

Technical Bulletin - 9

25

YEARS OF

ARECANUT
RESEARCH
AND
DEVELOPMENT



ICAR

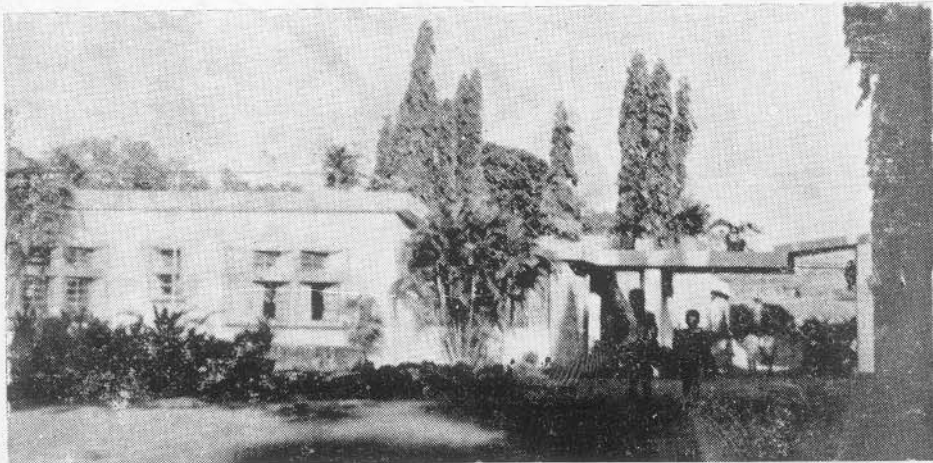
CENTRAL PLANTATION CROPS RESEARCH INSTITUTE

KASARAGOD-670124 KERALA, INDIA

ARECANUT REGIONS AND CENTRES OF ARECANUT RESEARCH



☉ CPCRI, REGIONAL STATION
☐ CPCRI, RESEARCH CENTER



LABORATORY - CPCRI, REGIONAL STATION, VITTAL

CP 1542

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CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
KASARAGOD - 670 124, KERALA, INDIA

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FOREWORD

The CPCRI is celebrating the Silver Jubilee of Arecanut Research and Development in India at its Regional Station, Vittal, South Kanara District, Karnataka State. Though in the international trade, Arecanut commodity does not find a prominent place its internal trade is sizable and is of the order of 2800 million rupees annually. Thousands of farmers in the States of Karnataka, Kerala, Tamil Nadu, Assam and West Bengal depend on this crop for their livelihood. Indeed, there are many farmers whose only source of income come from this crop. The Research and Development efforts on arecanut was started at a time when the crop was facing a crisis in the late 40s. It is most opportune that a correct documentation of the sequence of events that have taken place in the arena of arecanut research and development activities are authoritatively documented for the benefit of posterity during this celebration. The significance of this compilation becomes all the more relevant in view of the fact that this is one of the very few cases of successful story in which the R & D efforts have given rich dividends for the efforts that have been put in by the researchers, and extension and development agencies working hand in hand with the farmers to achieve their goal. I am sure that those who have participated in this venture will feel satisfied that they have fulfilled a great mission. The country achieved self-sufficiency in arecanut in the late sixties. I would like to place on record the efforts put in by Mr. K. Shama Bhat, one of our very senior colleagues who spent his entire life time in doing research on arecanut in having come forward to prepare this valuable document. I am also sure that this will be read by one and all connected with arecanut industry with considerable interest.

K. V. Ahamed Bavappa

Director

*Central Plantation Crops Research Institute
Kasaragod - 670 124*

PREFACE

Efforts on the improvement of arecanut crop in India began as early as in 1914 under the Mysore Agriculture Department at a government farm at Marthur in the *malnad* area of Shimoga with the main objective of tackling the *Koleroga* disease of the crop. Experiments on manuring and selection were also taken up at Marthur Farm. Unfortunately, the farm was closed in 1939 and the researches discontinued. Later, work mainly concentrated on the control of diseases like fruit-rot caused by *Phytophthora arecae* and Anabe, *Ganoderma lucidum*, were carried out by the Agricultural Departments of erstwhile Madras, Mysore and Bombay States. The organised researches on the all-round improvement of the crop on all the aspects were launched only after the establishment of ICAC in 1949 and with the opening of a net work of research stations in the important arecanut growing belts of the country. The work initiated by the ICAC was subsequently taken over by the ICAR in 1966 and by forming the CPCRI in 1970.

Considering the initial hurdles in the establishment of research stations, the work that had to be started from scratch and the long period required for the palm to flower and attain stability in yield, the progress made in developing suitable technology and its transfer to the farmers have been substantial and all those connected with this chain of events could be proud of the achievement. All the same the scientists have still a heavy load of responsibility in view of the large number of problems remaining to be solved. There are the devastating diseases like Yellow Leaf, Anabe, tender nut fall, etc., to be tackled. Research on the technology is still in its infancy and requires a great lot of efforts. The Scientists are aware of the requirements of the farmers and their need to have improved implements like climbing device, sprayer which can effectively spray the bunches without climbing the tree, machines for dehusking and a number of small gadgets for intercultivation in the gardens, irrigation etc. The varieties of arecanut suitable for a greater part of the country are yet to be evolved particularly with resistance to Yellow Leaf Disease. These problems should receive priority attention.

At this moment when the SIJAR is being organised, one cannot forget the pioneers in the research and development work that have been carried out during the past 25 years and whose names I do not wish to mention individually here but have contributed their might. The research workers of the erstwhile CARS and its regional stations cannot be forgotten. The guidance and support received from eminent scientists like Shri CM John, Drs. K.P.V. Menon, KM Pandalai, late M.M. Krishna Marar, Dr. B.P. Pal, Dr. M.S. Swaminathan, late Dr. G.I. Patel, Shri Mohan Rao and others were of immense value. The role played by late K.K. Nambiar, the first Secretary of ICAC, Shri K. Shamanna, late B.S. Varadarajan, Shri O.D. Garg and Shri T.T. Paulose, on the administrative side was rewarding. A number of farmers in the vicinity of the research stations who have been very cooperative in allowing the scientists to work in their gardens owe special mention. I am grateful to Dr. N.M. Nayar, former Director for suggesting me to prepare this material. Lastly, I wish to express my gratitude to Dr. K.V. Ahamed Bavappa, Director of our Institute with whom I had the privilege to work almost throughout, for allotting me this piece of work and under whose guidance I could prepare this material.

K. Shama Bhat

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INTRODUCTION

Areca nut industry in India was passing through a crisis when the second World War broke out. During the year 1945, representations were made to the Central Board of Revenue by those interested in the industry regarding its deplorable plight; the heavy cost of cultivation and poor return mainly due to the absence of scientific research to improve cultivation and augment production, the heavy crop loss due to fruit-rot caused by *Phytophthora arecae* and the ill-developed marketing system in vogue. Besides, the country lost about 50 per cent of the area under areca nut during partition, to East Pakistan (now Bangla Desh) causing considerable shortage in production. These necessitated huge imports to meet the internal demand. This unrestricted imports of areca nut at low prices which adversely affected the local areca nut industry were also brought to the notice of the Government. There was demand for immediate protection in some form or the other for the local industry for its survival. As a first step towards the improvement of the industry, the Government of India set up an *ad hoc* Committee under the Indian Council of Agricultural Research to consider and formulate coordinated schemes for the purpose. On the recommendations of the *ad hoc* Committee, the Government of India, constituted the Indian Central Areca nut Committee (ICAC) in May, 1949.

The ICAC was charged with the responsibility of assisting the Government in the improvement and development of

production and marketing of areca nut and areca nut products and all the matters incidental thereto by:

1. undertaking, assisting or encouraging agricultural, industrial, technological, and economic research;
2. producing, testing and distributing improved varieties of seed;
3. encouraging and assisting the adoption of improved methods in cultivation so as to increase yield and improve quality;
4. assisting in the control of parasites and insect pests and fungal diseases which affect areca nut in the field, in storage, or during transport;
5. carrying on such propaganda in the interests of the areca nut industry as may be necessary;
6. encouraging the adoption of improved measures for the marketing of areca nut, fixing and adoption of grade standards for areca nut and its products;
7. encouraging the purchase, curing, grading and marketing of areca nut and its products through cooperative or other agencies and undertaking enquiries and making recommendation relating to storage, transport facilities etc;
8. giving financial and technical assistance to organisations engaged in growing, curing, processing, grading, marketing and manufacture of areca nut and its products;

9. maintaining such institutes, farms, stations, curing arrangements, warehouses, conditioning and processing plants as may be necessary;
10. collecting statistics from growers, traders and manufacturers on all relevant matters connected with arecanut and distribution of such statistics and information to the interests concerned, and establish a Market Intelligence Service;
11. (a) making advice available on all matters essential to the development of the arecanut industry;
(b) advising on such matters that fall within the functions of the Committee which are referred to it by the Government;
12. employing such staff as may be necessary for the proper performance of any or all of these functions; and
13. recommending the maximum and minimum prices to be fixed for arecanut and the controlled purchase and distribution of imported arecanut and adopting any other measures or performing

any other duties which may be required by the Government of India to adopt or perform or which the Committee may consider necessary or advisable in order to carry out the purposes for which it is constituted.

