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Report of
the Indian Central
Coconut Committee

VIII Report

1954

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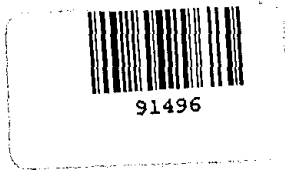
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THE
INDIAN CENTRAL COCONUT COMMITTEE
EIGHTH ANNUAL REPORT

(1st April 1952 to 31st March 1953)

PART I

CHAPTER I

INTRODUCTION

The coconut palm occupies place of pride among the many economic trees of the tropics. Although it starts bearing only eight to ten years after planting, once it has begun to yield, it continues to do so regularly throughout its life of about 80 years. It accommodates itself remarkably well to a variety of environmental conditions and treatments, yielding well when cared for properly and never failing completely even when neglected except due to disease or old age.

The original home of the coconut is still a debated point, but there appears to be no doubt that it had been well established from pre-historic times on the sea coasts of the tropical countries and on the islands of the tropics.

India, which has an area of 1.548 million acres under coconut produces 3323.6 million nuts. She ranks second among the coconut growing countries of the world both as regards the area under and the production of coconuts.

The following are the important coconut growing tracts of India.—

1. The sandy coastal belt commencing from Bombay and extending up to West Bengal including, as it does, the coastal areas of the Ratnagiri and North Kanara Districts of Bombay State, the South Kanara and Malabar Districts of Madras State, the Travancore-Cochin State and the eastern coastal tracts of Madras and Orissa and the coastal area of West Bengal.
2. The reclaimed backwater soils of Malabar District and Travancore-Cochin State.
3. The midland regions of the West Coast bordered by the backwaters on the west and the hills on the east.
4. The laterite hill-slopes in Malabar and Travancore-Cochin.
5. The deltaic areas of the Cauvery, Krishna and Godavari rivers.
6. The Mysore plateau with an altitude of about 2000 to 2500 ft. above sea-level.
7. The Andaman and Nicobar and the Laccadive islands.

Coconut is also grown in the interior of West Bengal and the Brahmaputra valley of Assam State.

But it is on the West Coast of India that the coconut industry has been organised best. Here, distributed among the Travancore-Cochin State and the Districts of Malabar and South Kanara are more than one million acres under the coconut or more than 70 per cent of the total Indian acreage.

The coconut in the country's economy

The coconut is one of the principal cash crops in the areas where it is grown on a commercial scale and the prosperity of the people of these areas is closely woven round it. There is not a single part of the tree which is not useful to man. It provides those who tend and grow it with sweet water to quench their thirst, tasty meat to garnish their food, timber for building their houses, fuel for their hearths, water-proof thatch for roofs and ready cash to buy for them the necessities of life. It is, for these reasons, hailed as "Kalpavriksha", the divine tree. The nut for which the tree is mainly grown yields copra, oil, oil cake and coir fibre all of which have important places in the country's economy. The making and milling of copra, the retting of coconut husk and the extraction from it of fibre, the conversion of the fibre into yarn and the manufacture of coir mats and matings, all provide employment and the means of livelihood for thousands of persons particularly on the West Coast of India.

The Indian Council of Agricultural Research and coconut development

Before the Indian Central Coconut Committee was set up in 1945, the Indian Council of Agricultural Research had been interesting itself in the development of the coconut industry. In 1937, it financed jointly with the late Government of Travancore a scheme to investigate the diseases of the coconut palm and in 1938 along with the Madras Government another scheme to investigate certain economic and practical problems such as the criteria for the selection of quality seedlings, the causes of button shedding and the quality and quantity factors of the coconut husk in different stages of maturity of the nut.

The Indian Council of Agricultural Research's share of liability in respect of the two schemes was taken over by the Indian Central Coconut Committee with effect from the 1st January, 1946. Work on the former scheme has been merged in the work of the Central Coconut Research Station at Kayangulam. The latter scheme terminated on the 31st March, 1952.

The Indian Central Coconut Committee is set up

The Indian Central Coconut Committee was set up in February, 1945 under the Indian Coconut Committee Act, 1944 to concert measures for the improvement and development of the Indian coconut industry. The functions of the Committee as laid down in the Act, include—

1. the undertaking and assisting of agricultural, economic and technological research in respect of the coconut;
2. the encouraging of co-operative effort among coconut growers;
3. the improving of the marketing of coconuts and coconut products;
4. the collecting of statistics relating to various aspects of the coconut industry; and

5. the supply of information to Government departments, the trade and the general public on matters connected with the coconut industry.

The Committee's main source of revenue consists of a cess at the rate of 4 annas per cwt. collected on copra crushed in power-driven mills. According to the Indian Coconut Committee Act, 1944 the cess could be collected only from mills coming under the purview of the Indian Factories Act. According to the Indian Coconut Committee (Amendment) Act, 1952, however, it is leviable with effect from the 1st April, 1953 from all power mills irrespective of whether they come under the Factories Act or not.

According to the Act of 1944 the constitution of the Committee is as follows:—

(a) The Vice-President of the Indian Council of Agricultural Research who is also *ex-officio* President of the Committee.

(b) 9 representatives of the growers of coconut—3 nominated by the Travancore-Cochin Government, 2 by the Madras Government and one each by the Governments of Bombay, Mysore, Orissa and West Bengal.

(c) 5 representatives of the coconut oil industry—2 nominated by the Travancore-Cochin Government and one each by the Government of Madras, the Indian Merchants' Association, Bombay and the Bombay Chamber of Commerce.

(d) 7 representatives of Governments—3 nominated by the Travancore-Cochin Government, 2 by the Mysore Government and 1 each by the Central Government and the Madras Government.

(e) 1 representative of the Travancore Chamber of Commerce.

(f) 3 representatives of consumers elected by Parliament.

The Indian Coconut Committee (Amendment) Act of 1952 has made the following modifications in the constitution of the Committee:—

(a) The number of Government representatives has been raised to 8, the Assam Government having been given the right of nominating a representative.

(b) The Agricultural Marketing Adviser with the Government of India will be a member of the Committee *ex-officio*.

(c) The Vice-President of the Indian Council of Agricultural Research is no more to be *ex-officio* President of the Committee. The Government of India have the power to appoint as President any of the members of the Committee or any other person.

In April every year the Committee elects its Vice-President and the various sub-committees to function for the 12 months commencing with the 1st of May.

What the Committee has done so far

The Committee has set up two Central Coconut Research Stations, one at Kasaragod in South Kanara district, Madras State to undertake fundamental research on breeding, cultivation, manuring, etc. and the other at Kayangulam in Travancore-Cochin to investigate the pests and diseases of the coconut palm.

The Committee is financing along with the Travancore-Cochin Government 3 Regional Coconut Research Stations to undertake cultural and

manurial experiments of local significance. Schemes for setting up of Regional Research Stations have been sanctioned for Bombay, West Bengal and Madras States. A Regional Research Station which was functioning in Orissa since 1946 was closed down on the 31st March 1953 on account of the unsuitability of the site selected for it.

Investigations under the coconut research scheme, Madras have shown that, taking all factors into account, harvesting the nuts when they are 11 months old is the best procedure for tracts where coir-making is an important industry and green husks are in demand for the purpose.

The Committee is now financing jointly with the State Governments concerned 29 coconut nurseries with an annual production target of about 5 lakhs of seedlings. Of these 9 nurseries are situated in the Madras State, 11 in Travancore-Cochin, 1 in Mysore, 3 in Orissa, 2 each in Bombay and West Bengal and 1 in Assam. Besides the above there is a nursery attached to the Committee's Central Coconut Research Station at Kasaragod with an annual production target of 10,000 seedlings.

Wild sunn-hemp (*Crotalaria striata*) has been proved to be an ideal green manure for coconut gardens and steps taken to popularise it are proving effective.

It has been shown that the leaf disease of the coconut could be controlled by spraying the leaves with copper fungicides thrice a year and a scheme to demonstrate this has been in operation since October, 1949 under the control of the Joint Director, Central Coconut Research Station, Kayangulam. Although the etiology of the root disease is still under investigation, it has been shown that by proper manuring and regular intercultivation the disease could be controlled and the trees made to give economic yields.

Trials at the Central Coconut Research Station, Kayangulam have shown that it is possible to destroy grubs of the rhinoceros beetle, breeding in manure pits by spraying them with water dispersible B. H. C. and that the black-headed caterpillar (*Nephantis serinopa*) could be kept in check by spraying the leaves of the coconut trees with 0.2 per cent solution of water dispersible D. D. T.

Grade specifications for coconut oil and standard contract terms for milling copra have been prescribed and recommended to the trade for adoption in their transactions.

Following the Committee's recommendations, regulated markets for coconuts and coconut products have been set up in the Malabar, South Kanara and East Godavari districts of Madras State. The regulated market at Tiptur in Mysore State has brought within its purview the trade on copra also. The Travancore-Cochin Government have the question under their active consideration.

Since August 1947 the Committee has been publishing in English and in Malayalam a monthly "Bulletin" and since the last quarter of that year a quarterly Journal in English called "The Indian Coconut Journal". From January, 1953 a Kannada edition of the "Bulletin" has been under publication. A handbook on Coconut Cultivation has been brought out in the English, Malayalam and Kannada languages. Telugu, Tamil and Bengali editions of the handbook are under print. A "Report on the Marketing of Coconuts and Coconut Products in India" has been published in Malayalam.

Propaganda for better coconut cultivation is being conducted among the cultivators of Travancore-Cochin by a Coconut Propaganda Officer appointed jointly by the Committee and the Travancore-Cochin Government and among the growers of Malabar district and elsewhere by the Agricultural Assistant in the Committee's office.

The Committee has been participating in industrial and agricultural exhibitions to popularise its publications and to propagate scientific ideas of cocorut cultivation.

The Committee's publications and the extension work undertaken by it have created a real awakening among coconut growers and increasing numbers of them are taking to scientific methods of cultivation.

Enquiries into the cost of cultivation of coconuts have been conducted in Travancore-Cochin State and the Malabar and South Kanara districts of Madras State. The results of the enquiry in Travancore-Cochin have been published in "The Indian Coconut Journal" and an account of the enquiry in Malabar and South Kanara districts will be published shortly.

With a view to popularising the drying of copra with the aid of hot air kilns, the Committee has sanctioned a sum of Rs. 12,900 to be advanced to the Malabar District Co-operative Produce Sale Society for constructing such a kiln in the premises of the Society's Badagara Branch.

CHAPTER II ADMINISTRATION

Personnel

Sardar Datar Singh, Additional Secretary to the Government of India and Vice-President, Indian Council of Agricultural Research continued to be the President of the Committee till the 28th October 1952 on the forenoon of which date he relinquished the office of Vice-President, Indian Council of Agricultural Research. He was succeeded by Shri K. R. Damle who assumed charge of the offices of Vice-President, Indian Council of Agricultural Research and President of the Indian Central Coconut Committee on the forenoon of the 12th November 1952.

Shri K. P. Madhavan Nair, B.A., B.L., Member, Council of States was the Vice-President, having been unanimously re-elected to that office.

Shri K. Gopalan, M.A., B.Com. (Manch'r) continued to be the Secretary of the Committee.

A list of the Members of the Committee as on the 31st March 1953 is given in Appendix I. There were three vacancies on that date, as Parliament had not elected the members to represent the consumers of coconut on the Committee.

The composition of the various sub-committees as they were on the 31st March, 1953 is given in Appendix II.

Meetings of the Committee

The 15th and 16th Meetings of the Committee were held during the year, the former in Madras on the 30th April, and the latter in Ernakulam on the 9th October 1952. Both the meetings were presided over by Sardar Datar Singh.

The 15th Meeting

In the course of his address to the members, the President referred to the fall in prices of coconuts and coconut products. While being of the opinion that the dizzy peaks that prices had touched before the slump began might not possibly return, the President observed that coconut growers had a right to be assured of a reasonable economic return on their investment and labour. Adverting to the rules that were before the Committee for organising coconut crop competitions in Travancore-Cochin, the President expressed the hope that the competition would give a fillip to better coconut cultivation in the State, and would lead to a substantial stepping up of coconut production.

Shri P. B. Kurup was elected as the Committee's representative on the Indian Council of Agricultural Research and its Advisory Board for a period of 3 years from the 1st February 1952.

The following decisions among others were taken by the Committee at its meeting:—

(1) That the Madras Government's modified scheme for the establishment of two zonal parasite breeding stations, one at Razole in East Godavari District and the other at Ponani in Malabar District be approved.

(2) That the schemes for the multiplication and distribution of *Crotalaria striata* seeds sanctioned so far by the Committee be abandoned, that the future production of *Crotalaria striata* seeds be restricted to the Central Coconut Research Stations of the Committee, that the crop be confined to the borders of coconut plantations and fallow lands, if any, that the State Governments be requested to step up the production of these seeds and popularise the crop as a green manure and that the Director, Central Coconut Research Station, Kasaragod be asked to prepare an article on the growing of *Crotalaria striata* as a green manure crop in coconut plantations for publication in the Committee's "Bulletin" and as a pamphlet in the various regional languages.

(3) That the rules for the organisation of coconut crop competition in Travancore-Cochin be approved.

(4) That the Government of India be requested to ensure that the import of copra and coconut oil was not allowed to the detriment of the legitimate interests of the indigenous industry and that, in future, before any action on such matters was taken, the Indian Central Coconut Committee was consulted.

The Committee also passed the following resolution:—

"This Committee resolves to recommend to the Government of India that copra and coconut oil be removed from within the purview of Open General Licence and that permits be issued to importers particularly to consumers on a liberal scale up to an annual limit of 1,00,000 tons in terms of copra".

The 16th Meeting

Addressing the 16th meeting, the President said that the translation into practice by the bulk of coconut growers of the results of the investigations undertaken at the research stations would be the true measure of the success of the work done by the Committee and added that it was of the utmost importance to see that the programmes of work at the Committee's Central Research Stations were so designed that the maximum results were obtained in the minimum possible time. He referred to the popularity of the spraying scheme to combat the leaf disease and of the quality seedlings supplied from nurseries jointly financed by the Committee and State Governments and made an appeal to the latter to see to it that each nursery produced its target number of seedlings. He was against a rise in the price of the seedlings distributed from these nurseries and thought that it would take some time more for growers to become so quality-conscious as not to mind paying a higher price for the right type of seedlings.

Continuing, the President referred to the Committee's persistent demand that coir and coir products be brought within its purview and hoped that the Ministry of Commerce who had under their consideration the question of the establishment of a separate Coir Board would take into account the Committee's legitimate demand. He gave the assurance that, if coir came under the Committee no separate cess for its development would be collected.

