagrams pertaining to same were prepared for the Director.

(2) *Biometrical Studies*

(i) Growth and yield measurements of the marandawila progeny trial and the Ratmalagara calibration trial were taken to serve as raw material for the Biometrician's proposed studies at East Malling Research Station.

(ii) The routine recordings of the Calibration trial at Ratmalagara were carried out as per schedule.

(iii) The analysis of the Botanist's 300-palm block data with a view to determining the efficiency of pre-experimental yield as a calibrating variate for experiments with adult coconut was completed before the Biometrician left for overseas studies.

(3) *Agri-Meteorology*

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

VII. Advisory Division

(1) *Advisory Visits*

(*a*) During the year 6,661 visits have been made by the field staff to coconut lands for advice and demonstrations on planting, soil conservation, draining, manuring, cultivation, pests and diseases control and for inspections under the Fertilizer Subsidy Scheme.

(*b*) 14,544 holdings in all were visited in connection with general advisory work. 2,470 holdings were visited for advice and demonstrations in connection with pests and diseases.

(*c*) The field staff attended 147 meetings and delivered 137 talks. The Division participated in two exhibitions.

(2) *Demonstration Centres*

(*a*) Routine items of work were carried out at the Demonstration Centres at Pallai, Alampil, Mundel and Mylambavelly.

(3) *Citronella Subsidy Scheme*

The main items of work for the year under this Scheme comprised inspection of lands for the payment of cash subsidy and the issue of free fertilizer. The actual fertilizer distribution was as follows:—

(*a*) 2,197 applicants who had obtained seedlings during May/June 1962, were issued 380 tons 6 cwt. 14 lbs. fertilizer in May 1967.

(*b*) 4,147 applicants who had obtained seedlings during May/June 1960 and October/November 1962 were issued 1,102 tons, 14 cwt. 84 lbs. of fertilizer in October 1967.

VII. Planting Division

(1) *Seed Nuts*

The Planting Division maintained 12 nurseries during the year. A total of 2,066,354 seednuts were planted for issue of seedlings in May/June and October/November seasons. 455,370 seednuts were planted for issue of seedlings in May/June and 1,610,984 seednuts for October/November.

(2) *Seedlings*

A total of 1,415,327 seedlings were booked for the two planting seasons as follows :—

	Number
May/June 1967	352,592
October/November 1967 ...	1,062,735
Total	1,415,327