The Committee was expected to work in collaboration with State Governments and coordinate its activities with the work of various committees and State Governments. The members of the Committee were drawn to give representation to growers, manufacturers and traders besides Departments of Agriculture of the arecanut growing states and nominees of the Government of India.

The ICAC with the above responsibilities fixed on it, was well aware of its role. Various programmes aimed at increasing production of arecanut to make the country self-sufficient in the commodity by arranging adequate protection to the indigenous industry and putting it on a sound scientific footing were initiated by the ICAC. Towards achieving this objective the Committee launched a three pronged approach *viz.* (1) research (on production and technology); (2) development, and (3) marketing.

ORGANISATION OF ARECANUT RESEARCH

PRODUCTION RESEARCH:

The *ad hoc* Arecanut Committee's earliest decision was to arrange for an All India Arecanut Survey on the agricultural practices adopted in different parts of the country, which emerged at its second meeting in 1948. Late K. K. Nambiar who conducted the survey has, in his comprehensive report besides presenting the details of arecanut cultivation in various parts of the country also, came out with the following important recommendations which formed the foundation for the later research and development programmes initiated by the Indian Central Arecanut Committee.



K. K. NAMBIAR
THE FIRST SECRETARY ICAC (1949 - 55)

(1) Production of arecanut in India to be enhanced to meet the deficit by increasing the yield per unit area as well as increasing the area under the crop. Emphasis was laid on intensive cultivation by adopting more effective cultural and manurial practices and on control of pests and diseases. Better methods of curing and marketing were also recommended.

(2) A central research station for the fundamental and applied studies to be set up as no research on arecanut had ever been done anywhere in India.

(3) Establishment of four or five regional research stations in important arecanut growing regions of the country to solve local problems.

(4) Establishment of arecanut nurseries to supply quality seedlings.

(5) Obtaining correct statistics regarding area and production of arecanut in the country.

(6) Extension programme for doing propaganda among the growers to be taken up.

Research Stations on grant-in-aid basis

Based on the above recommendations, the ICAC in 1951 approved schemes formulated by the Governments of the major arecanut growing states for establishment of regional research stations for arecanut in four regions scattered in erstwhile Bombay, Mysore, Madras and Travancore - Cochin States.

The first such station established was for the investigation on the stem-breaking disease of arecanut palm, a scheme proposed by the then Madras Government. It was started on 1st August, 1952 at Vittal in South Kanara district. The scheme was in operation up to 10th October, 1955.

A second station was established at Ollukkara near Trichur in erstwhile Travancore-Cochin State on 17th October, 1952. The Station was functioning till 1955.

The third station which started operation on 10th December, 1952 was at Yadehalli near Thirthahalli in Mysore State (Karnataka).

The erstwhile Bombay Government though proposed a scheme and selected a site for establishing the Station at Hutgar near Sirsi could not go ahead with the scheme.

Another Regional Station started in November 1957 by the Government of Orissa on grant-in-aid basis at Sakigopal was also closed down in July, 1963. Thus the initial programme of having regional research stations on grant - in - aid basis through state Governments could not materialise except for the one Station at Yadehalli (Thirthahalli) under the Karnataka Government.

Research Stations under the ICAC

The original programme envisaged by the ICAC was to establish Regional Stations first and then later convert one of them as a Central Station. Since the above programme did not materialise the ICAC decided in 1953 to establish the Central Arecanut Research Station (CARS). During the Second Five Year Plan period (1956-57 to 1960-61) setting up of

Regional Arecanut Research Stations (RA RS) constituted a major item of work under ICAC. Out of six stations sanctioned, five commenced working.

CENTRAL ARECANUT RESEARCH STATION, VITTAL

On the recommendations of a special sub-committee, the ICAC decided to locate the CARS at Vittal (in the erstwhile Madras State) in Karnataka in a representative arecanut tract. A Special officer (Shri P. A. Srinivasan) was appointed in June, 1955 to arrange for the acquisition of the required land and for attending preliminary works connected with the starting of the Station.

The CARS came into existence in April, 1956, with an area of 6.7 ha of land acquired for the purpose. As the work of the Station increased additional areas were acquired and the Station has now a total area of 68.34 ha.

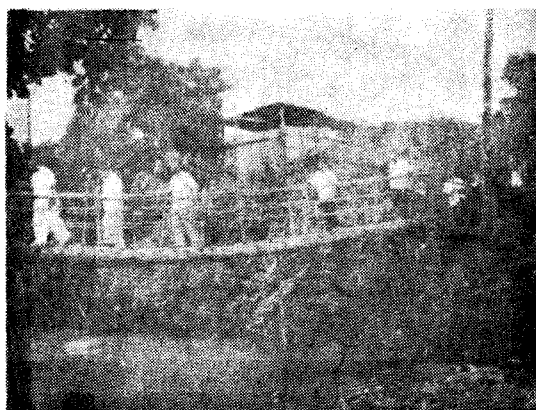
The Station is located in Vittal village, Buntwal Taluk of Dakshina Kannada district of Karnataka State, 42 km from Mangalore Railway Station on the Mangalore-Vittal-Puttur highway. It lies on 12°15'N latitude and 75°25'E longitude. The altitude of the Station ranges from 73 to 92 m above mean sea level.

A winding rivulet 'Vokkethur' runs placidly along the north-eastern boundary and then through the middle of the Station.

The soil of the Station is typically lateritic and is admixed with sand, alluvium and gravel, in varying proportions in different locations and is acidic, with a mean pH, of 5.25.

The area receives a mean rainfall 3700 mm per year distributed over 120 days. The major rainfall occurs during the south-west monsoon period from June to September and remaining during the north-east monsoon period in October and November. The months of December and January to April or even May are dry without any rainfall.

Early history and development of facilities: The terrain of the Station consisted of hillocks and shallow valleys with the rivulet running in between. Except for a small area of dry, single crop paddy land, majority of the area consisted of shrub jungle and fallow flat plots. The Station site was not well connected with a road except for a foot-path cutting across the bushes. The main hurdle to reach the location during the initial years, was the unbridged river Vokkethur. During monsoon it used to be virtually a task to reach the site. Initially the Station maintained its own country boat followed by a bamboo foot-bridge put up in 1961, till a bridge-cum-vented dam was constructed in 1967-68. At the time of taking over of the lands, there were no buildings except for two grass thatched huts. The first construction was a farm shed 6m x 4m with Mangalore tiled roof taken up in



FOOT-BRIDGE USED IN LATE 50's

1958-59. During 1960-62 one more shed designated as field laboratory (with a plinth area of 64 sq. m.) was constructed. The first major construction consisting of one laboratory building, guest house and 11 quarters to house Farm Superintendent, Research Assistants, Fieldmen and Watchmen was initiated in 1961-62 and got completed during 1963-64. Between 1970 and 1975 another set of 35 quarters for scientists and other staff besides an administrative block were constructed. The main laboratory building was extended by addition of two more rooms to house the library. Other facilities like a dispensary, a club room and a canteen were also constructed during this period. The third stage was construction of additional room for the Guest House, a farmers' hostel and seven more staff quarters which was commenced in 1978-1979.



COUNTRY BOAT USED IN 50'S

Vittal village together with the Station was electrified only in 1962-63. The main source of irrigation was the river Vokkethur. Initially the water was lifted by using *Piccottah* to irrigate the arecanut nurseries and gardens followed by diesel engine pumpsets and later supplemented

by electrically operated motor and pump-sets from 1963 onwards. As more area came into cultivation the source of irrigation was strengthened by tapping underground water through bore wells.

During the initial years the administrative wing and the scientists were housed in buildings taken on rent at the Vittal village. With the construction of laboratory, the Station started acquiring laboratory equipments and other facilities required for work. The library facilities improved gradually with the procurement of books and periodicals of both Indian and foreign.

On the field planting programme, the Station first planted a progeny garden of 2.23 ha in 1957, a spacing trial garden in 1958 and further areas in later years as and when field experiments were planned. Till 1970, all the experimental plantings were only on arecanut or crops associated with it as inter or mixed crops. From 1971, two other crops, cashew and cacao were also included in the different studies.

The original scheme had only five scientists including an Arecanut Specialist who was the head of the Station. There were three sections *viz.*, agronomy, botany and pathology. During 1963-64, two more sections, statistics and soil chemistry were added. Separate sections on entomology and plant physiology were established during 1964-65. The Station with its regional stations were merged with the Central Coconut Research Stations to form the Central Plantation Crops Research Institute (CPCRI) in January, 1970. The Station at Vittal was redesignated as Regional Station and Regional Arecanut Research Stations were converted as Research Centres of CPCRI. With the two



Dr. G. I. PATEL
THE FIRST ARECANUT SPECIALIST, CARS, VITTAL
1957-59

coordinated projects *viz.*, All India Coordinated Coconut & Arecanut Improvement Project, and Cashewnut & Spices Improvement Project coming into operation in October and December 1970 respectively, the Regional station, Vittal was further strengthened to work as centre of the two coordinated projects.