The meeting considered the progress reports for the year ending the 30th June, 1952 relating to its Central Coconut Research Stations and the nursery schemes and Regional Coconut Research Station schemes to which it extends grant-in-aid and took appropriate decisions. The meeting also considered and approved of the revised budget estimates of the Committee for 1952-53 and the budget estimates for 1953-54.

Inter alia the Committee also decided—

(1) to call a conference of the Entomologists of the States of Madras, Travancore-Cochin and Mysore, the Head of the Division of Entomology in the Indian Agricultural Research Institute and the Officers of the Committee to review the progress of work done so far on the control of the important pests of the coconut palm and to chalk out the lines on which control measures should proceed.

(2) to extend by 5 years from the 22nd December 1952 the scheme under which the Travancore-Cochin Regional Coconut Research Stations have been set up.

(3) to extend by three years from the 1st April 1953 the period of appointment of the Coconut Propaganda Officer, Travancore-Cochin and his staff.

(4) to publish from the 1st January, 1953 a Kannada edition of the Committee's monthly "Bulletin".

(5) to publish a Bengali edition of the handbook "Coconut Cultivation" provided the West Bengal Government undertook free of cost to the Committee the translation of the handbook into Bengali, and

(6) to conduct an enquiry into the cost of cultivation of coconuts in the Malabar and South Kanara districts of Madras State.

Meetings of Sub-committees

The Sub-committees for Agricultural Research, Marketing and Economics, Finance and Scientific Appointments, each met twice in the course of the year in conjunction with the 15th and 16th meetings of the Committee.

A meeting of the Sub-committee for scrutinising plans and estimates regarding buildings to be constructed at the Central Coconut Research Station, Kasaragod met on the 15th March, 1953 at that Station.

In accordance with the decision of the 16th meeting of the Committee a conference of the Entomologists was held at the Central Coconut Research Station, Kayangulam on the 5th March, 1953 which was attended by the Government Entomologist, Coimbatore, the Director, Central Coconut Research Station, Kasaragod, the Joint Director, Central Coconut Research Station, Kayangulam, the Entomologist, Central Coconut Research Station, Kayangulam and the Secretary of the Committee.

Central Coconut Research Station, Kasaragod

Shri C. M. John, B. A., continued to be the Director of the Station during the year under report. The term of the temporary staff for petty construction and repairs and other works and of the Stenographer was extended by one year from the 15th May, 1952 and the 1st March, 1953 respectively. Four posts of Senior Research Assistants and one post of Statistical Assistant sanctioned for the Station had not been filled up at the end of the year.

A meteorological observatory for crop-weather studies was set up during the year and some of the instruments installed. The Junior Research Assistant in Agronomy was got trained in Agricultural Meteorology for three months at the Agricultural Meteorological Station, Poona.

The layout work started during the previous year was continued during the year under report and the levelling up of mounds and depressions was completed in the main area intended for conducting the manurial and cultural experiments. The fields were suitably divided and laid out for experimental purposes. The Hill-Block comprising an area of about 42 acres remained to be laid out at the end of the year.

The Coconut Development Officer and the two Field Assistants appointed to work the scheme for the development and improvement of coconut cultivation in the Andamans were given instructions regarding their work in the first week of January, 1950.

The Central Coconut Research Station, Kayangulam

Dr. K. P. V. Menon, B. A., Ph. D., D. I. C. continued to be the Joint Director in charge of the Station.

Shri T. A. Davis appointed as Plant Physiologist joined duties on the 25th August, 1952 and Shri U. Karunakaran Nair promoted as Senior Research Assistant in Plant Pathology on the 14th October, 1952.

Shri A. N. Nagaraj appointed as Assistant Virus Pathologist joined duties on the 31st December, 1952.

Regional Coconut Research Stations

The period of the three Regional Coconut Research Stations at Neyyattinkara, Thodupuzha and Kumarakom in Travancore-Cochin was extended for a period of 5 years from the 22nd December, 1952 as decided by the Committee at its 16th meeting.

The Regional Coconut Research Station at Sakhigopal in Orissa functioned only up to the 31st March, 1953. The State Government thought fit to close down the Station with effect from the 1st April 1953 as the site selected was not a suitable one and the progress made by the Station was not satisfactory.

The recurring expenditure on the Regional Coconut Research Stations is shared by the Committee and the State Government concerned in equal proportions while the entire non-recurring expenditure is borne by the Government of the State. The receipts are shared by the Committee and the State Government in the proportion of 40:60.

Coconut Nursery Schemes

Coconut nursery schemes were in operation during the year in the States of Madras, Travancore-Cochin, Mysore, Bombay, Orissa, West Bengal and Assam. The nursery schemes are sanctioned in the first instance for periods not exceeding five years when the recurring expenditure is shared by the Committee and the State Government concerned in the proportion of 50:50 and the receipt in the proportion of 40:60. A nursery scheme may be extended subsequently for 5 years when the Committee's share of the recurring expenditure does not exceed 1/3. A further extension by 5 years may be sanctioned but the Committee's contribution to the recurring expenditure will be limited to 15 per cent during this period.

Pilot scheme for the correct estimation of area and yield statistics of coconut in Mysore

This scheme which began functioning on 21st August 1951 was in operation during the year under report. The Committee contributes 50 per cent of the recurring expenditure on the scheme.

Coconut Development Schemes in West Bengal and the Andamans

The above two coconut development schemes which had been sanctioned by the Committee at its 14th meeting started functioning, the former in September, 1952 and the latter in January, 1953.

PART II
CHAPTER I
RESEARCH

(i) BOTANY INCLUDING BREEDING, PHYSIOLOGY, ETC.

1. Introduction and study of exotic varieties of the coconut :

The detailed study of the morphological and economic characters of the exotic varieties of the coconut started in previous years was continued at the Central Coconut Research Station, Kasaragod. To obtain a more correct idea of the economic aspect of the varieties, the nuts harvested from these trees in the four seasons of the year, *viz.*, south-west monsoon (July-August), north-east monsoon (September to November), cold weather (December-February) and summer (March-May) were studied with special reference to the quality and quantity of tender nut water and the quality and quantity of copra.

A trial for a comparative study of the Yellow Dwarf, Green Dwarf, Tall x Dwarf Hybrids and Natural Hybrids was laid out during the year.

Three varieties of the coconut—Gangabhavani, Rangoon Kobbari and Verri Kobbari—reported growing well in Vizag District were studied for the weight and volume of unhusked and husked nut, thickness of kernel and quantity of copra. The three varieties gave respectively 5.7, 9.5 and 3.3 ounces of copra per nut. Gangabhavani and Rangoon Kobbari have high copra content. Arrangements have been made to obtain planting materials of these varieties for trial and further studies.

2. Introduction of exotic varieties and other species of cocos :

An indent for the import of planting material of about 35 important varieties grown in foreign countries was placed with the Indian Council of Agricultural Research for trial at this Station. About 7 species of *Cocos* are also proposed to be obtained from Brazil.

3. Study of the West Coast Tall Variety :

A detailed scrutiny of the 10-year yield records of the trees of the West Coast Tall variety in the main block of the Station showed that:

- (i) The yield varies considerably from tree to tree.
- (ii) The trees yielding from 41 to 80 nuts per annum and forming 59.4 per cent of the population contribute 66.9 per cent of the yield.
- (iii) The high yielders, *i.e.*, trees yielding over 81 nuts per annum form only 8.6 per cent of the population and account for 15.8 per cent of the yield.

4. Quinquennial measurements :

The relative growth rate of different coconut trees can be judged more or less from a knowledge of the number of functioning leaves, the height of the trunk and the girth of trunk below the crown and at four feet from ground level. These characters had been regularly observed and recorded every 5 years at the Coconut Research Station, Kasaragod ever since the farm

was under the Madras Department of Agriculture. This work was continued during the year. Measurements were made of 3,784 adult palms. The data are under scrutiny.

5. Hybridisation :

In order to synthesise and evolve new forms of the coconut combining the desirable features of different varieties of the coconut, intra and inter-varietal hybridisation work started last year has been elaborated and continued during the summer months. These crosses involve the tall, dwarf and promising exotic varieties and palms bearing nuts of different colours and sizes. A total of 5,867 female flowers was cross-pollinated during the year at the Central Coconut Research Station, Kasaragod. The hybrid nuts will be collected and planted in the nursery and subsequently planted out for detailed studies.

6. Nursery studies :

(i) *Study of poor coconut seedlings*:—A study of the development and condition of the apple in the nuts of 65 poor seedlings removed from the 1951 nursery at the Central Coconut Research Station, Kasaragod showed that there is no reason to ascribe the poor growth of seedlings entirely to defective apple development.

(ii) *Maturity of seednuts and performance of the seedlings*:—To study the proper stage of maturity at which seednuts have to be harvested for raising good seedlings, seednuts aged 11, 12, 13 and 14 months (from date of stigmatic receptivity) were collected and planted in the nursery at the Central Coconut Research Station, Kasaragod in a randomised block layout adopting six replications. The date of germination and other nursery observations on the germinating nuts were recorded. Analysis of the data of germination of seednuts showed that nuts of different maturity stages did not differ from one another in the total percentage of germination and also in the time required for germination. The seedlings are being kept under observation.

(iii) *Effect of suspending seednuts in the air for germination*.—In some parts of the West Coast there is a practice of suspending seednuts on the branches of trees or some other supports for germination. In order to study the effect of this practice in comparison with the more common and conventional method of planting seednuts in the nursery, 50 seednuts were planted in sand and an equal number hung up on branches of a tree on the same day at the Central Coconut Research Station, Kasaragod. Observations on the germination of seednuts were regularly recorded. The results showed that 92 per cent of the seednuts planted in the soil and 90 per cent of the seednuts hung from the tree germinated, there being no appreciable difference in germination capacity of the nuts treated differently. Observations made on the nuts hung from the tree, however, revealed that the nuts were rather slow to germinate and that where the roots appeared first it took 128.1 days for germination and where sprouts appeared first, the number of days required for germination was 148.2. The difference is highly significant.

7. Study of barren nuts :

Some of the coconut trees are found to produce a high percentage of barren nuts. This is a source of some loss to the growers. In order to find out the extent of occurrence of this phenomenon data relating to the production of barren nuts in the coconut (nuts without or with imperfectly

ARTIFICIAL POLLINATION OF
A COCONUT INFLORESCENCE



A HYBRID (TALL x DWARF)
COCONUT PALM

developed kernel) in respect of 1,323 trees of the main block of the Station during the 10-year period 1942—51 were scrutinised. It was found that 97.7 per cent of the trees produced barren nuts at some time or other, while in the case of 6.1 per cent of the trees production of barren nuts appeared to be an annual and recurring feature. The percentage of barren nuts produced was found in general to vary from year to year. Further the number of barren nuts harvested was more in months from April to July and low in the months of September and October. The barrenness was found to be associated with the cracking of shells in a large number of cases. The site where crack developed was, however, found to vary with the season. Nuts harvested in November to March were found to have cracked at the base and those collected in April and May at the apex (stigmatic end). By dissecting barren nuts in different stages of maturity it was seen that the setting in of barrenness could be distinguished only after the nut had grown for five months after stigmatic receptivity. The effect of emasculating inflorescences of trees producing barren nuts with a view to induce open pollination is also being studied. Further studies have been programmed.

8. Study of button shedding:

(i) *Sequence of shedding*.—Shedding of buttons or young female flowers to the extent of about 75 per cent of the number produced is of common occurrence in the coconut. Undue shedding reduces the yield of the coconut. This phenomenon was continued to be studied during the year at the Central Coconut Research Station, Kasaragod. The salient features are summarised below:—

(a) The percentage of button shed is low prior to stigmatic receptivity and after six weeks of stigmatic receptivity.

(b) Maximum shedding is noticed during the second and third week of stigmatic receptivity.

(c) No significant differences are noticed in percentage of shedding occurring in different months of the year. However, it appeared to be heavy in the months of September, October and November.

(ii) * *Anatomical studies*.—The study of the anatomical features of the region from where buttons shed was continued. No abscission layer or other differentiation was seen. This confirms last year's findings.

(iii) *Effect of hormone spraying*.—The efficacy of hormones in preventing or reducing button shedding was studied by spraying solutions of hormones such as Planofix, Dichlorophenoxy acetic acid and Phyomone in different strengths at weekly intervals commencing from the early stage of button development. From the observations made so far, Dichlorophenoxy acetic acid in strengths varying from 5 to 30 parts per million appeared to be the most effective in preventing shedding of buttons. The studies are being continued.

Trials with hormones against button-shedding and pre-mature nutfall were continued at the Central Coconut Research Station, Kayangulam. Of the hormones tried, Methoxone and Fernoxone were observed to be effective to some extent. In the case of Fernoxone even though button shedding was arrested the fruits did not develop into coconuts of the usual size.

(iv) *Other experiments*.—Application of a wet pad of cotton wool at the point of attachment of the button with the spike appeared to reduce

* These observations are in conformity with those reported last year.

button shedding. The shedding of buttons from inflorescences naturally fertilised, artificially pollinated, bagged after emasculation, covered with button paper is under study. The effect of painting the stigmatic end of buttons with white lead paint is also under study. The problem of button shedding is programmed to be studied in more detail.

9. Study on the development of the nut :

The development of the female flower of the coconut from the opening of the spathe to the mature nut was studied. The following observations were made:—

The embryonic nut is somewhat flattened with the width more marked than the length before the stigma reaches the receptive stage. The cell cavity is not perceptible. After fertilization, the nut begins to grow faster in length than in width accompanied by increase in weight, volume and circumference. Two out of the three cells abort and the remaining one begins to differentiate. The water in the nut begins to form in the third month. From the fifth month onwards the width of the nut increases faster than the length and the internal cavity also increases in size. The formation of meat and the differentiation of fibre in the husk start in the sixth month. In about 6½ to 7 months the water in the nut becomes sweet and this stage is the best for harvesting the nut for tender nut purposes. The further growth of the nut is mainly characterised by the quick formation of kernel and a general reduction in the weight and volume of the nut which is more marked from the 11th month onwards. In the 11th month browning of the husk abutting against the carpellary ridge of the nut is seen in patches. This grows in intensity and covers most part of the nut in the 12th month. This browning is indicative of the onset of maturity of the nut.

10. Role of seednuts in carrying the root disease from generation to generation:

The role of seednuts in carrying the root disease from generation to generation has been under study at the Central Coconut Research Station, Kayangulam and seedlings raised from seednuts collected from palms in different stages of the disease has been planted out for observations.