REGIONAL ARECANUT RESEARCH STATIONS:

These were established in five different agro-climatic regions of the country with the following objectives:

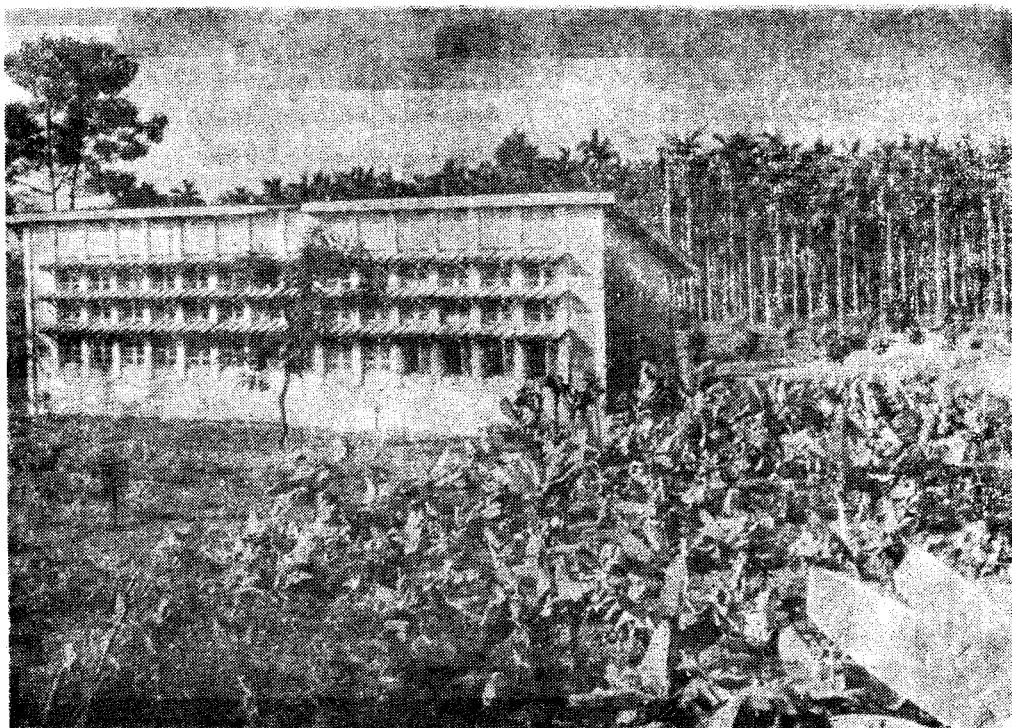
- (1) to tackle agronomical, pathological, botanical and other regional problems;
- 2) improve the quality and yield of arecanut in the region;
- (3) evolving

suitable manurial, cultural and irrigation schedules for adoption by the farmers; (4) Formulating, suggesting, and organising control measures against pests and diseases affecting arecanut in the region; (5) Investigating any other problem of economic importance to areca growers of the region and (6) raising quality areca seedlings from selected mother palms and supplying to farmers.

1. RARS, Palode: The Station was established in January, 1958. It is situated in Palode village in Nedumangad Taluk, Trivandrum District, Kerala State. The Station is 36 km away from Trivandrum city on the Trivandrum - Shencottah - Vamanapuram road. It is located at 77°2'E longitude and 8°42'N latitude and 210 to

240 m above mean sea level. The farm which was originally 11.8 ha in extent is now 31.8 ha and the soil is lateritic with pH of 4.2 to 5.0. The site is originally a portion of Vamanapuram Reserve Forest. It has Vamanapuram river on the western side, the public road to Vamanapuram on the eastern side and the reserve forest on the other two sides. There are four hillocks separated by valleys. The forest was cleared by the State Government prior to handing over of the site to the ICAC

The Station was started mainly to investigate the causes and find out the control measures for the yellow leaf disease of arecanut which is a serious problem, of the tract. The Station was also to tackle some of the important agronomic problems of the area.



REGIONAL ARECANUT RESEARCH STATION, MOHITNAGAR

2. RARS, Mohitnagar: The Station was established in February 1958. It is situated 9.7 km north-west of Jalpaiguri Railway Station on the Jalpaiguri - Siliguri State Highway in Jalpaiguri district, West Bengal State. It is located at 26°31'N latitude and 88°43'E longitude. The farm is 10.11 ha in extent and soil is mostly alluvium of the river Tista. The soil type sandy loam and the pH ranges from 4.5 to 6.0.

3. RARS, Hirehalli: The Station was established in July 1958. It is situated on the Bangalore-Poona National highway-58 km away from Bangalore, opposite to the Hirehalli Railway Station in Tumkur District, Karnataka State. It is located at 13°5'N latitude and 77°6'E longitude and about 845 m above mean sea level. The farm is in a breached tank bed with silty clay to clay loam extending to a depth of about 4 m whose pH is about 6.2. The soil gets slushy during monsoon and develops deep fissures during summer. The farm is 16.24 ha in area. It represents the *maidan* parts of Karnataka and neighbouring states of Tamil Nadu and Andhra Pradesh, where the annual rainfall does not exceed 1500 mm. The source of irrigation is deep tanks dug inside the farm.

There were no buildings at the Station at the time of acquisition. One laboratory-cum-office building and 4 quarters for the scientists and staff were constructed in 1961-62.

4. RARS, Peechi: The Station was established in September, 1958. It is situated in North Kerala at Kannara in Pananchary village in Trichur district. The Station is located on the Pattikkad-Peechi road side, 19.3 km east of Trichur town. It is at 10°3' N latitude and 76°10'E longitude and 76m above mean sea level. The

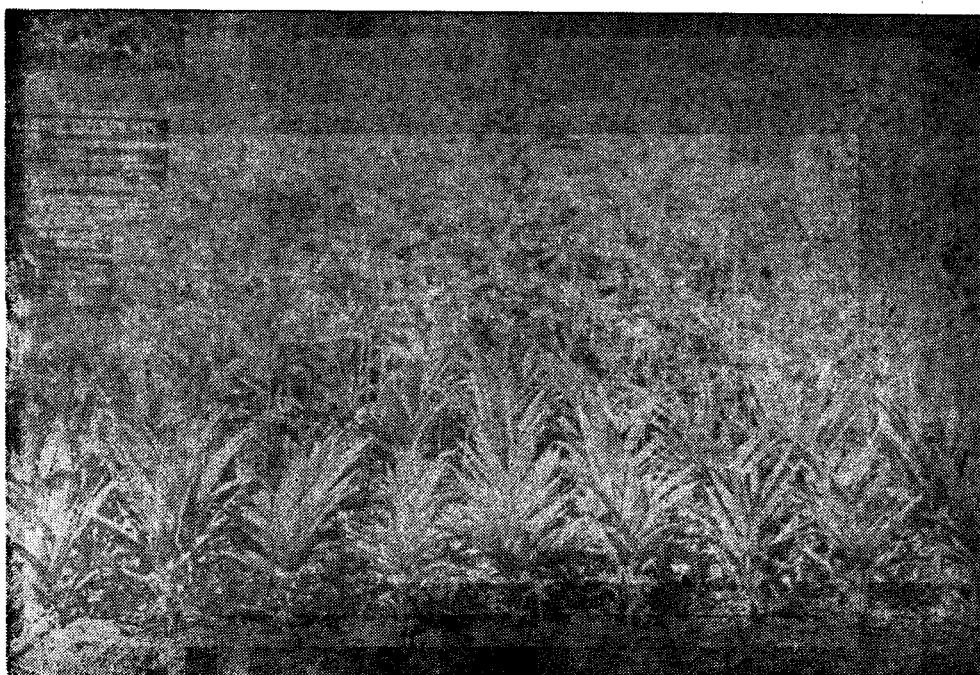
Manali river over which Peechi dam is constructed runs along the western border of the farm while the Kannara hill ranges occupy the eastern boundary. The soil of the farm is lateritic with the upper layers of the alluvial type with good admixture of sand and silt with pH ranging from 5.6 to 6.8. The total area of the farm is 14.16 ha.

There were no buildings at the Station. One laboratory-cum-office building and 5 quarters were constructed in 1960-61.

5. RARS, Kahikuchi: The Station was established in January, 1959. It is situated at a distance of 22 km from Gauhati Railway Station near Gauhati air-port (Borjhar) on Gauhati - Goalpara National highway in Assam. It lies at 26°11' N latitude and 91°47' E longitude at an altitude of 48m above mean sea level. The farm is 12.14 ha in extent where the soil is new alluvium with a sub surface laterite stratum with pH ranging from 5.0 to 5.2. There were no buildings at the Station. A laboratory-cum-administrative building and 5 quarters were constructed in 1962-63.

PROGRAMMES AND ACHIEVEMENTS OF RESEARCH STATIONS:

The country's pressing problem in the early fifties with respect to arecanut as indicated earlier was one of acute shortage in the supply of the commodity. The Research Stations immediately on establishment from mid and late fifties were therefore charged with the function of providing the know-how for increasing the production of arecanut both by expansion of area under the crop as well as by intensifying the production in the existing areas by improving the cultivation on scientific lines, through Research and Development programmes. The first step therefore was developing suitable technique for selecting



ARECANUT NURSERY

seed and raising seedlings in addition to procuring, raising and distributing seeds and seedlings both for use in the research stations and for distribution to the farmers. As a result of a series of nursery trials conducted at the research stations, the nursery techniques were standardised. Farmers were also trained in the correct technique of raising seedlings.

Concurrently research programmes towards crop improvement were taken up. This involved introducing and testing the performance of arecanut varieties from different countries besides evaluating the types available within the country. The exotic varieties of arecanuts introduced were from seven countries representing 24 types and species. The performance of these types were compared with indigenous types collected from all over the country. The promising ones were tested

under multilocation trials to find out their adaptability under different agroclimatic conditions. As a climax to these investigations a high yielding variety **Mangala** was released to the areca growers in the early seventies. It has three important characters, *viz.*, early bearing within 3-4 years, semi-tall stature and higher yield (75 per cent more than the local). This variety has been found to be superior and has wider adaptability than others tested. The variety has gained popularity among the farming community within a short span of 5 to 6 years after its release for general cultivation. Efforts are now being made to improve the purity of Mangala. In addition testing of other varieties also is in progress. An important collection made in the earlier years is the dwarf arecanut palm located near Kyatsandra of Karnataka which has about 1/3rd the height of normal type of equal age available presently for cultivation.



MANGALA
The Popular Arecanut Variety



HIREHALLI DWARF

Another important species in the collection is *Areca triandra* which has suckering habit and can be propagated by vegetative means. Both the dwarf palm and the *A. triandra* are being fully utilised in the programme of breeding for improvement in arecanut. The Institute has a few more types on the anvil awaiting release.

The third aspect in the research programme was to determine various agronomic (field) requirements *viz.*, spacing, cultural, manurial and irrigation; of the crop. These experiments were carried out in a coordinated manner not only at the main station at Vittal representing the coastal and semi *malnad* high rain fall area but also under different agroclimatic conditions prevailing at Hirehalli (representing the low rainfall *maidan*). Peechi and Palode (representing the coastal and southern Kerala with more uniform distribution of rainfall) and Mohitnagar (representing the alluvial types of

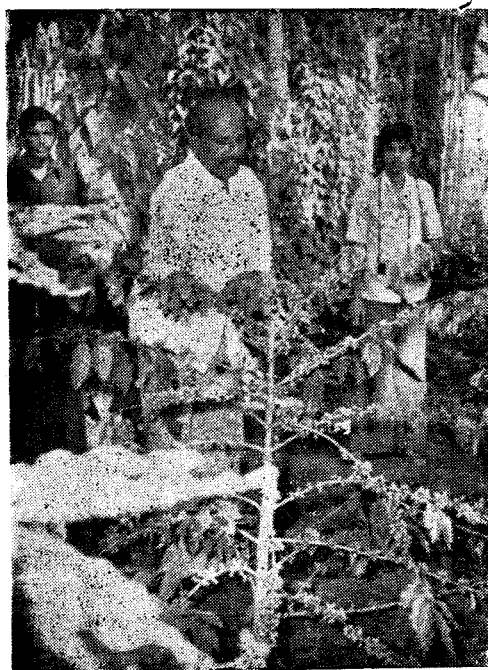
soil of West Bengal) and Kahikuchi (representing north-eastern India). These trials were in the field for more than 15 years and have helped in developing authentic recommendations. The spacing trials have suggested that the arecanut palms when planted as sole crop require a spacing of 2.7m x 2.7m or slightly closer with an average of about 7.3 sq. m space per palm for highest yield per unit area. The cultural experiment done under the *maidan* conditions of Hirehalli has indicated that digging the garden twice a year (in June and December) gives higher yield of arecanut as compared to other methods *viz.*, (i) scything grass and weeds twice a year (June and December), (ii) digging once a year (December) followed by scything weeds (June), and (iii) scything weeds twice a year (June and December) and digging once in two years. In Central Kerala digging had no advantage, but a clean cultivation without weeds was ideal. In southern Kerala on slopy lands clean cultivation and planting palms along the contour was the best. Mulching the gardens with organic matter like chopped areca leaf, arecanut husk or dry leaves from forest lands was found to conserve moisture besides suppressing weed growth.

The manurial experiments conducted have definitely proved the advantage of application of green leaf besides determining the optimum N, P and K requirements of the palm. The recommendation emerged out of these studies is application of 12kg each of green leaf and cattle manure besides nitrogen (N) 100g, phosphoric acid (P_2O_5) 40g and potash (K_2O) 140g per palm per year.

Irrigation experiments have thrown much light on the water requirement and scheduling of irrigation intervals for arecanut

In southern Kerala where gardens are not commonly irrigated, irrigation alone has been able to increase yield by two to three times. The water requirement of arecanut in central Kerala during the dry months has been found to be 82.5cm. At Vittal, irrigation requirement has been worked out based on evapotranspiration. An irrigation of 30 mm depth when the evaporation is 30 mm has been found the best. Labour saving methods of irrigation like sprinkler, perfo and drip or trickle systems are being evaluated in view of economy and efficient use of water.

The scientists were also aware of the need for utilising the available resources (land, water, sunshine, etc.) as well as the inputs to the maximum. Studies on the



ARECANUT WITH COFFEE INTERCROP



ARECANUT WITH PEPPER INTER CROP

rooting habit and growth (spread of crown) of the palm have indicated that both the soil as well as the above ground space is not fully utilised by the areca palm when it is raised as a pure plantation. This is more so during the early 4-5 years of prebearing growth period of the palm. The Institute initiated systematic trials with a large number of annual and perennial crops as inter and mixed crops in arecanut gardens. Crops suitable for different agroclimatic regions were screened and their cultivation practices were standardised. Among the annual crops or crops of similar nature, elephant foot yam (*Amorphophalus companulatus*), arrow-root and banana are a few examples. If the requirement of farmer is green fodder, Guinea grass (*Panicum maximum*) is recommended for cultivation in the inter-spaces. Among the perennials, pepper,



ARECANUT AND CACAO

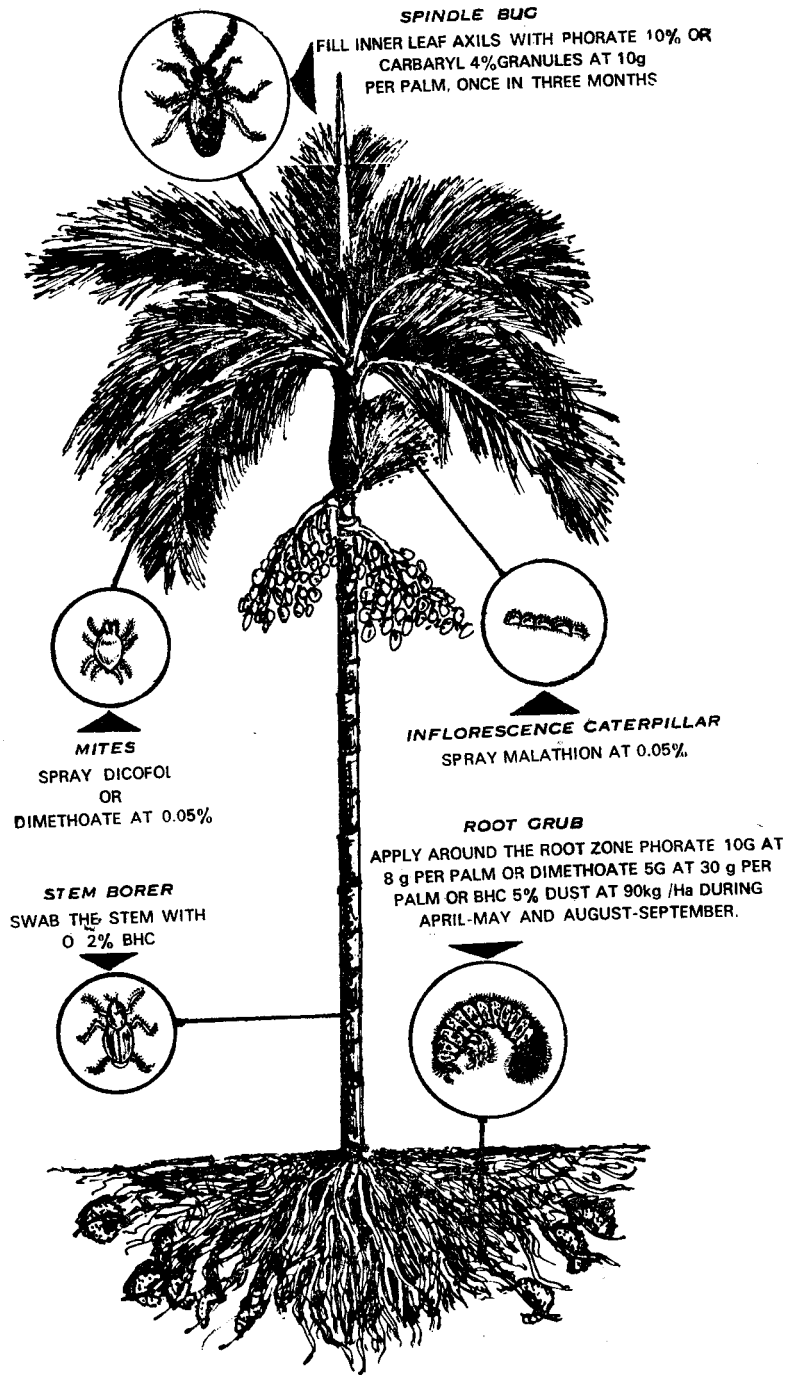
cardamom and betelvine are suggested depending upon the locality and the needs of the market. The most notable introduction is cacao as a mixed crop with arecanut. Until early 60's, cacao was known in India only as an ornamental or museum tree in some of the botanical or horticultural gardens and house compounds and back yards of bungalows and religious institutions. India was importing till recently its entire requirements of cocoa. By late 60's or early 70's cacao had established as a successful mixed crop with arecanut. Today, substantial area of arecanut gardens are seen flourishing well with cacao. Cacao is spreading fast in the arecanut gardens of Kerala and Karnataka States. With cacao as a mixed crop it is possible to double the income of arecanut farmers. In the existing arecanut gardens with the normal spacing of 2.7m×2.7m for arecanut, the spacing recommended for cacao is 2.7m×5.4m. From the spacing trial running at Vittal for