During the year under report the observations were continued.

11. Evolution of disease-resistant varieties:

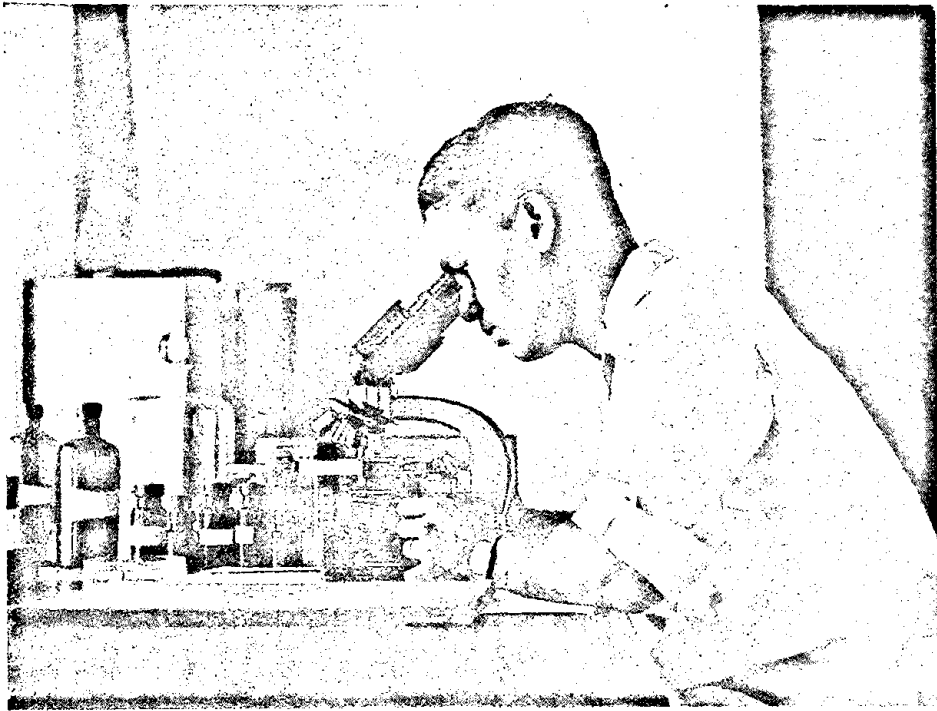
Work in connection with the evolving of disease-resistant varieties of coconut by hybridisation was continued during the year at the Central Coconut Research Station, Kayangulam and 100 hybrid seedlings obtained by cross-pollinating resistant palms were planted out in block II.

12. Transmission of root disease through pollen to progeny:

In order to find out whether the root disease of coconuts could be transmitted through pollen to the progeny, artificial cross pollination was done at the Central Coconut Research Station, Kayangulam between healthy female and diseased male parents. Thirty-nine (39) inflorescences were cross-pollinated with a view to planting seedlings raised from such nuts for future observation.

13. Plant Physiological Studies:

A survey and classification of the palms in the station was made to record external differences between healthy trees and trees showing different



CYTO-ANATOMICAL STUDIES AT THE CENTRAL COCONUT RESEARCH STATION, KASARAGOD. THE CAUSES OF BUTTON-SHEDDING ARE BEING INVESTIGATED.



PLANT PHYSIOLOGICAL LABORATORY AT THE CENTRAL COCONUT RESEARCH STATION, KAYANGULAM.

disease symptoms. To find out to what extent and at what rate the various life activities of the trees are affected by the disease, data on the rate of production and size of leaves, production of inflorescence, setting percentage of female flowers, etc. are being collected. Chlorophyll and dry matter contents of the leaves of healthy and diseased trees are being estimated. Preliminary trials for standardisation for drawing samples for estimations were made.

Some studies were made on the root sap of healthy and diseased trees. A few functioning roots of healthy and diseased palms were exposed at convenient distances from the bole; the roots were cut clean leaving one portion attached to the bole and the other detached from it. Rubber tubings were connected to both the cut ends and water was fed into the tubes. It was noticed that the upper part of the roots sucked in water while the lower portion pumped up root sap into glass tubing connected to the rubber tubing. The duration and heights to which root sap could thus be pumped up varied with different trees and roots. It was also observed that the sap collected from the functioning roots of healthy trees was acidic in reaction while that from diseased trees was either neutral or alkaline.

Attempts were also made to transfuse sap from healthy to diseased trees and *vice versa* by connecting up roots as described earlier. These trials are in progress.

Epidermal patterns of the leaves of coconut palms both diseased and healthy are being studied.

For inducing the formation of aerial roots in coconuts the stem was superficially girdled and soil and coir dust applied around this area in a box. Formation of aerial roots has taken place in the box within the course of three months and these will be used in attempts to invigorate diseased trees by administering nutrients, chemotherapeutants, etc.

All the items of work detailed above will have to be continued. In addition to this, anatomical and histological studies have to be undertaken of the structural differences in the leaf, stem, roots, etc. to find—

1. the adaptations which favour disease resistance or susceptibility;
2. the exact stage or location of internal breakdown due to disease;
3. the cause for impaired transpiration, translocation, flaccidity in leaves, etc. of diseased trees; and
4. means of eliminating susceptible types of seedlings in the nursery stage, etc.

14. Observations in Nurseries :

The germination dates of individual seednuts, the rate of production of leaves, the number of leaves produced, observations regarding splitting of leaflets, girth at collar and height, etc. were recorded in the nurseries jointly financed by the Committee and State Governments in order to aid in the selection of quality seedlings.

Experiments conducted at the nurseries in Madras State during the past three seasons to find out the period up to which seedlings could be kept in packing after removal from the nursery without any adverse effects had shown that seedlings of 9 and 12 months age could be kept in packing without any adverse effects up to a period of 10 days after removal from the nursery. During the year the trial was repeated with 12-month old seedlings and the observations confirmed the previous years' findings.

(ii) AGRONOMY INCLUDING SOIL CHEMISTRY, ETC.

1. Maintenance of Individual tree records:

The necessity for maintaining a record of the performance of individual trees at the Central Coconut Research Station, Kasaragod had been pointed out in previous reports. During the year under review harvest and flowering notes were recorded every month for over 6,000 trees of the Station.

2. Effect of regular cultivation and manuring of the coconut on yield

A detailed scrutiny of the yield data of 31 years of the "no manure no cultivation" and of the regularly cultivated and manured plots of the Station showed that cultivation and manuring increased yields to the extent of 1,175 nuts per acre of 60 trees, that the improvement brought about by regular cultivation and manuring was related to the initial bearing capacity of the trees and that seasonal effects appeared to be the major factor responsible for variation in yield from year to year. The yield in the "no manure no cultivation" plot though low, did not show any definite decline in the 31-year period.

3. Effect of mulching and burying husk in seedling pits:

It is reported that by burying dry coconut husks in seedling pits and mulching, it is possible to reduce the bad effects of drought in summer and economise expenditure on watering. To gather more data on this aspect an experiment was started during the year at the Central Coconut Research Station, Kasaragod with the following treatments:—

- (i) Planting seedlings on mounds surrounded by 25 dry husks 4 ft. cube pits.
- (ii) Planting seedlings over a layer of coconut husks laid at the bottom of the pits (4 feet cube.)
- (iii) Planting seedlings in pits (4 ft. cube) as usual in soil over which layer of saw dust was spread.
- (iv) As in (iii) but with coir dust instead of saw dust.
- (v) Control.

Note:—Saw dust and coir dust in treatments (iii) and (iv) were added in February at the beginning of summer.

The layout adopted was a randomised block design with single seedling plots replicated eight times. Detailed studies of the seedlings are being regularly made and recorded. The study will be continued.

4. Studies on green manure crops.—(i) *Crotalaria* species:

(a) *Observation on different types*.—Seeds of 30 types of *Crotalaria* collected last year were again sown this year at the Central Coconut Research Station, Kasaragod in observation plots and detailed observations on the time of flower opening, anther dehiscence, etc., were recorded. Two types, *viz* *Crotalaria sericea* and *Crotalaria retusa* were observed to be easily susceptible to and badly attacked by leaf-eating caterpillars.

(b) *Floral biology*.—Studies carried out on this aspect of *Crotalaria striata* showed that a flower panicle may contain as many as 50 flowers or more and it takes nearly nine days for all the flowers to open. The flowers that open in the first four days generally show a high set of pods. Studies on

Further dehiscence show that the pollen cells burst about 20 to 24 hours before the full opening of the flower.

(c) *Yield of seed from individual plants.*—Yield of seed from individual plants of *Crotalaria striata* was studied during the year. The yield varied from 2 oz. to 9½ oz. per plant, the average being 4.1 oz.

(d) *Nitrogen fixing capacity.*—Pot cultural experiments have been started to study the condition and manurial requirement of *Crotalaria striata* for optimum growth and fixation of atmospheric nitrogen.

(ii) *Cowpea varietal trials.*—Six varieties of cowpea, viz., New ERA, Cowpea 521, Cowpea G. 4, Cowpea Russian, Cowpea African and Cowpea Sanders were tried in randomised and replicated plots to compare their performance under local conditions. The crop in most of the plots, however, failed due to adverse weather conditions and incidence of pests.

(iii) *Other green manure crops.*—*Pueraria javanica*, *Crotalaria anagyroides*, Sunnhemp (*Crotalaria juncea*) and local cowpea were grown in observational plots. It was of interest to note at a test harvest that *Pueraria javanica* gave a yield of 23,600 lbs. green matter per acre. Measurements taken of a single plant showed that the total length of the plant including lateral branches was 135 feet.

(iv) *Manuring of green manure crops.*—In order to study the effect of the application of artificial fertilisers like potassium sulphate, superphosphate and ammonium sulphate to green manure crops, a few observational trials were started during the year. Manures were applied to *Calopogonium mucuroides*, *Pueraria javanica* and *Centrosema pubescens* in small plots in the sandy soil in south block. An experiment was also laid out in the block to study the effect of a basal application of phosphoric acid at 60 lb. P_2O_5 per acre on the growth and yield of *Crotalaria striata*. The phosphate manured plots gave 1229 lbs. more of green matter per acre than unmanured control plots.

i. Cultural experiment:

Experience has shown that intercultural operations in coconut gardens increase the production of nuts. To gather authentic data on this aspect a cultural experiment was started this year in the north block of the Central Coconut Research Station, Kasaragod. The treatments are:

(i) Ploughing in August-September and again in November-December.

(ii) Digging with mamotty in August-September.

(iii) Piling mounds in August-September and levelling up in November-December.

(iv) Forming basins round the trees in August-September and covering up in November-December.

(v) Control.

A randomised block design replicated four times was adopted. The trees in the different experimental plots are under observation and yield records are being maintained. Particulars of nuts and leaves shed in the different plots were also recorded from time to time.

ii. N. P. K. manurial experiment:

Though isolated attempts have been made to study the response of the adult coconut palms to individual nutrients like nitrogen, phosphoric

acid and potash, no comprehensive experiments have so far been conducted to determine the manurial requirements of the coconut in all its aspects and to obtain a broad picture of the effects and interactions of the different manures. It is also necessary to gather accurate data on the differences in response to the different manurial ingredients and their combinations, the relative effect of graded doses of the same ingredient, the effect of burying a green manure crop on the uptake and utilisation of artificial fertilisers, etc. To study this problem in detail a comprehensive manurial experiment has been started at the Central Coconut Research Station, Kasaragod.

The treatments consist of all combinations of the three major elements, viz. N, P and K each at three different levels (0, 1 and 2) with and without a basal application of a green manure crop grown *in situ*. In all, there are 54 treatments as shown below :—

Nitrogen		Phosphoric acid		Potash		Green manure
(N ₀)		(P ₀)		(K ₀)		(G ₀)
(N ₁)	×	(P ₁)	×	(K ₁)	×	(G ₁)
(N ₂)		(P ₂)		(K ₂)		
3	×	3	×	3	×	2:54

The layout is a confounded 3³ × 2 design with six plot blocks and replicated twice. Each block of six plots has three plots with green manure and three without.

All the 108 plots under this study have been accurately measured and mapped. The position of each tree has been marked in the map. The plots were worked with a junior hoe and weeded and kept ready for sowing of green manure with the receipt of summer showers in April-May.

Yield data for all the trees recorded in previous years were analysed.

Soil samples have been collected from the 1st, 2nd and 3rd foot layers from all the plots for analysis for zero values. The experiment is proposed to be continued for 5 years in the first instance.

7. Manurial experiment on trees and seedlings having yellow foliage:

To study the curative effect of an application of nutrients comprising the major nutrients like nitrogen, phosphoric acid and potash and micro-nutrients viz., iron, manganese, zinc, magnesium, copper, boron and molybdenum on the yellowing of leaves of trees and seedlings standing in the sandy soil of the Kasaragod Station, an experiment was started last year. The trees and seedlings were treated with suitable quantities of salts of the major and micro-nutrient elements. The trees and seedlings have been kept under observation. Magnesium was found to have the maximum curative effect.

During the year under report, application of micro-nutrient salts to leaf axils and painting of leaf surfaces with solutions of these salts were also tried to see if this had any curative or toxic effect. A total of 2 lb. 7½ oz. of mixed micro-nutrient salts was applied in nine leaf axils of a tree showing symptoms of yellowing. No effect has been observed so far. Painting of a few leaflets of a tree showing yellowing of the leaf with saturated solutions of these salts separately and all combined was also done. Leaflets painted with copper sulphate solution dried up within a few days after application. In the other cases, no visible effect could be seen.

8. Manurial experiment on seedlings :

With a view to study the nutrient deficiency symptoms in the coconut, 1,280 one-year old seedlings have been planted in a purely sandy area of the farm at the Central Coconut Research Station, Kasaragod in four randomized blocks. Each block contains 20 sub-plots each sub-plot containing four medium sized healthy and uniform seedlings surrounded by 12 seedlings, taken from a reject lot to serve as border rows. Measurable characters of all the 1,280 seedlings such as girth at collar, height, number of leaves and other relevant observations were recorded. The seedlings have been allowed to grow for the last eight months without the addition of any manure, but watered during summer so that any manure contained in the haustorium and in the soil will be exhausted by the growing seedling. The seedlings will be treated with suitable combinations of major and micro nutrient salts in the coming season and the effect observed.

9. Potash fixation experiment :

There is a view that potash applied to the soil subject to desiccation in summer gets locked up in an unavailable form. To test this, three soil types have been selected at the Central Coconut Research Station, Kasaragod and an N. P. K. fertilizer containing a high proportion of potash applied. Soil samples were drawn at monthly intervals for 12 months from the surface and sub-soils. The samples have just been got analysed for total and exchangeable potash. The data are under scrutiny.