the combined cropping system, a spacing of 3.3m×3.3m for both the crops is indicated as optimum.

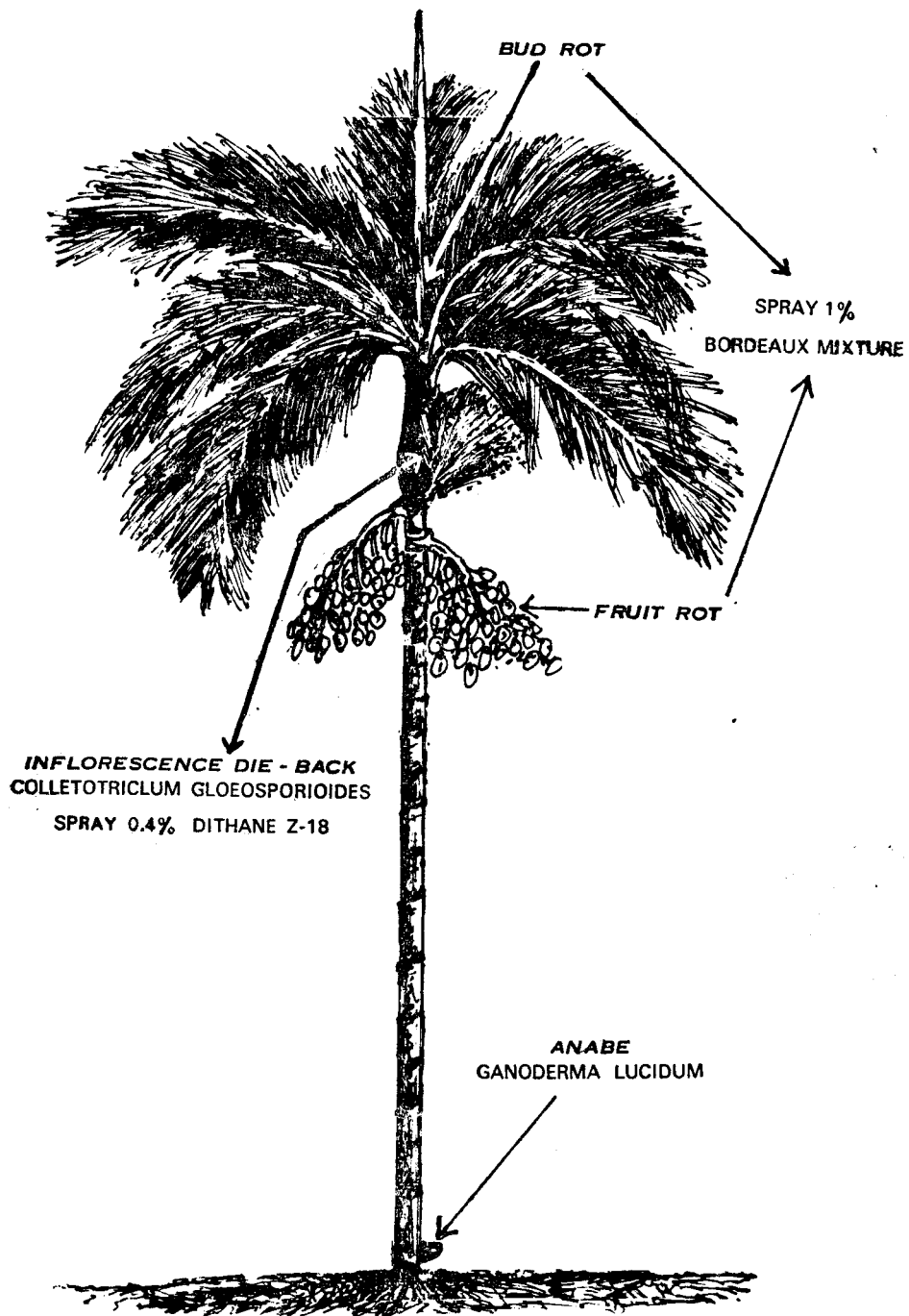
Alongside with the programmes on crop improvement, research efforts were made on studying the various pests and diseases of arecanut prevailing in different areas. Almost all the pests both major and minor have been studied. For all the pests appropriate chemical control measures have been evolved and recommended. The most important of the pests are root grubs (*Leucopholis burmeisteri*) feeding on roots, spindle bug (*Carvelhoea arecae*) harbouring in the leaf angles and feeding on the tender unfurled spindle and mites of various species, damaging the leaf surface, green fruits; etc.

Several diseases like the Fruit-rot and Bud-rot (both caused by *Phytophthora arecae*), Anabe caused by *Ganoderma lucidum* and Yellow Leaf Disease are damaging the palm to varying extents. Fruit-Rot (Kole-roga or Mahali) has been brought under check. Various fungicides have been tried but Bordeaux mixture continues to be the most effective preventive spray. Trials are under way to control the disease by using systemic fungicides. A programme has also been initiated on the possibility of forecasting the disease well in advance of its appearance. Anabe disease is still a problem to the scientists and methods of early diagnosis through various means are being tested as prelude to evolving a suitable control measure.

The Yellow Leaf Disease which has extended to about 32,000 ha in Kerala and a few isolated pockets in Karnataka is the most serious disease of arecanut. The affected palms show yellowing of leaves and bleached up appearance with loss of vigour



PESTS OF ARECANUT



DISEASES OF ARECANUT

The nuts of affected palms have a darkening of kernel and are unsuitable for chewing. Studies on the disease have been initiated as early as 1958 with the establishment of the Research Centre at Palode. Several biotic factors like fungi, bacteria, virus and MLO have been reported to be associated with the disease. The pathogenicity of the associated organisms has not been proved. The palms grown in low-lying areas with high water table are found more vulnerable for the spread of the disease. Nutritional studies made so far have also not been able to arrive at the cause of the disease. A large number of cultivars, genotypes and hybrids were tested and found not tolerant or resistant to disease, though there were some indications of tolerance among the hybrids with dwarf as one of the parents. Efforts are being made for a more intensified study on the role of micronutrients in the disease complex.

A new bacterial disease was recorded on arecanut from the *maidan* parts (Tumkur) of Karnataka State, caused by *Xanthomonas arecae*. The bacterium produces a toxic substance causing severe water soaked lesions in the infected leaves. Spraying the foliage with 100-200 ppm streptomycin and tetracycline effectively controlled the disease.

TECHNOLOGICAL RESEARCH

The original programme of ICAC was to locate the Technological Research Unit on arecanut also at Vittal at the Central Arecanut Research Station. Since the facilities required for such a research effort were not available at that time at Vittal the Arecanut Technology Unit was temporarily located at the Central Food Technological Research Institute (CFTRI) Mysore. The

unit started functioning from February, 1959. Later the scheme got merged with the CFTRI with effect from July 1962.

Important achievements of the Technology Unit of ICAC at CFTRI were:

- 1) perfecting the method for storage of ripe arecanut fruits for off-season use,
- 2) perfecting a drier for processing and drying of arecanuts,
- 3) chemical analysis of various trade varieties of arecanut with a view to prescribing quality grade standards and
- 4) utilisation of arecanut husk for manufacture of paper, etc.

Side by side with the establishment of the Technology Unit at the CFTRI the ICAC arranged several schemes for Technological Research on arecanut and its by-products under various universities and institutions on a grant-in-aid basis. These schemes included, (1) investigations on the utilisation of byproducts of arecanut at Gauhati University, Gauhati; (2) investigations on the byproducts of arecanut at Andhra University; (3) investigation on alkaloids of arecanut at Aligarh University; (4) researches on byproducts of arecanut at Central Leather Research Institute, Madras; (5) researches on byproducts of arecanut at Forest Research Institute and Colleges, Dehra Dun; (6) researches on properties of arecanut at Delhi University; (7) study of the method to preserve the nuts in fresh conditions at Kerala University; (8) utilisation of arecanut for medicinal or other commercial purposes at Calcutta Chemicals Co. Ltd., Calcutta; and (9) investigations of phenolic constituents and colouring in arecanut at Cotton College, Gauhati.

These schemes were helpful in knowing the basic quality, chemical constituents and certain pharmacological properties of arecanut.

A further thrust to research efforts on the technology and alternate uses of arecanut was given by the CPCRI during the seventies in collaboration with various institutes/agencies viz., Cancer Research Institute, Bombay; Central Drug Research Institute, Lucknow; Indian Drug Research Laboratory, Poona; Department of Chemical Technology, University of Bombay; Regional Research Laboratory Hyderabad; Oil Technological Research Institute, Anantapur; Central Leather Research Institute, Madras and Shri SRK Menon's Industrial Laboratory, North Parur (Kerala) and Industries like Punalur Paper Mills Ltd, Punalur. These schemes were financed by the Karnataka State Agricultural Marketing Board.

Studies made on the chemical analysis showed that arecanut contains 10-12 per cent fat, 27-32 per cent polysachharides, 16-20 per cent polyphenols, 7 per cent protein and 1.5 per cent alkaloides. Initial studies have indicated the possibility of



OBJECT OF ART FROM LEAF SHEATH

using arecanut fat for confectionary after suitable modification. The polymerised polyphenolics in arecanut can be used as a natural colouring matter in food and non-food industries. Use of arecoline and other alkaloides in pharmacology is indicated. Arecanut husk has been found suitable for making hard board and wrapping paper. It has been possible to make plyboards from arecanut leaf-sheath and use them in making tea chests. Other materials like file boards, veneer panels, bags, cups and plates could also be made out of leaf sheath.

DEVELOPMENT

As part of the developmental activity, the ICAC launched several programmes encouraging extension of area under arecanut and for improving the cultivation and production in the existing gardens by arranging supply of various inputs like planting material, fertilizers, pesticides and sprayers at subsidised rates besides making extensive propaganda on improved cultivation practices through various publicity media. At least two of the steps *viz.*, (a) arranging and supplying of seeds and seedlings to the farmers and (b) publicising the scientific methods of cultivation were very rewarding.

Establishment of arecanut nurseries:

The most important development programme of the ICAC was establishment of arecanut nurseries from early 50's to produce quality seedlings to cover new areas and to revitalise existing bearing gardens. Based on the pattern of financing of these schemes, they were classified into four categories *viz.*, (1) grant-in-aid nurseries where the State Governments were implementing the schemes with 50 per cent financial assistance from the Committee; (2) Second Five Year Plan nurseries sanctioned by the Government of India for the Plan period. Fifty per cent of the expenditure was shared by the Centre and the balance by the concerned state government; (3) Research Station nurseries where the expenditure was borne in full by the Committee in the case of its own

Research Stations and 50 per cent in the case of grant-in-aid Research Stations, and (4) Certified Village Nurseries, the entire costs of which were met by the Committee. The grant-in-aid nurseries were located in the States of Andhra Pradesh, Assam and Andamans. The Second Five Year Plan nurseries were in Kerala, Karnataka, Assam, West Bengal and Orissa. The nurseries attached to the Research Stations were in Kahikuchi (Assam), Jalpaiguri (West Bengal), Sakhigopal (Orissa), Thirthahalli Hirehalli and Vittal (Karnataka), Peechi and Palode (Kerala). The certified nurseries (numbering 360) were located in the major arecanut growing states of Kerala, Karnataka, Assam and West Bengal. Though the actual number of seedlings distributed through the above nurseries is not available, an approximate estimate can be made as follows:

<i>Agency</i>	<i>(No. distributed approx)</i>
1. Grant-in-aid nurseries	6,37,500
2. Second Five Year Plan nurseries	6,01,000
3. Research Station nurseries	18,22,800
4. Certified nurseries	<u>11,98,900</u>
Total up to end of 1960-61	42,60,200
Between 1961-62 and 1969-70	<u>13,00,000</u>
Total:	<u>55,60,200</u>

Publicity programme:

Under this programme, the ICAC published a periodical (Arecanut Bulletin / Journal), several leaflets and pamphlets besides colour posters were made available to the farmers in local languages from the year 1950. These publications were covering various aspects of arecanut cultivation on scientific lines besides suggesting the steps to be taken for the control of pests and diseases of the crop. The ICAC also published a Picture Book (Flip Book) on Arecanut Cultivation and an Arecanut Atlas.

A documentary Film on GROWING ARECANUT was produced by the ICAC in 1955. When more information was available, the film was reproduced in 1972 in revised form. These films were screened before the gathering of farmers to educate them on improved methods of cultivation.

The ICAC as well as the Research Stations used to participate in various

exhibitions arranged by both Government and private agencies. The Research Stations were also conducting Farmers' week and **Kisan Melas** in Research Stations almost annually which attracted large number of farmers where exchange of ideas and farmers problems used to be discussed. The scientists of the Research Stations were keeping close contact with the farmers. Frequent visits to their fields were also made to make on the spot study of the problems and render necessary advisory services to the farmers.

After the dissolution of ICAC in 1965, the developmental programmes were entrusted to the Indian Arecanut Development Council.

Later from 1979, the Regional Research Station, Vittal and the Research Centres have also been involved in the Lab-to-Land programmes of the Indian Council of Agricultural Research.

ECONOMICS AND MARKETING

The lack of adequate marketing facilities for the arecanut and the exploitation of arecanut growers by traders was realised even from early days. The *ad hoc* Arecanut Committee in the first meeting resolved to appoint a Cooperative Marketing Officer to go into the problems of arecanut marketing and organise cooperative societies for the proper marketing of arecanuts. Shri K. Shamanna who was appointed as Co-operative Marketing Officer in December, 1948 after visiting important arecanut collection centres in Cochin, Travancore, and Malabar (all in Kerala now); South Kanara and North Kanara (both in Karnataka) Ratnagiri (Maharashtra) and Bombay came forward with specific recommendations for organising cooperative marketing societies in different arecanut growing areas.

The ICAC as a matter of policy took up several steps to organise and develop cooperative marketing units in important arecanut producing states of Karnataka, Kerala, Assam and Maharashtra. The Committee extended financial assistance to such cooperative marketing societies which were not in a position to function economically with their own resources. It also helped to organise and establish new societies in areas where such facilities were not available.

The Committee was also interested in the successful working of the Regulated Markets for arecanut established under the Agricultural Produce Markets Act in the

important assembling centres where the areca growers generally sell their produce. Regulated Markets were established in all the important arecanut assembling centres in Karnataka State and arecanut was included as a notified crop under the Act. In regard to Kerala a Regulated Market for arecanut was established in the erstwhile Malabar district. The Committee drew the attention of the various State Governments to the need for establishing regulated markets in the important marketing areas.

The ICAC right from its inception was much concerned with the unrestricted imports of arecanuts and its repercussions on the domestic industry. In view of this, one of its earliest resolutions was to recommend to the Government of India the need for restricting the unabated imports. The Government of India, realising the need for protecting the industry, began to regulate arecanut imports from 1949-50 onwards. Protection duty on imports besides a ceiling on the monetary value and quantum of imports were imposed. The import duty was slowly increased and the quantity of imports as well as the monetary ceiling on the imports were slowly reduced periodically. The above measures gave a boost to the indigenous production.

Slump in the arecanut market and birth of CAMPCO: The intensive drive and concentrated efforts of ICAC from 1949 to 1965 and later by Arecanut Development Council and ICAR through the planned

Research and Development programmes brought the country to the foot-steps of self-sufficiency in arecanut by the end of sixties, a few years earlier than anticipated. The improvement in the internal marketing system was not probably commensurate with the rapid rate of increase in production which has resulted in lowering of arecanut prices in the production centres and a panic among the growers towards the end of 1971. The decline in the prices was as much as 30-40 per cent in 1973 from that of 1969-70 levels.