10. Study on the breakage of petioles of coconut palms :

Severe breakage of petioles of palms have been noticed particularly in the young plantation located in the sandy area of the Central Coconut Research Station, Kasaragod. To study if manuring would remedy this condition, the plot was differently manured, one half with potassium sulphate to supply 1.0 lb. K_2O per seedling and the other with potassium sulphate to supply 1.0 lb. K_2O plus lime at 25 lb. per seedling. A complete history and present condition of the material in the field with the planting plan has been recorded. Petiole samples collected from the seedlings where breakage of petioles is severe and from normal healthy seedlings from an adjacent plot were analysed for the common nutrient elements prior to the application of manures. It was found that the seedlings with severe breakage of petioles contained about 62 per cent more of potash but 25 per cent less of phosphoric acid than in petioles of normal healthy seedlings. It is, therefore, proposed to give an additional dose of P_2O_5 in the form of superphosphate to the trees.

11. Study of conservation of soil moisture in relation to soil type and cultural practices :

In almost the entire coconut area where cultivation of the crop is done under unirrigated conditions, drought conditions prevail for four to six months in the year. The intensity and duration of the rainless period depend upon the commencement and termination of monsoon rains. These factors influence the yield of the coconut considerably. It is possible, however, to lessen the ill effects, if conservation of soil moisture is made possible through proper intercultivation and tillage practices. As a preliminary to this investigation, the study in variation in soil moisture in a few plots at the Central Coconut Research Station under different cultural practices which was started in the summer of 1951-52 was continued till the receipt of monsoon showers in May-June 1952. The following is a summary of observations made:—

(i) Regular cultivation and manuring help to conserve soil moisture to a considerable extent especially in the sub-soil layers.

(ii) Plots having shade effect due to the spread of leaves of standing trees were seen to contain more moisture than partially shaded plots.

(iii) Littoral sandy soil has got only a low water-holding capacity and dries up in summer to a moisture content of even 0.2 per cent. The presence or absence of trees in the plot did not make any difference.

(iv) Mulching of seedling beds with dry coconut leaves in summer tends to conserve moisture to some extent.

12. Seasonal variations in soil moisture:

In order to study the field saturation capacity of the different types of soil available at the Station and the rate of loss of moisture from them in summer, an experiment was started during the year. Four types of soils, viz., sandy soil, red soil, yellowish red loam and laterite soil were selected for this study. Samples of soils from 1st, 2nd and 3rd foot layers were drawn every month and analysed for moisture. Composite samples were also drawn and preserved for detailed chemical investigation later. The study is in progress.

13. Conservation of moisture in seedling pits:

There is a system of planting coconuts in the lateritic hill slopes and hill tops of certain localities in rectangular pits of about 4' long, 2' wide and 2½' deep while in most situations the system is to plant in square pits. The purpose of planting in rectangular pits is said to be that in this method the pits conserve more moisture and the seedlings are not, therefore, affected by the drought in summer. The possibility of the size and direction of the rectangular pits conserving more moisture than the square pits was investigated by fortnightly moisture determination in the two types of pits—square and rectangular—laid out in 3×3 latin square layout at two sites on the western slope of the hill block at the Central Coconut Research Station, Kasaragod. It was found from the data that differences in moisture content in the different types of pits are not very marked. However, there is an indication to show that the moisture content of the soil is to some extent influenced by the topographical lay of the land and the aspect of the sun. The study is being repeated during the summer of 1952-53. Moisture determinations of soil samples collected at fortnightly intervals from these pits are in progress.

14. Effect of applying common salt to coconut and soils:

The coconut palm is found growing luxuriantly and yielding heavily in situations near the sea coast. This has led to the belief that application of salt will benefit the coconut and several practices applying salt to the coconut and coconut soils have consequently been developed. The efficacy or otherwise of some of these practices was investigated at the Central Coconut Research Station, Kasaragod during the year under report.

(i) *The effect of salt in conserving soil moisture and releasing potash in coconut soils.*—It is claimed that salt helps to conserve soil moisture and also renders available to the coconut more of potash. To investigate this problem common salt at 300 lb. Na₂O per acre was applied to experimental plots in the sandy loam, red loam, yellowish red loam and laterite gravelly soil types of the Central Coconut Research Station, Kasaragod. Salt was broadcast and

incorporated into the soil. Samples of soil have been collected from the 1st, 2nd and 3rd foot of soil and analysed for moisture. Composite soil samples have also been drawn for analysis of total available and exchangeable sodium and potassium. The study is in progress.

(ii) *The effect of addition of common salt in softening laterite rocks.*—

There is a belief that the addition of common salt softens laterite rocks and it is a usual practice to add some quantity of salt at the time of planting coconut seedlings in pits where laterite is met with. To see if salt has any effect in softening the laterite bottom of such pits salt mixed soil was spread at the bottom of a pit 2 feet 9 inches deep showing fairly hard laterite stone at the Central Coconut Research Station, Kasaragod. An adjacent plot treated similarly but without salt served as control. The pits have been kept under observation. The salt does not appear to have caused any visible effect so far. A portion of the salt-treated soil has been preserved for detailed chemical investigation. Pieces of laterite stones of uniform size and hardness collected from the pits were also treated with salt in pots of suitable size and are kept under observation to see if the salt has any effect in breaking the hard structure of the stones.

(iii) *Common salt as a nutrient*—It is a general practice on the West Coast to add about 2 seers (roughly 4 lb.) of salt per tree to low yielding coconut trees for improving the yields. To study how low yielding trees respond to the application of salt, 25 low yielding adult coconut trees growing in different situations at the Central Coconut Research Station, Kasaragod were treated with salt at 5.7 lb. per tree applied in basins. The trees have been kept under observation.

(iv) *Retention of salt applied in coconut soil and to the crown of coconuts.*—To be of any practical value, the salt applied to the coconut must be retained in the soil for a sufficient interval of time. To test if this was so, a simple experiment was conducted at Kasaragod by applying a known weight of salt to a small plot and finding out how long salt was retained in the soil. It was found that seven days after the application of the salt, during which time a total of 11.94 inches of rain had fallen, the surface and sub-soil samples did not reveal the presence of any salt. It may be added that the base exchange capacity of these soils is low and that the possibility of the salt added being fixed in the exchange complex is also remote.

There is also a common belief that salt and ash applied to leaf axils prevent beetle attack and improve the condition of the coconut trees. To see how far the salt itself remains in the leaf axils, salt and sand mixed together were applied in different quantities to different numbers of leaf axils of healthy functioning leaves in different trees. It was found that a leaf axil of a medium healthy tree can take 3 lb. 2 oz. of a mixture containing equal proportions of sand and salt, that after a fall of 4.09 inches of rain no trace of salt was found in any of the leaf axils where the salt and sand mixture was applied and that the sand remained in the axils and was not washed off.

15. Copra making by kiln drying :

Copra is generally made by sun drying. This is not, however, possible during rainy season, necessitating the drying of nuts by artificial means. Studies on the modified "10-acre Malayan Copra Kiln" constructed for preparing good quality copra during the rainy season was continued during the present year. A series of experiments were conducted at the Central Coconut Research Station, Kasaragod to assess the quality and quantity of kiln dried

and sun dried copra. It was found that there is practically no difference in the percentage of oil and quality and quantity of copra prepared by the different methods. It is now proposed to modify the firing tunnel on the "Sindewahi" furnace model so that the possibility of using materials like coconut leaves, etc. for firing the kiln can be investigated.

16. Study of spoilage of ripe nuts on storage :

To prevent or delay the decay of ripe coconuts stored for edible purposes several practices are ordinarily adopted. A beginning was made this year to study this problem at the Central Coconut Research Station, Kasaragod. An experiment has been started to study the influence of the following factors on the spoilage of nuts during storage.

(i) Sand storage *versus* open storage.

(ii) Unhusked and husked to varying degrees.

(iii) Position of nuts in storage; *viz.*, vertical, inverted and horizontal.

Samples of nuts were drawn from each lot once in 15 days, cut open and studied for the condition of the kernel and water within. The study is in progress.

17. Study of nut to nut variation in a bunch :

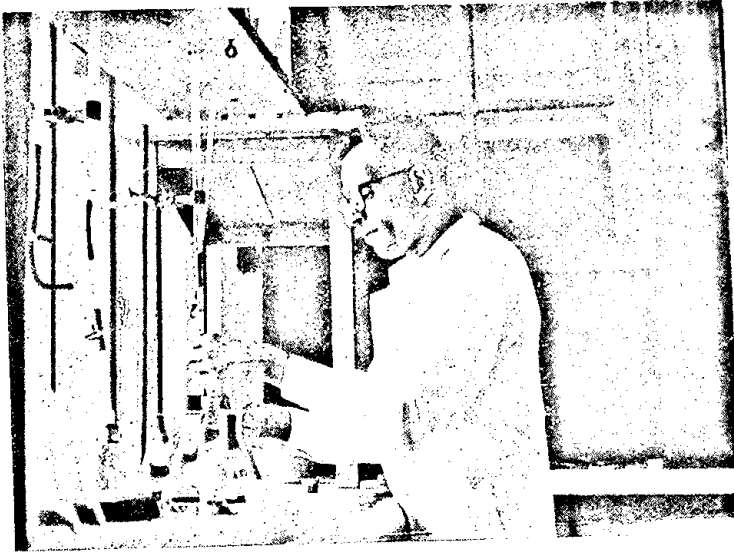
It has been reported that all the nuts in a bunch are not uniform with respect to size, copra content, oil content of the copra, germination, capacity etc. In order to determine the variation that may exist in the different nuts in a bunch, a study was initiated during the year at the Central Coconut Research Station, Kasaragod. Four bunches in each of the groups containing 4 nuts, 6 nuts, 8 nuts and 10 nuts per bunch were harvested and the nuts studied for all quantitative characters. The data are under scrutiny.

18. Study of ground water level in coconut plantations :

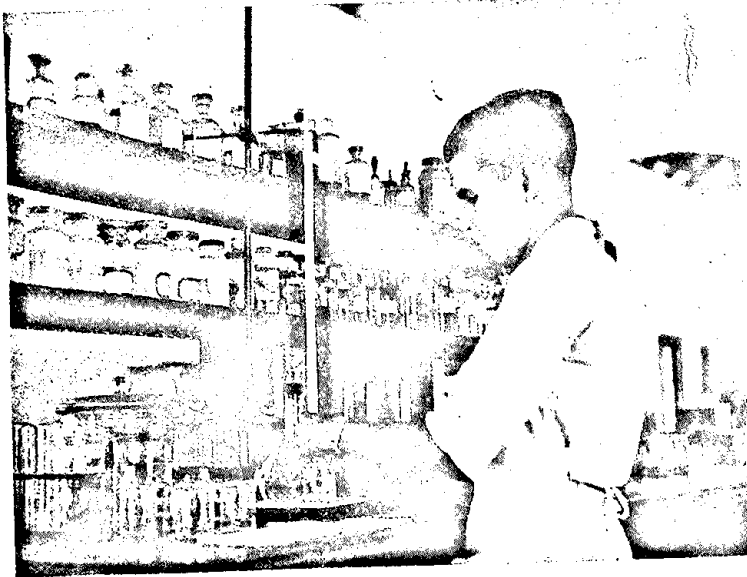
The coconut requires good supply of sub-soil moisture for proper growth. Too much water resulting in water logging or too little water under drought conditions are equally injurious. A study of the rise and fall of the water level in the wells located in different parts of the Research Station at Kasaragod has been initiated during the year. Ten wells situated in different parts of the farm at different elevations and soil types were mapped beginning from the low lying sandy zone at the western end of the farm and ending with the lateritic hill slopes of the hillock on the eastern side. The first reading of the water levels was made in February 1953. Monthly measurements have since been made and recorded. The readings will be studied in relation to rainfall, moisture content of the soil types and yield of trees standing adjacent to the wells, etc.

19. Chemical studies at Kayangulam :

Previous work in chemistry carried out at the Central Coconut Research Station, Kayangulam mainly consisted in the collection of comparative data on the chemical analysis of soils, and tissues from healthy and diseased coconut areas to throw light on the factors responsible for the causation of the disease and formed part of an approved technical programme. The soil studies were intended to find out the nutritional status of the soil and its suitability for healthy coconut growth. The results of mechanical, chemical and base exchange studies revealed that the soils of most of the coconut areas were deficient in the major plant food ingredients and also that there were



THE SOIL CHEMIST AT WORK IN THE CHEMICAL LABORATORY OF THE CENTRAL COCONUT RESEARCH STATION, KAYANGULAM



AT THE CHEMICAL LABORATORY OF THE CENTRAL COCONUT RESEARCH STATION, KASARAGOD. THE FREE FATTY ACID CONTENT OF COCONUT OIL IS BEING ESTIMATED

a number of ameliorative aspects that required further attention. Analytical studies of leaf tissues meant to throw light on the plant physiological equilibrium relating to factors responsible for or predisposing the disease conditions revealed that there was a general accumulation of inorganic nutrients in diseased leaf tissues. Work carried out during the period under report may be divided into four main items, *viz.*, (1) soil studies (2) tissue studies (3) studies on the ameliorative aspects (4) miscellaneous.

(1) *Soil studies :*

During the year the complete chemical analysis of 68 soil samples was done. 52 samples were mechanically analysed and base exchange determinations were done for 44 samples. Carbonate carbon determinations were made for 11 soil samples. All these data were recorded for preparing a soil map of the coconut areas of the State.

(2) *Tissue studies :*

In this connection micro-nutrient copper was estimated in 83 leaf samples, chlorides in 117 leaf samples and moisture in 55 leaf and 27 midrib samples. Determination of major nutrients was done for 28 samples of coconut water and nitrogen partition studies in 10 diseased leaf samples.

(3) *Studies on the ameliorative aspects of soils :*

This consisted in the determination of the carbon—nitrogen ratio of 103 samples of soil—green manure mixtures undergoing decomposition. Chemical analysis for major nutrients was done for 9 silt and 7 press mud samples. Determination of moisture was made in a batch of 243 soil samples to which different amounts of common salt had been added. Moisture determinations were also made for 210 soil samples from experimental areas having different cultural treatments.