On the representations of the growers, the Government of Karnataka constituted a Committee in 1972 under the Chairmanship of Shri T.T. Paulose to examine the causes of declining prices and suggest suitable

means to improve the condition. The Committee in its report submitted to the Government in March 1973, recommended among other things, setting up of Central organisation for procurement of the bulk of the produce, for its proper storage and timely release for sale as and when there is demand. The Kerala Government also set up a similar Committee to go into the problem of falling prices of arecanut. An unified thinking and approach on the part of growers and the two state Governments of Karnataka and Kerala resulted in the birth of the Central Arecanut Marketing and Processing Cooperative Limited (CAMPCO) in July 1973. Within a short period of 2-3 years after its establishment, the CAMPCO was able to bring an impressive impact in stabilising the arecanut prices.

IMPACT OF R AND D PROGRAMMES ON THE INDUSTRY

The research, development and economics and marketing programmes had a spectacular impact on the production of arecanut in the country in the last 25 years. There was both an increase in the cultivated area and productivity as is evident from the following table.

practices of the crop including efficient control of pests and diseases. The farmers are motivated towards scientific cultivation because of the enhanced returns and fairly steady market condition. They have become aware of the high yielding varieties and the need for adopting

Area, Production and Productivity of Arecanut

Year	Area		Production		Productivity	
	('000ha)	% increase	('000 t)	% increase	kg / ha	% increase
1956 - 57	94.80	—	74.7	—	789	—
1980 - 81	184.50	94.6	191.4	156.2	1037	31.3

The area under arecanut increased by 94.6 per cent within the last 25 years, the production recorded a raise of 156.2 per cent and productivity per ha increased by 31.3 per cent. While the increase in area might be attributed to the various developmental measures taken up by various agencies, the productivity per unit area can be attributed on the gain in the scientific knowledge and application in cultivation

appropriate cultivation practices and are eager to know the latest findings in the methods of control of pests and diseases. The farmers are conscious of the need for bringing down the cost of cultivation or widening the gap between cost of cultivation and income and increase the income per unit area. Inter and mixed cropping have become popular to achieve these ends.

APPENDIX I

IMPORTANT EVENTS

- 1947 *Ad hoc* Arecanut Committee formed
- 1949 Government of India constituted Indian Central Arecanut Committee
- 1951 Nursery schemes initiated by ICAC
- 1952 Establishment of Research Station for investigation of stem-breaking disease of arecanut at Vittal
- 1955 Land taken possession for establishment of Central Arecanut Research Station
- 1956 Establishment of CARS
- 1958 RARS, Peechi came into existence
RARS, Hirehalli came into existence
RARS, Mohitnagar came into existence
- 1959 RARS, Kahikuchi came into existence
RARS, Palode came into existence
Arecanut Technology unit started functioning at CFTRI
- 1961 RARS, Palode - Construction of laboratory building completed
RARS, Peechi - Construction of laboratory building completed
RARS, Mohitnagar - Construction of laboratory building completed
- 1962 RARS Hirehalli, construction of laboratory building completed
Arecanut Technology unit of ICAC at CFTRI got merged with CFTRI
- 1963 CARS, Vittal got electrified
- 1964 Construction of laboratory building, guest house and 11 quarters at CARS completed
- 1966 The Central and Regional Arecanut Research Stations came under direct control of ICAR
- 1970 The Central and Regional Arecanut Research Stations and the Central Coconut Research Stations got merged to form the Central Plantation Crops Research Institute with head-quarters at Kasaragod
- 1975 Construction of 35 additional quarters and administrative building completed

APPENDIX II

SCIENTIFIC PAPERS ON ARECANUT PUBLISHED

Year	SUBJECT								Total	
	Agronomy Sci & Plant	Soil Phy.	Botany	Entomo- logy	Patho- logy	Market- ing	Statistics	Chem- istry		Other uses
1950	1	-	-	-	-	2	-	-	-	3
1951	8	-	-	-	1	5	-	-	-	14
1952	3	-	-	-	2	3	-	-	2	10
1953	1	-	-	-	1	-	-	-	1	3
1954	5	1	-	-	4	-	1	1	-	12
1955	8	1	1	1	1	-	-	-	4	15
1956	5	4	-	-	4	-	-	-	-	13
1957	4	2	-	-	3	1	1	1	-	12
1958	5	1	-	-	1	-	-	1	-	8
1959	2	5	2	2	1	-	-	2	2	14
1960	4	3	3	3	5	1	-	-	2	18
1961	5	5	3	3	3	-	-	1	-	17
1962	2	5	2	2	7	-	-	-	3	19
1963	3	7	5	5	4	1	-	7	6	33
1964	6	4	4	4	1	3	1	3	-	22
1965	4	6	4	4	6	-	1	2	-	23
1966	1	2	-	-	2	-	1	1	2	9
1967	-	3	1	1	-	-	-	-	1	5
1968	8	2	2	2	1	-	1	2	2	18
1969	1	-	-	2	-	-	-	-	2	5
1970	3	3	-	-	4	-	-	-	-	10
1971	6	-	-	-	6	-	-	-	-	12
1972	4	3	1	1	1	-	-	1	-	10
1973	10	-	-	1	-	-	-	-	-	11
1974	5	2	1	1	2	-	-	-	1	11
1975	1	2	1	1	2	-	-	1	-	7
1976	1	-	-	4	12	-	-	-	1	18
1977	3	2	1	1	-	1	-	1	-	8
1978	2	1	-	-	3	-	-	-	-	6
1979	1	-	-	5	5	-	-	-	1	12
1980	1	-	-	-	-	-	-	-	-	1
1981	-	-	-	1	1	-	-	-	-	2
Total	113	64	44	44	83	17	6	24	30	381

APPENDIX III

FROM THE VISITORS' BOOK (CPCRI-RS, VITTAL)

Name and address of the dignitary visited	Comments made
10-8-1957 Dr. V. G. PENSE Statistical Adviser, ICAR, New Delhi	The staff is doing good work in developing the area. Certain minimum facilities, e. g; an approach across the river, some buildings, should be provided very quickly.
25-10-1957 Sri. K. VENKATRAMANA GOWDA M. L. A., Puttur (South Kanara)	Necessary buildings have got to be put up at an early date for housing office and for purpose of residence of the members of the staff. A pucca road and a bridge are inevitable.
30-10-1957 Dr. B. P. PAL Director, IARI, New Delhi	—
16-5-1958 Sri. M. N. CHOUTA, B.A.,B.L. Vakil and Former President, SCCC Bank Ltd., Mangalore and Ex-Member, Indian Central Arecanut Committee	There is vast progress alround from what I saw when I visited last. This is a place of pilgrimage to every areca farmer to take informative guidance for his own cultivation.
13-6-1958 Fr. PETER VERHACLEEN St. Thomas Seminary, Mangalore	Within a few years barren hills have been changed into a beautiful garden to encourage the rural people in the development of the plots.
28-1-1960 Dr. J. S. PATEL Agriculture Commissioner with Govt. of India, New Delhi	I am glad to have seen this Station.
20-11-1960 Sri. C. J. PADMANABHA Deputy Commissioner, Mangalore	It was instructive and educative to go round the exhibition arranged in connection with areca growers week. The Station is very popular with areca cultivators.

14-12-1960
Sri. KADIDAL MANJAPPA
Minister for Revenue, Govt. of Karnataka

I was very much pleased with the work done at this Station.

18-1-1961
Sri. UPENDRANATH BARMON
Chairman, Public Accounts Committee,
Parliament of India

After visiting the research institute and the nurseries and plantations of different years, we are happy to note that this young institute is doing very well towards progress and for the development.

22-4-1961
Sri. N. M. ADYANTHAYA
President, Karkal Taluk Board, Karkal

The entire surroundings are kept very clean. The Officers-in-charge are very courteous and deserve all praise.

22-4-1961
Sri. K. J. BALLAL
Ballal Bagh, Mangalore

Everybody must see the Station before he is starting the garden.

25-1-1962
Sri. K. H. SRINIVASA MURTHY and
Sri. RAMADAS KAMATH
along with a party of 63 Gramasevak
Trainees
Instructor-in-charge of Panchayat &
Instructor in Agril. GTC Kendra

Visited the Research Station and the trainees learnt all about arecanut and the visit was very useful to the trainees.

1-8-1962
Sri. D. MARULE GOWDA
Arecanut Grower, Kallambella, Sira Taluk,
Tumkur Dist.

The research programme regarding the different proportion and combination of manuring, spacing tests also bulk gardening are highly impressive. I wish some experiments regarding best and profitable curing of nuts should be undertaken specially a comparative study and experiments may be conducted with regard to chali way of curing as well as slicing and boiling.

7-12-1962
Mr. DAVID S. CALDWELL
Rural Route 2, Connersuille, Indiana,
United States

The United States would be a good market for arecanut chewing gum. We use a lot of chewing gum. I am looking forward to the day when I can relive part of my Indian experiences by chewing arecanut gum.