(4) *Miscellaneous :*

The final plan and details regarding a trace element manurial experiment to be started during the 1953 season was prepared. Experimental trials were started during the year to investigate the seasonal yellowing of the leaves of coconuts. In the Thottapally Spillway area a sudden wilting of coconut palms to the base of which dredged Kari soil had been dumped was noticed. The wilt conditions progressed steadily and resulted in the death of many of the palms there. Samples of soil, sub-soil water, etc., were collected and analysed. The sub-soil water samples were observed to be heavily charged with hydrogen sulphide. The soils were found to have an unusually high concentration of chlorides, soluble iron and aluminium salts as well as high acidity due to the decomposition of organic matter. These factors may be responsible for the death of the coconut palms in this area. Studies were also carried out to correlate the poor and stunted growth of sunhemp in certain patches in the experimental blocks of the station where green manure was grown with unsatisfactory soil fertility status. A number of soils manures, etc., received from coconut growers were analysed and advisory help rendered.

Work on all the aspects detailed above have to be continued to collect sufficient information to draw clear conclusions. Further work arising out of the results obtained on topics like the seasonal yellowing of the leaves, the wilting of coconut palms in Thottapally, etc., has to be undertaken.

The trace element manurial experiment is to be started and continued. Field trials with silts, press mud, etc., have to be undertaken to assess their ameliorative effect in diseased areas. Soil survey work of the station and work according to the technical programme of work have to be continued.

(iii) PLANT DISEASES AND PESTS INCLUDING WEEDS, FUNGI,
VIRUS AND INSECT AND OTHER ANIMAL PESTS

1. Plant Pathology:

Synopsis of previous work.—Two surveys of the trees in the Central Coconut Research Station, Kayangulam had been made, one with reference to the occurrence and intensity of the root and leaf disease and the other with regard to the incidence of the diseases and the colour of the nuts and petioles of the palms. The trees were also classed under different age groups. A large number of isolations of infected tissues was made and the under-mentioned organisms were obtained.

Roots—*Botryodiplodia theobromae*, *Rhizoctonia bataticola*, *R. solani*,
Fusarium sp.

Leaf—*Helminthosporium halodes*, *Gliocladium roseum*, *Gloeosporium* sp.,
Pestalotia palmarum.

Stem—*Gloeosporium* sp., *Diplodia* sp., *Thielaviopsis paradoxa*.

Immature nuts—*Diplodia* sp.

Healthy coconut seedlings grown in cement tubs at 20 per cent and 100 per cent soil moisture were periodically inoculated with the root fungi. The results obtained showed that water-logging might have a predisposing effect for initiating infection. Inoculation experiments conducted on the roots of mature palms showed that even though individual roots might take infection, diseased symptoms were not manifested in the crown. Inoculation experiments conducted on the tender leaves of coconut palms showed that of the leaf fungi tried *Helminthosporium halodes* was the most virulent parasite.

Virus aspect of the disease was also investigated with a view to find out whether the root disease of coconuts could be of virus origin. The results obtained were negative.

The role of seednuts in carrying the disease from generation to generation is under study. Seedlings raised from seednuts collected from palms in different stages of the disease have been planted out for further observations.

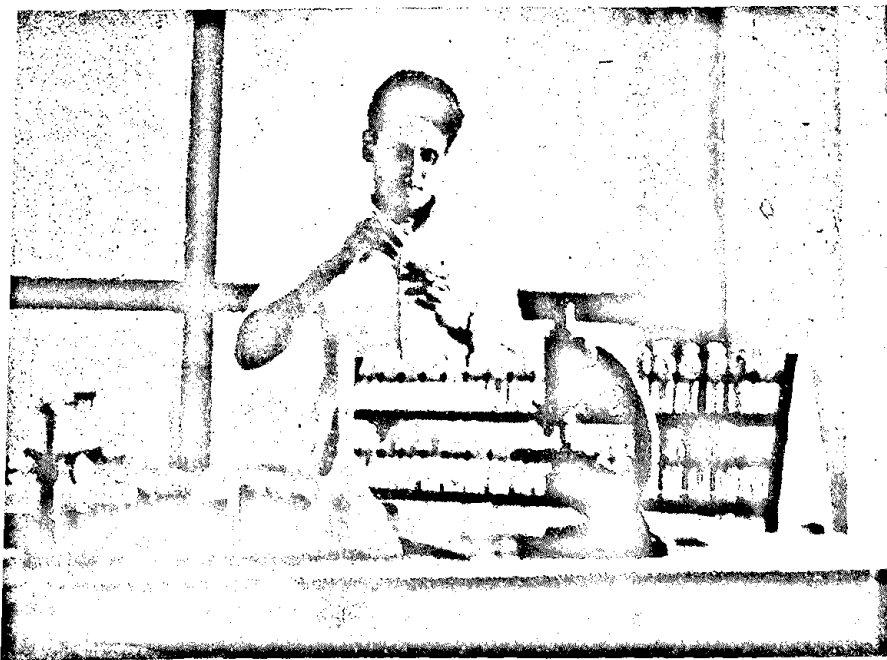
To study the comparative efficacy of fungicides against leaf disease, experimental spraying trials were made with Bordeaux mixture, Perenox, Perelan, Dithane and Fermate. Hybridisation work for evolving disease-resistant palms was continued and during the year under report 958 hybrid seednuts were produced. The role of micro-nutrients like zinc, iron, copper, boron, molybdenum etc. in coconut root and leaf disease is being investigated. Studies were in progress on the effect of plant hormones on premature nut-fall and button shedding. The prophylactic treatment consisting of spraying, manuring and cultural operations to control the root and leaf diseases of coconuts was in progress in block I.

Work done at the Central Coconut Research Station,
Kayangulam during the year

Root disease.—A large number of isolations were made and studied from the roots of coconut seedlings planted around badly diseased trees with a view



PLANT PATHOLOGICAL LABORATORY AT THE CENTRAL COCONUT RESEARCH STATION, KAYANGULAM



THE ENTOMOLOGY LABORATORY AT THE CENTRAL COCONUT RESEARCH STATION, KAYANGULAM

to find out whether any new organism other than those already obtained was associated with the root disease of coconuts. *Neocosmospora vasinfecta*, a fungus hitherto not seen in coconut roots was obtained from one seedling. Pulses like horse gram, green gram, black gram and cowpea were grown around healthy and diseased trees and isolations were made from the roots of these pulses from time to time. A strain of *Neocosmospora vasinfecta* was obtained from the roots of green gram and horse gram. Further inoculation and other studies with this fungus are in progress. Coconut seedlings grown in cement tubs on soils the moisture content of which was adjusted at 20 per cent and 100 per cent were inoculated with coconut root fungi *Botryodiplodia theobromae*, *Rhizoctonia solani* and *R. bataticola*. Infection was obtained in the case of seedlings maintained at 100 per cent soil moisture.

Virus transmission trials were continued according to the well known virological methods. Transmission was attempted by sap inoculation. Sap extracted from the leaves and petioles of diseased palms was inoculated on to the leaflets of healthy trees by rubbing, using carborandum powder as abrasive. Inoculation by the pin prick method was also tried. In other cases petioles from diseased palms were wedge grafted on young palms and the graft bandaged with raffia grass blades and padded with wet cotton wool. Root grafts were done on seedlings planted around diseased palms. Roots of both healthy and diseased trees were exposed and roots of healthy seedlings were wedge grafted on the roots of diseased palms. The grafts were bandaged and padded up as usual and kept moist. In other trials portions of leaflets from diseased trees were trimmed to convenient rectangular shapes and inserted into windows cut to size in the petioles of healthy trees. Here also the joints were padded up and kept moist. Transfusion of sap between diseased and healthy trees were attempted by connecting up the cut ends of roots of healthy and diseased trees by rubber tubings. A continuity of circulation was established with root of a diseased tree and the stem of a healthy one. Insect transmission trials were also made. Insects belonging to 5 different species were collected from the field and liberated on to the leaves of diseased palms and allowed to feed there for 24 to 48 hours. They were then transferred on to the leaves of healthy trees and allowed to remain feeding till they died. 1732 insects were liberated in this manner during the year.

As secondary hosts tapioca, *Jatropha* sp. and plantains were inoculated with sap extracted from a diseased palm. Virus diseases of the common weed plants generally found in coconut gardens are also under study. A phylloidy of *Crotalaria striata* which is grown as green manure in coconut gardens is specially being investigated in this connection. By grafting it has been possible to transmit this disease from diseased to healthy plants of *C. striata*.

Leaf disease.—Isolations made from leaf disease gave *Helminthosporium halodes*, *Gloeosporium* sp., *Gliocladium roseum*, *Pestalotia palmarum*, *Fusarium* sp., etc. In the laboratory screening trials were made with a number of fungicides against infection by *Helminthosporium halodes* on coconut leaf tissue. The fungicides tried were Bordeaux mixture, Perenox, Perelan, Fermate, Dithane, Wetcol (15), Gybamate, Coppesan, Yellow cuprocide, Cupravit and Viriceure. Of these Bordeaux mixture gave the greatest protection; Wetcol (15) was the second best and Perenox was third. Field trials with the different fungicides were continued. This consisted in

the spraying of infected coconuts once every quarter and Bordeaux mixture, Perenox, Perelan, Dithane and Fermate were the fungicides used.

Spraying with micro-nutrients like zinc, boron, manganese, copper, iron and molybdenum was done both singly and in different combinations.

Problems requiring further attention

(a) Further investigations are necessary regarding the virus aspects of coconut diseases.

(b) The role of micro-nutrients in the etiology of coconut diseases requires further attention.

(c) Further trials with more fungicides against the leaf disease have to be undertaken.

(d) The use of chemotherapeutants in the control of coconut diseases is to be investigated.

The other items of work according to the approved technical programme are to be continued.

2. Entomology :

(i) The Rhinoceros beetle—*Oryctes rhinoceros*

Synopsis of previous work.—A general survey of the rhinoceros beetle attack on coconuts was carried out in Travancore-Cochin and its seasonal history and life history were under study. Some chlorinated hydrocarbons and arsenical insecticides were tried against the larvae of beetle. Benzene hexachloride was found to be quite effective. A number of repellents tried were not successful in controlling beetle attack. Similarly poison baits also were ineffective. A prophylactic experiment was started and was in progress in block I against beetle. This consisted in the spraying of breeding material and breeding traps with a weak solution of benzene hexachloride.

Work done during the year.—Reports of heavy damage caused by the rhinoceros beetle were received from Travancore-Cochin, Madras, Orissa, Assam, and the Andamans. On the West Coast beetle activity was at its maximum during April, May and June 1952 and March 1953 and at its minimum soon after the south-west monsoon. Studies on the life history of the pest showed that its total life cycle from egg to emergence of the adult beetle varied from 101 to 260 days. The average was 171 days. Chlordane and other insecticides were tried in the laboratory against the larvae of the beetle. But these were not found to be so effective as benzene hexachloride. Experiments were conducted at the Central Coconut Research Station, Kayangulam to find out suitable formulations of BHC and its mode of application to compost heaps which are generally favourite breeding grounds for the beetle. It was found that the maximum efficiency was obtained when the insecticide was applied as spray to the top of the heaps. The prophylactic control experiment started in 1951 in block I at the Station was continued. This consists in the spraying of all breeding places both inside the block and all round within a belt of 200 yards with 0.01 per cent BHC. As a result of this treatment it was found that the incidence of fresh attack had come down to 1.2 per cent while at the same time in the control blocks it was 21.5 per cent. Experiments to protect the crowns of coconut palms from beetle attack were continued. Filling leaf axils with a mixture of sand and BHC was found to be effective during dry weather for about three months. In order to make

trials for the biological control of the beetle a consignment of Scold wasps *Scolia ruficornis* was imported from Zanzibar. Unfortunately all the wasps died during transit even though the consignment was despatched by air and the usual precautions had been taken.

(ii) **The coconut caterpillar—*Nephantis serinopa***

Synopsis of previous work.—Observations on the seasonal history of the pest and life history studies were made. Insecticides like DDT, BHC, Toxaphene, DDD, etc., were tried against the caterpillars of the pest. Weekly records of natural parasitism at Ayiramthengu were kept. Breeding of parasites like *Trichospilus pupivora* and experiments on biological control of *Nephantis serinopa* were carried out.

Work done during the year.—*Nephantis serinopa* was reported to be doing severe damage to coconut palms in the coastal and littoral areas of Travancore-Cochin, Malabar, the deltaic regions of Godavari, Orissa, Goa, Bombay, etc. The life history of the pest was under study during the year. It was found that the duration of its life cycle from the egg to the emergence of the moth was about 2 months on the West Coast. Here the insect was present throughout the year in some stage or other of its development. During the hot months of March, April and May the attack was very severe. Weekly record of natural parasitism at Ayiramthengu was regularly maintained and this showed that the most common pupal parasite met with throughout the year was *Stomatoceras sulcatiscutellum*. The eulophid parasite was present only up to the end of February in large numbers. After that with the rise in atmospheric temperature it dwindled in numbers and by the middle of March was completely absent in the field. The rearing of larval and pupal parasites in the laboratory was continued and they were released in large numbers at Neendakara, Kuttanad and Vypeen. New insecticides like Chlordane were included in the insecticidal trials against the pest. In trials on the residual effect of BHC and DDT against the larvae of the pest it was found that the toxic action of DDT persisted for two months while BHC lost its toxicity in less than 30 days. Under the heavy rainfall conditions prevalent on the West Coast BHC did not appear to be a suitable insecticide against *Nephantis serinopa*.

(iii) **The palm weevil—*Rhynchophorus ferrugineus***

Synopsis of previous work.—A survey of the weevil attack in the different areas of Travancore-Cochin was in progress. Laboratory trials with different insecticides against the larvae of the weevil were made and it was found that Pyrethrin-piperonyl butoxide combination was effective. Life history studies were continued.

Work done during the year.—The complete life cycle of the weevil from egg to emergence of the adult varied from 59 to 120 days. Some species of mites were found in association with dying larvae and pupae of the pest. The mite is being identified with a view to its utilisation for biological control. Insecticidal trials both against the larvae and adults of the weevil were carried out. New insecticides like Chlordane and parathion were also tried. Of all these Pyrocone E, which is a combination of Pyrethrin and piperonyl butoxide was found to be the most effective. The insecticide at 1% strength is to be injected into the crowns of infected palms by the gravitational method of Roach. This method has become quite popular with coconut growers and there is an increasing demand for the supply of this chemical.

(iv) Cockchafer—*Lencopholis coneophora*

Synopsis of previous work.—The insect was recorded for the first time in 1951 as a pest on the roots of coconut palms in certain parts of Quilon District of Travancore-Cochin. It attacks other inter-crops like yam, tapioca, etc. Preliminary trials with different insecticides against the cockchafer grub showed that BHC could be used with some success.

Work done during the year.—Larvae of the cockchafer beetle *L. coneophora* attacking the roots of coconut palms were observed in certain areas of Thiruvella and Mavelikara taluks in Travancore-Cochin State and in Quilandy, Nadapuram Road and Mahe in Malabar. The adult beetles emerge "en-masse" from the soil soon after the early south-west monsoon showers. Eggs are laid in the damp soil during June/July and larvae hatch out in about 20 days. The larvae continue to feed and grow and cause considerable damage. Control measures using BHC and DDT were tried both in the laboratory and field. Preliminary results indicate that BHC is more effective than DDT. A randomised replicated experiment using different formulations of BHC and Chlordane has been started at Thazhakara and is in progress.

(v) Minor pests

(a) *Termites.*—Investigations were continued on the control of white ants in coconut nurseries. Seednuts steeped in solutions of DDT, BHC, Chlordane, Parathion, Paris-green, Pentachlorophenyle, Sodium pentachlorophenate, etc., have been planted out and observations regarding the incidence of termite attack are being recorded.

(b) *Nematodes.*—A species of nematodes is being regularly obtained in coconut seedlings suddenly found wilting in nurseries. These were, on identification, declared only to be saprophytic eelworms.

Other minor pests of coconut observed were *Parasa lepida*, *Gangara thyrsis*, *Suastis gremius*, *Natada nararia*, *Aspidiotus destructor*, etc. Experiments on the control of rats with some new rodenticides were also in progress during the year.

The following problems require further attention:

Oryctes s. linocero

1. Study of the bionomics, life history and ecology of the pest.
2. Insecticidal trials on the control of the beetle both grub and adult.
3. Biological control of the beetle with *Scolia* sp.
4. Control of the pest through breeding traps.

Nepantia serinopa

1. Study of the life history of the pest to discover the most vulnerable stage in its life cycle for application of control measures.
2. Insecticidal and biological control.
3. Study of the effect of environmental factors on the loss of toxicity of insecticides.

Rhynchophorus ferrugineus

1. Study of the life history of the pest.
2. Ecological factors responsible for weevil attack.

3. Trials with insecticides.

4. Biological control.

Lencopholis coneophora

1. Study of the life history and ecology of the pest.

2. Chemical and biological control.

Termites

1. Study of environmental factors suitable for the activity of termites.

2. Control measures using insecticides.

Minor pests

Study of their life history and control measures.

CHAPTER II

DEVELOPMENT WORK

(i) *Distribution of quality coconut seedlings.*—A list of coconut nurseries financed jointly by the Committee and State Governments that were in existence in 1952-53 together with their dates of commencement and their annual production targets is given in Appendix III.

The numbers of seedlings actually sold by the nurseries in the various States are given below:—

Name of State	No. of seedlings sold
Madras	1,47,698
Travancore-Cochin	Not available
Orissa	13,348
Bombay	9,194
Mysore	Nil.
Assam	689

In addition to the nurseries listed in Appendix III there was a coconut nursery functioning in the Central Coconut Research Station, Kasaragod from which 5,043 seedlings were distributed during the year.

(ii) *Growing green manure crops in coconut gardens.*—Trials made with several green manure crops have shown that the wild sunn-hemp (*Crotalaria striata*) is very well suited for being grown as a green manure crop in coconut gardens. Two grant-in-aid schemes for the multiplication and distribution of the seeds of this green manure were in operation during 1951-52, but the Committee at its 15th meeting decided that the schemes be terminated, that the crop be confined to the borders of coconut plantations and to fallow lands, if any, and that the State Governments be requested to step up the production of these seeds and popularise the crop as a green manure and that an article

on its growing in coconut gardens be published in the "Bulletin" and reprinted as a pamphlet in the various regional languages. Accordingly the *Crotalaria striata* seed distribution schemes were wound up in the course of the year under report. The article on the growing of the green manure crop has been published in the "Bulletin" (*vide* issues of the English and Malayalam editions for September, 1952). Reprints of the article in English and Malayalam have been taken and distributed. A Kannada translation was brought out as a pamphlet in February 1953.

(iii) *Spraying of coconut crowns to control the leaf disease.*—The scheme to spray with copper fungicides the crowns of coconut palms to control the leaf disease worked under the direction of the Joint Director, Centre Coconut Research Station, Kayangulam was in operation during the year except for the monsoon months of June, July and August 1952. The number of sprayings done was 1,05,762 and the fee levied for each spraying was 2 annas. The scheme was sought to be worked on a no-profit no-loss basis.

(iv) *Biological control of Nephantis serinopa.*—Two parasite breeding stations jointly financed by the Committee and the Madras Government were started during the year, one at Kasaragod on 4th December 1952 and the other at Razole on 1st September 1952 for rearing and releasing parasites for the control of the coconut pest *Nephantis serinopa*. A survey of the coastal belt of South Kanara and Malabar districts was undertaken by the staff of the former station, while parasites were reared and released in large numbers by the latter.

(v) *Extension work.*—1. *Publications.*—The monthly "Bulletin" in English and Malayalam and the quarterly in English, "The Indian Coconut Journal" continued to be published during the year. The Committee at its 15th meeting decided to enhance the annual subscription of the "Bulletin" from 6 annas to 12 annas and this was given effect to from August, 1952. A Kannada edition of the "Bulletin" began to be published from January, 1953.

The second edition of the English and Malayalam versions of the handbook "Coconut Cultivation" was brought out during the year.

The following publications were available for sale during the year at the prices noted against each.—

Name of publication	Price per copy	
	Rs.	A. P.
"Coconut Cultivation"—handbook in Malayalam	0	10 0
		(postage extra)
Do. in English		do.
"Report on the Marketing of Coconuts and Coconut Products in India"—Malayalam	0	8 0
		(postage extra)
"Coconut Cultivation"—booklet in Malayalam	0	0 6
		(inclusive of postage)
"Diseases of the coconut and how to control them"—booklet in Malayalam		do.

The following free pamphlets were available for distribution during the year in the languages noted against each:—

<i>Title of pamphlet</i>	<i>Languages in which published</i>
(1) Advantages of cultivating coconut on a plantation basis.	English, Malayalam, Tamil, Telugu and Kannada
(2) Planting and care of coconut seedlings.	Malayalam, Tamil, Telugu and Kannada
(3) Facts about the Indian Central Coconut Committee.	Malayalam
(4) Coconut Cultivation—What you should know.	do.
(5) Coconut diseases and how to control them.	do.
(6) Quality coconut seedlings and where to get them from.	do.

II. *Participation in Exhibitions.*—The following exhibitions were participated in by the Committee:—

(1) All India Agricultural, Industrial and Educational Exhibition, Trichur held from 26th April 1952 to 11th May 1952.

(2) III Industrial Exhibition, Kottayam—1st January 1953 to 14th January 1953.

(3) All-India Educational, Industrial and Agricultural Exhibition, Ernakulam—21st December 1952 to 4th January 1953.

(4) All-India Agricultural, Industrial and Arts Exhibition, Trivandrum—25th January 1953 to 16th February 1953.

(5) Shri Jagannath Temple Festival Exhibition, Tellicherry—25th February 1953 to 4th March 1953.

(6) Orissa Agricultural Exhibition, Cuttack—February, 1953.

III. *Advisory work among coconut growers.*—The Coconut Propaganda Officer appointed during the previous year by the Travancore-Cochin Government with 50 per cent financial aid from the Committee continued to function during the year under report. He was on tour for 197 days and addressed 60 public gatherings besides contacting individual growers, inspecting their gardens and giving them advice.

The Agricultural Assistant in the Committee's office toured for 151 days and visited 101 villages in Malabar district, meeting large numbers of growers, inspecting their gardens and giving them advice regarding improved and scientific methods of coconut cultivation.

IV. *Coconut crop competition.*—In April, 1952 the Committee had decided to run a coconut crop competition in Travancore-Cochin. The competition for the first year was started on the 1st January, 1953. Under the competition rules the minimum number of competitors for a taluk has been fixed at 12 and the values of the taluk, district and State prizes have been fixed at Rs. 100, Rs. 250 and Rs. 500.

(b) *Coconut nursery scheme.*—Two nursery schemes one each at Kumta and Ratnagiri are being run in the State. The nursery at Kumta started functioning on 1st February 1948 with an annual production target of 6,000 seedlings. Sanctioned for an initial period of 5 years, the scheme was extended for a further period of 5 years from 1st February 1953 with an enhanced production target of 10,000 seedlings per annum. During the year under report 8,614 seedlings were distributed from the nursery and 13,191 seednuts were sown from which about 10,000 seedlings are expected to be produced for distribution during the 1953 planting season.

The nursery at Ratnagiri was started on the 23rd October, 1950 and was sanctioned for a period of 5 years. It has an annual production target of 15,000 seedlings. Only about 2,200 seedlings were available for distribution from this nursery during the year under report. Out of this 663 seedlings were distributed among growers of the Ratnagiri district and the remaining reserved for planting at the Regional Coconut Research Station proposed to be started at Ratnagiri. Only 4,050 seednuts were sown in the nursery during the year from which about 2,600 seedlings are expected to become available for distribution during the 1953 planting season.

V. Orissa

(a) *Coconut nursery schemes.*—Two 5-year schemes had been sanctioned for Orissa, the first of which started functioning on 1st January 1946 and the second on 1st December 1949. Under the first scheme there were two nurseries at Puri and Cuttack with an annual production target of 10,000 seedlings and under the second a nursery at Balia with an annual production target of 5,000 seedlings. On the expiry of the first scheme it was extended for a period of two years. Meantime, the State Government put up proposals for a comprehensive coconut nursery scheme to bring under it all the existing nurseries in the State and the Committee sanctioned them in October, 1952 on condition that the expenditure on the scheme was shared by the Orissa Government and the Committee in the ratio of 2:1 and the receipts in the ratio of 3:2. When the year under report closed, the State Government had not signified their acceptance of the conditions. During the year under report 13,348 seedlings were distributed from all the three nurseries and 20,650 seednuts were sown in them.

A Regional Coconut Research Station sanctioned for the State had been functioning at Sakhigopal from the 9th October, 1948. The State Government, however, closed down the Station on the 31st March, 1953 as the site on which it was situated proved to be an unsuitable one and the work at the station had not registered adequate progress. It is, however, proposed to start a Regional Coconut Research Station on another suitable site.

VI. West Bengal

(a) *Coconut nursery scheme.*—A 5-year coconut nursery scheme under which two nurseries (one at Tollygunge and the other at Chandernagore) have been set up with a total annual production target of 24,000 seedlings started functioning in West Bengal on the 7th June, 1951. The number of seedlings distributed during the year under report was 2,220, while the number of seednuts sown in the nurseries was of the order of 23,288.

(b) *Coconut development scheme.*—A 5-year scheme to develop, in all its aspects, coconut cultivation in West Bengal and to educate the public fully

n the various uses of coconut and in the development of the many subsidiary industries connected with the coconut has been sanctioned for West Bengal and has been in operation in the State since September, 1952. The programme of work under the scheme consists mainly of educative propaganda in the matter of raising good and economic coconut plantations by planting quality seedlings with the proper spacing and the proper depth, adopting appropriate inter-cultivation and manurial practices and controlling pests and diseases and of renovating the existing gardens by earthing up the exposed boles of palms, adequate manuring with farmyard manure, green leaves etc., removing unwanted trees growing in close proximity with coconut palms and competing with them, removing senile and old trees which appear diseased and unthrifty and underplanting in vacant sites. Propaganda will also be done regarding the proper stages of maturity at which tender and ripe nuts should be harvested, the conversion of ripe nuts into copra and oil and the retting of husks and their conversion into fibre for developing rope-making as a cottage industry.

VII. Assam

Coconut nursery scheme.—A 5-year coconut nursery scheme sanctioned for Assam, started functioning on the 15th October, 1951. A nursery at Kahikuchi has been set up under the scheme with an annual production target of 7,000 seedlings. The number of seedlings distributed from the nursery during the year was 689 and the number of seednuts sown 5,528.

VIII. The Andamans

Coconut development scheme.—A 3-year scheme for the improvement and expansion of coconut cultivation in the Andamans jointly financed by the Committee and the Andamans Administration started functioning on the 7th January, 1953. The programme of work on the scheme consists of improvement of existing coconut plantations, expansion of coconut cultivation by planting up new areas suitable for coconut, production and distribution of quality coconut seedlings, adoption of measures to combat the rhinoceros beetle and propaganda and demonstration regarding improved methods of coconut cultivation. Some preliminary work on the scheme had been done when the year under report closed.

PART III

CHAPTER I

ECONOMIC AND MARKETING ACTIVITIES

Statistics of acreage and production :

The most recent figures available of the area under and production of coconuts in the different coconut growing States of India are those relating to the year 1950-51. They are given below :—

Area under and production of coconuts in India in 1950-51

State	Area in acres	Production in thousand nuts
Travancore-Cochin ..	6,61,442	13,22,884
Madras ..	6,37,314	15,75,749
Mysore ..	1,85,715	2,97,148
Bombay ..	31,535	47,303
West Bengal* ..	16,500	22,205
Orissa ..	11,019	34,363
Assam* ..	3,573	21,912
Others* ..	1,000	2,000
Total ..	15,48,098	33,23,564

* Figures for previous years repeated.

During 1952-53 as in the previous year it was not possible to collect more recent figures of acreage and production from the West Bengal and Assam Governments; hence the figures for previous years are repeated. The figures for West Bengal for 1949-50 have been revised and these revised figures have been repeated for 1950-51. The figures relating to Mysore are provisional and are under verification.

Correct estimation of area and yield statistics :

Of the four pilot schemes for the correct estimation of area and yield statistics sanctioned by the Committee for the States of Madras, Bombay, Mysore and Travancore-Cochin only the Mysore scheme had started functioning on the 21st August, 1951. The scheme which had been sanctioned for a period of one year was due to expire on the 21st August 1952, but was extended to the end of December, 1953.

2. Statistics of copra crushed, oil extracted and cake produced in mills coming under the Factories Act :

The above statistics for the year under report are given in Appendix IV

3. Prices :

At the commencement of the year under report the coconut oil market at Cochin had begun to recover from the effects of the slump which had overtaken it in the last quarter of 1952. The year opened with the price of coconut oil at Cochin standing at Rs. 1,287—4—0 per ton as against the rock bottom of Rs. 1,095 per ton reached in the middle of March, 1952. The upward trend steadily persisted and the price stood at well over Rs. 1,600 per ton in the first week of July, 1952. By the 3rd October, 1952 the price level had gone beyond Rs. 1,705 per ton. October witnessed a steep rise in price reaching Rs. 1,977—13—0 per ton on the 29th of the month. This was the maximum price for coconut oil during the year. This was followed by a downward trend and on the 3rd December the price stood at Rs. 1,606—15—0. But in January, February and March, 1953 the price looked up, going up to Rs. 1,935—3—0 per ton on the 17th March, 1953. The year closed with the quotation remaining firm around Rs. 1,892 per ton.

The price recovery witnessed in the quarter April—June, 1952 was due to resumption of consumer demand for coconut oil and the general trade recovery. As part of their import policy for the second half of 1952, the Government of India had removed copra and coconut oil from under the Open General Licence and further stipulated that of the quantities of oil covered by import licences, only half should be imported as oil, the other half being imported as its equivalent of copra. This was responsible for imparting strength to the coconut oil market in the second half of 1952. The downward trend in the last few weeks of 1952 was mainly caused by the fall in the prices of oilseeds consequent on the delay in the announcement of the export quotas for the first half of 1953. From the beginning of 1953, however, the downward trend was arrested and the price of coconut oil rose steadily, thanks to a short groundnut crop and good foreign advice for coconut oil.

The monthly average prices of coconuts, copra, coconut oil and coconut oil-cake in the Cochin, Alleppey and Kozhikode markets are given in Appendix V.

4. Imports of coconuts and coconut products :

During the year under report 10,53,000 coconuts, 19,377 tons of copra and 20,154 tons of coconut oil were imported into India according to statements received from the Collectors of Customs (vide Appendix VI).

5. Regulated markets :

The following Market Committees established on the basis of the recommendations made by the Committee were functioning during the year under report :—

- (1) The Malabar Coconut and Arecanut Committee, Kozhikode.
- (2) The South Kanara Coconut and Arecanut Market Committee, Mangalore.
- (3) East Godavari Coconut and Tobacco Market Committee, Rajahmundry.

The Travancore-Cochin Government had the matter under consideration when the year closed.

Inclusion of coir within the purview of the Committee :

As decided by the Committee at its 14th meeting, the Vice-President of the Committee had been negotiating with the Government of Travancore-Cochin in the question of the inclusion of coir within the Committee's purview. In October, 1952 the Committee considered an interim report from its Vice-President stating that the matter was still under the consideration of the Travancore-Cochin Government. On the 16th November, 1952 a conference of coir interests was convened at Trivandrum by the Ministry of Commerce and Industry (Government of India) to consider measures for affording relief to those engaged in the coir industry in India. The Vice-President and the Secretary of the Committee attended the conference by invitation and explained the Committee's point of view that coir be brought within its purview. It was, however, decided by a majority of the conference that a separate Coir Board should be set up. Since then the Indian Coconut Committee (Amendment) Act, 1952 has been passed by the Union Parliament. Section 5 of the Amendment Act, modifying Section 9 of the original Act, specifically excludes coir and coir products from the Committee's purview.

CHAPTER II

BUDGET AND FINANCES

Receipts.—The receipts of the Committee from coconut cess amounted during the year to Rs. 2,60,907—6—6 as against Rs. 3,09,923—10—0 during the previous year.

Receipts from the Central Coconut Research Stations at Kasaragod and Kayangulam by sale of farm produce amounted to Rs. 48,045—14—0 and Rs. 14,143—4—11 respectively as against Rs. 43,189—4—3 and Rs. 24,735—4—10 respectively in the previous year. Receipts from the spraying scheme were Rs. 14,210—1—3 as against Rs. 8,858—3—8 in the previous year.

Realizations from the sale of the Committee's publications, subscriptions of periodicals and charges of advertisements published in the periodicals amounted to Rs. 4,627—5—9 as against Rs. 4,366—8—6 in the previous year.

Expenditure.—The expenditure on the Office of the Committee amounted during the year under report to Rs. 85,023—3—1 as against Rs. 84,659—7—0 in the previous year. Travelling allowance paid to non-official members was only of the order of Rs. 6,202—4—0 as against Rs. 18,081—4—0 paid in the previous year. The expenditure on Publicity and Propaganda during the year was Rs. 18,478—0—10 while it was Rs. 19,633—2—4 in the preceding year.

Capital expenditure on the Central Coconut Research Stations, Kasaragod and Kayangulam during the year was Rs. 32,977—5—11 and Rs. 4,591—0—6 respectively as against Rs. 1,21,570—3—5 and Rs. 26,906—15—0 respectively in the previous year.

Recurring expenditure during the year on the two Central Coconut Research Stations was Rs. 1,36,323—13—5 and Rs. 1,09,345—15—9 as against

THE INDIAN CENTRAL COCONUT COMMITTEE

Rs. 1,06,915—15—3 and Rs. 96,148—7—11 during the preceding year. The expenditure on the spraying scheme was Rs. 11,935—11—0 as against Rs. 10,701—12—3 in the previous year.

Contributions to grant-in-aid schemes were not made during the year, having been deferred to the next year.

A statement showing the Receipts and Payments Account of the Committee for 1952—53 is given in Appendix VII.

Contributory Provident Fund.—A statement showing the Committee's Contributory Provident Fund Receipts and Payments is given in Appendix VIII.

CHAPTER III

MISCELLANEOUS.

Acknowledgments.—In presenting this Annual Report of the Committee I would like to place on record my grateful thanks to Sardar Datar Singh (President of the Committee till 28th October, 1952), Shri K. R. Damle (President since 12th November, 1952) and Shri K. P. Madhavan Nair, the Vice-President for the generous help and guidance they have always given me in the discharge of my duties. I would also like to thank the members of the Committee and the public for their assistance in one way or other and the officers and staff of the Committee for their help, co-operation and devotion to duty.

K. GOPALAN.

APPENDICES

APPENDIX I

List of Members of the Indian Central Coconut Committee as on the 31st March, 1953.

1. Shri K. R. Damle, Vice-President, Indian Council of Agricultural Research (President—ex-officio).
2. Shri K. S. Bhandari, "Premvihar", Falmir, Kankanady P. O., Mangalore—2—nominated by the Government of Madras to represent the growers of coconut.
3. Shri Vengayil Raghavan Nayanar, Bar-at-Law, Thalavil, Mathamangalam, via Palayangadi, North Malabar, nominated by the Government of Madras to represent the growers of coconut in India.
4. Shri N. Krishna Iyer, M.A., B.L., Advocate, Kottayam, Travancore-Cochin, nominated by the Government of Travancore-Cochin to represent the growers of coconut in India.
5. Shri Mankuzhi M. Madhavan, B.A., B.L., Kadakkavur, nominated by the Government of Travancore-Cochin to represent the growers of coconut in India.
6. Shri B. M. Peter, Andikadavu, nominated by the Travancore-Cochin Government to represent the growers of coconut in India.
7. Shri S. K. Kallapur, B.A., LL.B., Village Industries Committee, Karnatak Branch, Dharwar, North Kanara District, nominated by the Government of Bombay to represent the growers of coconut in India.
8. Shri Dharendra Narayan Mukerji, M. L. A., 42, Chowringhee, Calcutta, nominated by the Government of West Bengal to represent the growers of coconut in India.
9. Shri Jagannath Misra, B.L., M.P., Puri, Orissa, nominated by the Government of Orissa to represent the growers of coconut in India.
10. Shri V. Venkatappa, Member, Legislative Assembly, Tittamaranahalli, Channapatna Taluk, Mysore State, nominated by the Government of Mysore to represent the growers of coconut in India.
11. Shri P. Balarama Kurup B.A., Techno-Chemical Industries Ltd., Kozhikode, nominated by the Government of Madras to represent the coconut oil industry in India.
12. Shri K. P. Madhavan Nair, B.A., B.L., Ernakulam Mills Ltd., Ernakulam, nominated by the Government of Travancore-Cochin to represent the coconut oil industry in India.
13. Shri A. R. Sulaiman Sait, M. L. A., Municipal Chairman, Alleppey, nominated by the Government of Travancore-Cochin to represent the coconut oil industry in India.
14. Shri K. M. Antia, B.A., LL.B., General Manager, Tata Oil Mills Co. Ltd., 24 Bruce Street, Bombay, nominated by the Indian

- Merchants' Association to represent the coconut oil industry in India.
15. Mr. C. E. Bingham, Messrs. Lever Brothers (India) Ltd., Bombay, nominated by the Bombay Chamber of Commerce to represent the coconut oil industry in India.
 16. The Director of Agriculture, Madras, appointed by the Government of Madras to represent that Government.
 17. Shri M. K. Appajappa, Director of Agriculture, Mysore, appointed by the Government of Mysore to represent the Government.
 18. Shri K. Narayana Menon, Additional Secretary to the Government of Travancore-Cochin, Development Department, Trivandrum, appointed by the Government of Travancore-Cochin to represent that Government.
 19. Shri V. J. Joseph, C/o. Messrs. Pothan Joseph & Sons Ltd. Alleppey, nominated by the Travancore Chamber of Commerce.
 20. The Agricultural Commissioner with the Government of India appointed by the Central Government.
 21.)
 22.) The three seats to be filled by Members of Parliament elected by
 23.) Parliament were vacant.
 24. Shri P. Gopalan Nair, Registrar of Co-operative Societies, Travancore-Cochin, nominated by the Travancore-Cochin Government.
 25. Shri C. H. Lingadevaru, LL.B., Landlord, Chiknaikēnahalli, Mysore State, nominated by the Mysore Government to represent that Government.
 26. Shri M. Sankara Menon, Director of Agriculture, Travancore-Cochin, Trivandrum, nominated by the Travancore-Cochin Government to represent that Government.

APPENDIX II

The Sub-Committees of the Indian Central Coconut Committee
as on the 31st March, 1953.

I. Finance Sub-Committee

1. Vice-President (*Chairman ex-officio*).
2. President (*Member ex-officio*).
3. Agricultural Commissioner with the Government of India.
4. Shri A. R. Sulaiman Sait.
5. (Vacant—to be filled by one of the three members of Parliament to be elected to the Committee).
6. Shri K. Narayana Menon.
7. Shri P. B. Kurup.
8. Shri V. J. Joseph.
9. Shri K. S. Bhandari.
10. Shri C. H. Lingadevaru.

II. Agricultural Research Sub-Committee

1. President—(*Chairman*).
2. Vice-President.
3. Agricultural Commissioner with the Government of India.
4. Director of Agriculture, Madras.
5. Shri P. Gopalan Nair.
6. Shri M. K. Appajappa.
7. Director of Agriculture, Travancore-Cochin.
8. Shri V. Venkatappa.
9. (Vacant—to be filled by one of the three members to be elected by Parliament).
10. Shri Dhirendra Narayan Mukerji.
11. " B. M. Peter.
12. " V. R. Nayanar.
13. " K. S. Bhandari.

III. Scientific Appointments Sub-Committee

1. President—(*Chairman*).
2. Vice-President.
3. Agricultural Commissioner with the Government of India.
4. Shri P. B. Kurup.

IV. Marketing & Economics Sub-Committee

1. President— (*Chairman*).
2. Vice-President.
3. Agricultural Commissioner with the Government of India.
4. Director of Agriculture, Madras.
5. Shri V. R. Nayanar.
6. Shri M. K. Appajappa.
7. Director of Agriculture, Travancore-Cochin.
8. Shri P. Gopalan Nair.
9. " V. J. Joseph.
10. " Jagannath Misra.
11. " S. K. Kallapur.

12. Mr. C. E. Bingham.
13. Shri A. R. Sulaiman Sait.
14. " B. M. Peter.
15. (Vacant—to be filled by one of the three members to be elected by Parliament).

V. Technological Sub-Committee

1. President—(Chairman).
2. Vice-President.
3. Agricultural Commissioner with the Government of India.
4. Director of Agriculture, Madras.
5. Shri P. Gopalan Nair.
6. " M. K. Appajappa.
7. Director of Agriculture, Travancore-Cochin.
8. Shri K. M. Antia.
9. " P. B. Kurup.
10. Mr. C. E. Bingham.
11. Shri Dharendra Narayan Mukerji.
12. " S. K. Kallapur.
13. " N. Krishna Iyer.
14. (Vacant—to be filled by one of the three members to be elected by Parliament).
15. (Vacant do. do.)

APPENDIX III

List of coconut nurseries functioning in 1952-53 with dates of commencement and annual production targets

Name of State	Location of nursery	Date of starting	Annual target production	Remarks
Madras	1. Pattukottai	10-11-1948	19,200	
	2. Samalkot	do.	do.	
	3. Pattambi	do.	48,000	
	4. Nileshtar	do.	do.	
	5. Maruteru	do.	6,400	
	6. Anakapalle	do.	do.	
	7. Coimbatore	do.	do.	
	8. Tindivanam	14-5-1949	do.	
	9. Maradur	29-4-1950	6,000	
Travancore-Cochin	10. Vaikom	5-1-1951	20,000	
	11. Kazhakuttam	do.	do.	
	12. Changanacherry	do.	do.	
	13. North Parur	do.	do.	
	14. Kunnathur	do.	do.	
	15. Chirayinkil	do.	do.	
	16. Shertallai	do.	do.	
	17. Thakazhi	do.	25,000	
	18. Thodupuzha	do.		Attached to the Regional Coconut Research Station, Thodupuzha
	19. Neyyattinkara	do.	do.	Attached to the Regional Coconut Research Station, Neyyattinkara
Mysore	20. Irinjalakuda	1-9-1946	20,000	
	21. Hebbal	1-5-1951	15,000	
Orissa	22. Puri & Cuttack	1-1-1946	10,000	
	23. Balia	1-12-1949	5,000	
Bombay	24. Kumta	1-2-1948	6,000	
	25. Ratnagiri	23-10-1950	15,000	
West Bengal	26. Tollygunge	7-6-1951	24,000	
	27. Chandernagore	do.		
Assam	28. Kahikuchi (Guhati)	15-10-1951	7,000	

APPENDIX IV
Quantities of copra crushed, coconut oil extracted and coconut oil cake produced in power mills coming under the purview of the Factories Act from 1st April 1952 to 31st March 1953

State	(1) Copra crushed—(in cwts.)												
	April	May	June	July	August	September	October	November	December	January	February	March	Total
Madras	14,418	14,235	14,001	10,449	7,678	6,831	10,194	12,557	11,661	13,664	13,453	17,738	1,46,879
Bombay (a)	14,627	15,262	22,507	23,234	27,446	48,993	45,820	32,107	15,540	23,897	18,040	19,786	3,07,259
Travancore-Cochin (b)	1,12,729	83,247	92,163	94,148	71,968	..	130	..	147	239	265	236	4,54,255
Saurashtra (c)	99	99	169	276	214	..	..	..	..	..	..	..	1,874
Total	1,41,873	1,12,843	1,28,840	1,28,107	1,07,306	55,824	56,144	44,664	27,348	37,800	31,758	37,760	9,10,267
	(2) Coconut oil extracted—(in cwts.)												
Madras	9,103	8,938	9,110	6,497	4,777	4,213	5,750	7,776	7,276	8,622	8,170	11,196	91,428
Bombay (a)	8,950	9,380	13,823	14,283	16,863	30,093	27,815	19,006	9,468	14,619	10,470	12,189	1,86,959
Travancore-Cochin (b)	66,627	51,486	57,627	58,689	45,140	..	80	..	93	146	164	137	2,79,569
Saurashtra (c)	62	62	109	164	133	..	..	..	..	..	..	..	1,150
Total	84,742	68,866	80,669	79,633	66,913	34,306	33,645	26,782	16,837	23,387	18,804	23,522	5,59,106
	(3) Coconut oil cake—produced (in cwts.)												
Madras	4,780	4,745	4,606	3,554	2,611	2,308	3,154	4,244	3,999	4,575	4,464	5,844	48,884
Bombay (a)	5,159	5,363	7,756	8,372	9,475	16,709	16,186	9,009	5,546	7,977	6,560	7,013	1,05,127
Travancore-Cochin (b)	37,262	29,058	32,248	32,966	24,987	..	..	..	..	..	..	..	1,56,521
Saurashtra (c)	33	32	55	101	67	..	39	..	43	72	82	76	600
Total	47,234	39,198	44,665	44,993	37,140	19,017	19,381	13,253	9,588	12,624	11,106	12,933	3,11,132

(a) Includes figure for Mills in Baroda.
(b) Statements have not been received from Collectors, Central Excise for September 1952 to March 1953.
(c) No crushing in other months.

APPENDIX V

Monthly average prices of coconuts, copra, coconut oil and coconut oil cake at Cochin, Alleppey and Calicut, from April 1952 to March 1953

(1) Coconuts (Price per 1000 nuts)

Months		Cochin (Husked) Rs. A.		Alleppey (Husked) Rs. A.		Calicut (Husked) Rs. A.	
April,	1952	133	2	137	11	120	4
May,	1952	124	6	134	6	107	10
June,	1952	124	14	128	12	98	7
July,	1952	131	1	135	5	109	8
August,	1952	130	15	132	13	105	5
September,	1952	125	8	130	8	107	12
October,	1952	133	11	136	1	112	6
November,	1952	132	12	136	4	102	12
December,	1952	132	1	133	4	106	14
January,	1953	146	7	138	15	144	1
February,	1953	161	6	161	6	154	4
March,	1953	165	0	159	11	156	12
Average		136	12	138	12	118	13

(2) Copra (Price per ton)

Months		Cochin (Office Pass) Rs. A.		Alleppey (Thelivu) Rs. A.		Calicut (Office Pass) Rs. A.	
April,	1952	946	1	958	13	947	13
May,	1952	992	14	964	10	1,009	15
June,	1952	1,013	7	991	0	1,079	0
July,	1952	1,100	6	1,098	15	1,145	2
August,	1952	1,072	11	1,093	2	1,121	14
September,	1952	1,102	13	1,120	4	1,126	1
October,	1952	1,194	13	1,202	6	1,190	10
November,	1952	1,181	5	1,186	8	1,154	15
December,	1952	1,137	8	1,154	10	1,126	0
January,	1953	1,175	2	1,190	12	1,189	9
February,	1953	1,223	4	1,250	7	1,229	10
March,	1953	1,262	14	1,241	11	1,241	0
Average		1,116	15	1,121	2	1,130	2

(3) Coconut Oil (Price per ton)

Months	Cochin		Alleppey		Calicut
	Rs.	A.	Rs.	A.	Rs.
April, 1952	1,402	7	1,390	7	1,430 11
May, 1952	1,459	15	1,450	4	1,502 13
June, 1952	1,504	10	1,561	7	1,583 5
July, 1952	1,646	5	1,622	6	1,704 7
August, 1952	1,607	6	1,596	3	1,659 14
September, 1952	1,643	0	1,626	13	1,684 4
October, 1952	1,781	2	1,749	11	1,776 7
November, 1952	1,764	8	1,742	6	1,748 4
December, 1952	1,685	4	1,667	11	1,706 4
January, 1953	1,749	9	1,747	6	1,795 8
February, 1953	1,825	5	1,847	12	1,854 3
March, 1953	1,877	12	1,881	4	1,894 11
Average	1,662	4	1,657	0	1,695 1

(4) Coconut oil cake (Price per ton)

Months	Cochin		Alleppey		Calicut	
	Rs.	A.	Rs.	A.	Rs.	A.
April, 1952	334	1	331	13	333	3
May, 1952	334	10	322	4	350	8
June, 1952	315	4	303	6	350	11
July, 1952	312	2	296	14	313	12
August, 1952	304	2	290	9	278	0
September, 1952	314	2	300	14	298	7
October, 1952	340	13	331	13	333	2
November, 1952	337	3	318	2	326	14
December, 1952	351	0	330	6	330	15
January, 1953	335	13	314	5	352	11
February, 1953	355	8	340	0	340	2
March, 1953	360	4	342	0	349	13
Average	332	15	318	9	329	14

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APPENDIX VI

Statement showing imports of coconuts, copra and coconut oil into India in 1952-53

Countries from which imported	Coconuts		Copra		Coconut oil	
	Nos.	Value Rs.	Quantity in tons	Value Rs.	Quantity in tons	Value Rs.
Ceylon	10,53,150	2,79,527	15,393	1,62,15,913	8,452	1,29,12,522
Straits Settlements	100	44	909	8,51,724	8,336	1,27,64,466
F. M. S.	..	..	425	5,60,700	1,787	30,89,549
Seychelles	..	..	2,603	28,04,239	..	..
Maldives	..	..	47	36,626	..	..
Philippines	..	..	..	..	1,579	19,95,778
Total	10,53,250	2,79,571	19,377	2,04,69,202	20,154	3,07,62,315

APPENDIX

Receipts and Payments account of the Indian Central Coconut
RECEIPTS

Particulars	Amount					
	Rs.	A.	P.	Rs.	A.	P.
Opening balance as on 1-4-1952 ..	3,71,934	5	1			
Less refund of Security ..	100	0	0	3,71,757	15	7
Less publication receipts adjusted ..	76	5	6			
Coconut cess collected under section 3 of Indian Coconut Committee Act, 1944						
Madras ..	26,777	10	6			
Bombay ..	82,097	1	0			
Travancore-Cochin ..	1,52,032	11	0	2,60,907	6	6
Other receipts:—						
i. Publication receipts ..				4,627	5	9
ii. Other miscellaneous receipts ..				330	13	5
iii. Farm Produce and other receipts:—						
(a) Central Coconut Research Station, Kasaragod ..				48,045	14	0
(b) Central Coconut Research Station, Kayangulam ..				14,143	4	11
iv. Receipts from the Scheme for control of leaf disease of coconut:—						
(a) Old Scheme ..				9,822	6	0
(b) Extension Scheme ..				4,387	11	3
(c) Interest on Investment of Rs. 2,00,000 @ 1% from 29-5-1952 to 14-7-1952 ..				1,000	0	0
				7,15,022	13	5

VII
Committee for the year ended 31st March 1953

PAYMENTS

Particulars	Amount					
	Rs.	A.	P.	Rs.	A.	P.
I. A. Administration :						
Salary of Secretary & staff ..	43,980	13	0			
Allowances and Honoraria ..	22,358	1	0			
Leave Salary & Pension contributions ..	1,598	1	11			
Indian Central Coconut Committee Provident Fund contribution ..	2,105	14	0			
Contingencies ..	14,980	5	2	85,023	3	1
B. T. A. of Non-official Members ..				6,202	4	0
C. Publicity and Propaganda ..				18,478	0	10
II. Agricultural Research :—						
A. Research Stations—						
i. Central Coconut Research Station, Kasaragod						
(a) Capital Expenditure : Payment on account of Acquisition of Land ..	1,561	9	0			
Lay out ..	7,174	8	3	8,736	1	3
Stores Dead and Livestock :						
Implements Tools etc. ..	884	9	0			
Furniture and Equipment ..	1,710	7	5			
Farm Carts ..	33	2	9			
Work animals ..	650	0	0			
Laboratory Equipment ..	9,485	14	3			
Meteorological observatory ..	5,679	5	3			
Photographic Equipment ..	5,797	14	0	24,241	4	8
(b) Recurring Expenditure :						
Staff Salary ..	55,797	6	0			
Allowance & Honoraria ..	28,105	11	0			
Leave Salary and Pension contribution ..	5,852	4	4			
Indian Central Coconut Committee Provident Fund contribution ..	1,565	0	0			
Contingencies ..	16,823	9	1			
Working Expenses ..	28,179	15	0	1,36,323	13	5
ii. Central Coconut Research Station, Kayangulam ..				2,79,004	11	3
(a) Capital Expenditure :						
Buildings—Residential and Non-residential ..	1,147	13	8			
Water Supply and Electric fittings ..	800	7	0	1,948	4	8

RECEIPTS

<i>Particulars</i>	<i>Amount</i>		
	<i>Rs.</i>	<i>A. P.</i>	<i>Rs. A. P.</i>
B/F			7,15,022 13 5

7,15,022 13 5

K. RAMAN MENON

Accountant

Indian Central Coconut Committee

PAYMENTS

Particulars	Amount					
	Rs.	A.	P.	Rs.	A.	P.
<i>Stores Dead and Livestock:</i>						
Implements, tools, etc. ..	671	0	8			
Furniture and Equipment ..	1,756	8	2			
Laboratory Equipment ..	215	3	0	2,642	11	10
(b) <i>Recurring Expenditure:</i>						
Staff Salary ..	49,465	3	0			
Allowances and Honoraria ..	22,485	0	0			
Leave Salary and Pension contributions..	1,173	1	4			
Indian Central Coconut Committee Provident Fund contributions ..	2,508	0	0			
Contingencies ..	21,050	12	2			
Working Expenses ..	12,663	15	3	1,09,345	15	9
(c) <i>Scheme for control of leaf disease of coconut:</i>						
(i) Old Scheme ..	8,160	13	3			
(ii) Extension Scheme ..	4,174	13	9	12,335	11	0
Refund of Government of India Loan of Rs. 3,50,000 1st annuity of repayments ..				95,288	0	0
By closing balance-current account with Imperial Bank of India ..	1,77,133	8	2			
<i>Imprests:</i>						
Secretary's Office ..	750	0	0			
Central Coconut Research Station, Kasaragod ..	1,500	0	0			
Central Coconut Research Station, Kayangulam ..	1,500	0	0			
Advance Recoverable account-Office of the Secretary ..	1,323	0	0			
C. C. R. S., Kasaragod ..	29,080	15	6			
I. C. Coc. C. "Suspense Head" Caution Money Deposit ..	50	0	0			
Advance for purchase of Conveyances ..	323	0	0			
Andaman Advance account ..	2,796	15	3	2,14,457	6	11*
* Includes Security money deposit of Rs. 150.				7,15,022	13	5

Checked and found correct.
P. V. SUBRAMANIA IYER
Assistant Accounts Officer (OAD)
Travancore-Cochin.

K. GOPALAN
Secretary
Indian Central Coconut Committee

Receipts and Payments account of the Indian Central Coconut Committee
RECEIPTS

Particulars	Amount			Amount		
	Rs.	A.	P.	Rs.	A.	P.
To opening balance as on 1-4-1952 ..				1,599	3	0
Post Office Savings Bank account ..						
<i>To Subscription account:</i>						
Subscription received ..	10,768	0	0			
Refund of advance with interest ..	2,532	0	0	13,300	0	0
<i>To contribution account:</i>						
Contribution received ..				5,777	0	0
<i>To interest account:</i>						
Special contribution by the Committee ..	401	14	0			
Interest on Post Office Savings Bank account received for the year 1951-52 ..	9	15	0	411	13	0
Total ..				21,088	0	0

Income and Expenditure Account for

EXPENDITURE

To interest credited to subscription account @ 3% per annum ..				1,084	0	0
To interest credited to contribution account @ 3% per annum ..				525	0	0
Total ..				1,609	0	0

Balance Sheet of the Indian Central Coconut Committee
LIABILITIES

<i>Subscription Account:</i>						
As per last balance sheet ..	32,037	0	0			
Subscription received during the year ..	10,768	0	0			
Refund of advance with interest ..	2,532	0	0			
Add interest credited ..	1,084	0	0			
	46,421	0	0			
Less advance to subscribers ..	4,116	0	0	42,305	0	0
<i>Contribution Account:</i>						
As per last balance sheet ..	17,884	0	0			
Contribution received during the year ..	5,777	0	0			
Interest credited ..	525	0	0			
	24,186	0	0			
Less forfeiture of contribution to account of subscribers resigned ..	653	0	0	23,533	0	0
Total ..				65,838	0	0

K. RAMAN MENON

Accountant

Checked and found correct.

P. V. SUBRAMANIA IYER
Assistant Accounts Officer
(OAD), Travancore-Cochin

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Committee Provident Fund for the year ended 31st March 1953
PAYMENTS

Particulars	Amount			Amount		
	Rs.	A.	P.	Rs.	A.	P.
<i>By Subscription Account:</i>						
Advance to subscribers ..				4,116	0	0
<i>By Contribution Account:</i>						
Forfeiture of Committee's contribution to the account of the subscribers resigned ..				653	0	0
<i>By Investment Account:</i>						
Post Office National Savings Certificates ..	15,400	0	0			
By closing balance in the Post Office account ..	919	0	0	16,319	0	0
				21,088	0	0

the year ended 31st March 1953

INCOME

By special contribution from the Committee for payment of interest ..	401	14	0
By interest accrued on Post Office National Savings Certificates ..	1,193	2	0
By interest accrued on Post Office Savings Bank Account ..	14	0	0
	1,609	0	0

Provident Fund as on 31st March 1953

ASSETS

<i>Investments:</i>						
Post Office National Savings Certificates as per last balance sheet ..	47,150	0	0			
Investments during the year ..	15,400	0	0	62,550	0	0
Balance in Post Office Savings Bank Account ..				919	0	0
Interest on Post Office Savings Bank Account for 1952-53 ..	14	0	0			
Interest on investments on Post Office National Savings Certificates for 1951-52 ..	1,161	14	0			
Interest accrued on investments on Post Office National Savings Certificates for 1952-53 ..	1,193	2	0	2,369	0	0
				65,838	0	

K. GOPALAN,
Secretary.