<p>4-1-1963 Sri. O. D. GARG. Secretary, ICAR Secretary, ICAC Calicut</p>	<p>I was much pleased to find the cooperative spirit and the enthusiasm of the research workers.</p>
<p>3-2-1963 Sri. V. SRINIVASA SHETTY, M.L.C. Coondapur</p>	<p>This is my third visit to the farm. The improvement has been beyond my expectations.</p>
<p>19-3-1963 COMPOST TRAINING CAMP TRAINEES Manchi, Buntwal Tq.</p>	<p>It is very impressive and instructive to go round the farm.</p>
<p>22-5-1963 Sri. JAGANATH RAO, Chandragiri Member of Parliament, New Delhi</p>	<p>This Station is well maintained and one can gather useful information.</p>
<p>26-5-1963 Sri. K. M. HEGDE, Bhairumbe Sirsi, North Kanara</p>	<p>Arecanut drying machine is very much useful to our area where tendernuts are dried.</p>
<p>23-10-1963 Sri. P. J. GREGORY Secretary, Indian Central Coconut Committee, Ernakulam</p>	<p>I visited the CARS, Vittal years ago. I am happy to note that Research Station has progressed much from that time. The bulk garden is really good and can be taken as a model for all arecanut growers.</p>
<p>18-12-1963 A. Batch of 43 students of the III Year B.Sc. (Agri) from Agricultural College, Hebbal, Bangalore UAS Bangalore</p>	<p>We had a very interesting and educative time going round the centre.</p>
<p>18-12-1963 Sri. SIDDIQUE UMMAR Sandal Wood Estate Planter Mercara, North Coorg</p>	<p>I have travelled all over the area including nursery and am very much pleased of the experiments and is worth seen by all areca growers.</p>
<p>19-2-1964 Progressive cultivators and Zilla Parishad Office bearers from Ratnagiri district Ratnagiri</p>	<p>Got the information about cultivation and research work going on in the station.</p>

<p>3-6-1964 Sri. A. BHIMA BHAT Vice President ICAC</p>	<p>It is a pleasure to note that the Research Station is coming up very well.</p>
<p>27-8-1964 Sri. K. M. VENKATRAMANA GOWDA Land-Holder, Sullia, S. K. Kurunjekar Brothers, Sullia.</p>	<p>The research work is very helpful to all the people who cultivate areca privately. Regarding the experimentation in distance, 9'x9' is the best of all.</p>
<p>1-11-1964 Dr. K. RAMA BHAT President, Taluk Congress Committee and Member, Taluk Board, Thirthahalli</p>	<p>Being a regular visitor to the Station since its inception, I am very much satisfied about its progress. I wish that this Station will be a place of pilgrimage for the areca growers.</p>
<p>27-12-1964 A batch of 105 students from the College of Agriculture, Dharwar Sri. K. G. VERGHESE, Sr. Lecturer and Sri K. S. ALWA, Lecturer, UAS, Dharwar.</p>	<p>Visited the farm and the students were taken round by the Areca Specialist and Agronomist. Very promising work is being carried out at this Station. The work being done is very interesting.</p>
<p>14-2-1965 Dr. V. N. MADHAVA RAO, Reader in Horticulture, Agric. College & Res. Institute, Coimbatore.</p>	<p>Visited the Station with a party of seven post-graduate students from the Agricultural College, Coimbatore.</p>
<p>26-5-1965 Sri. A. SHANKER ALVA, Member of Parliament, Mangalore.</p>	<p>The Institute is doing very good work and takes keen interest in the areca growers of the locality.</p>
<p>30-12-1965 Sri. K. P. A. MENON, OSD, ICAR</p>	<p>I was much impressed with the great potentiality which this Institution possesses. Now that the Institute has come under the direct management of the ICAR I do hope the Research workers who are trying to solve some of the difficult problems of Indian Agriculture will get the much sought after facilities.</p>

<p>24-2-1966 Sri. S. R THAKUR, and J. R. Kamat. Panjim, Goa, PB 52</p>	<p>Amongst few gardens visited in Mysore, Kerala and Maharashtra this garden indeed has done excellent works.</p>
<p>5-8-1966 Sri. M. K. DEVARAJ Advocate and Farmer, Rajagrha Mangalore - 2</p>	<p>I have visited this farm several times. This time I see lot of improvements in the gardens and experimental farms also. My ambition is to visit this ideal farm every year.</p>
<p>11-11-1966 Sri. K. C. NAIK, Vice Chancellor Agri. Univ., Bangalore</p>	<p>I was looking forward to visit this Station and I am happy to see that it is maintaining progress.</p>
<p>11-2-1967 Dr. K. KRISHNAMURTHY, Assoc. Professor (Agronomy), UAS Bangalore</p>	<p>The fertilizer experiment, the spacing and mixed cropping trials needs no greater compliments. The varietal collections are very interesting.</p>
<p>24-11-1967 Sri. P. S. HARIHARAN Addl. Secretary, ICAR</p>	<p>—</p>
<p>19-9-1968 Sri. B. S. VARADARAJAN Jt. D. A. Dev. IC.P.OOD Agrl. Advisor Canara Bank, PO Bangalore-2</p>	<p>I have visited this Station after a lapse of 6 years and I am happy to record that fruits of Research Sub-Committees endeavours have come to bearing. I would say that this is one Research Institution which has tackled problems of arecanut growers and provide solution to them.</p>
<p>15-11-1968 Sri. M. C. POTHEN, Planter, Calicut Chairman, Arecanut Development Council.</p>	<p>I very much appreciate the interest taken by the young scientists and the way in which they are tackling the various problems connected with this plant even after the marketing stage.</p>
<p>1-2-1969 Sri. ANNASAHEB P. SHINDE Union Minister of State, Food and Agriculture, New Delhi</p>	<p>I am going back with good impression of the work being carried on by our Director and young scientists. Intercropping of cocoa, banana etc, with arecanut has also great importance. Scientists should be given encouragement.</p>

4-3-1969

Mr. K. C. SHADDOCK
Cadbury Fry (India) Pvt. Ltd.

Quite fascinating. The work which is now being undertaken on the interplanting of arecanut with cocoa promises very well for the future and would well prove of significant economic value.

6-10-1969

Sri DALJIT SINGH
Dy. Comm. (Hort.), Min. of Food,
Agri. C.D. & Coop. (Dept. of Agri)
New Delhi

A very interesting institute, does excellent work on areca palm. Study of other crops like cocoa as a companion crop is praiseworthy. The institute has gone ahead and achieved something despite handicaps.

17-11-1969

Sri G. RANGASWAMI
Dean, Univ. of Agrl. Sciences
Bangalore - 24

I am happy to see the neatly maintained laboratories and well planned exhibits for visitors.

4-1-1970

Sri ANNASAHEB P. SHINDE
Union Minister of Food & Agriculture
Govt. of India

I have great hopes and expectations from this Station. The Station is doing well. I wish it sets record for other research stations in actual performance.

11 January 1970

Dr. A. B. JOSHI
Dy. Director General, ICAR, N. Delhi

I see the coming of an arecanut revolution through high yielding varieties and hybrids.

20-11-1970

Participants of the workshop on Financing
Agriculture of Canara Bank
Canara Bank

We had very nice and understanding tour of the areca gardens and brilliant exposition of the Areca cultivation.

29-10-1970

Mr. W. R. FEVER
Cadbury - Schweppers Ltd. Bournville UK

I regret my time was limited but it was sufficient to see and talk about the plans for cocoa work. This seems excellently planned with regard to the two important aspects of establishment and spacing.

20-2-1971

Sri. V. R. KRISHNAN EZHUTHACHAN
Member, Indian Central Coconut Development Council & President Trichur Dt. Coop. Bank along with Mrs. VR Krishnan Ezhuthachan and V. K. Ramkumar Student Medical College, Calicut

It was about a decade ago that I visited this Station during its formative period when it was facing a lot of teething troubles. Now I find the developments that have since come about are remarkable.

11-4-1971
Prof. T.C.N. SINGH
Emeritus Scientist, ICAR

And I am very much impressed with good and original work going on in each section.

12-6-1971
Sri. M. PANDA
Lecturer in Entomology, Univ. of Kalyani,
Kalyani PO, Nadia Dt. WB

Along with a group of students of B.Sc. (Ag), Hons class I have visited the CARS. We have been impressed by the research work carried on here.

25-10-1971
Sri. S. L. KATYAL
Asst. Director General (Hort.) ICAR
New Delhi

I am very happy to see the station and its recent achievements in bringing out VTL-3 variety of arecanut, a good combination of growth of cocoa with arecanut palms, the early bearing of pepper, the improvement in laboratory work, the additional experiments laid out, the maximum production plot, the manurial, spacing, irrigation and inter-cultivation trials and overall, the general enthusiasm and the dedication of the staff members and scientists for their work. All my best wishes are for the success of the Station and its able and devoted workers.

16-11-1971
Mr. CHRISTOPHER OBASOLA
Nigerian Instt. for Oil Palm Research,
Benin City, Nigeria

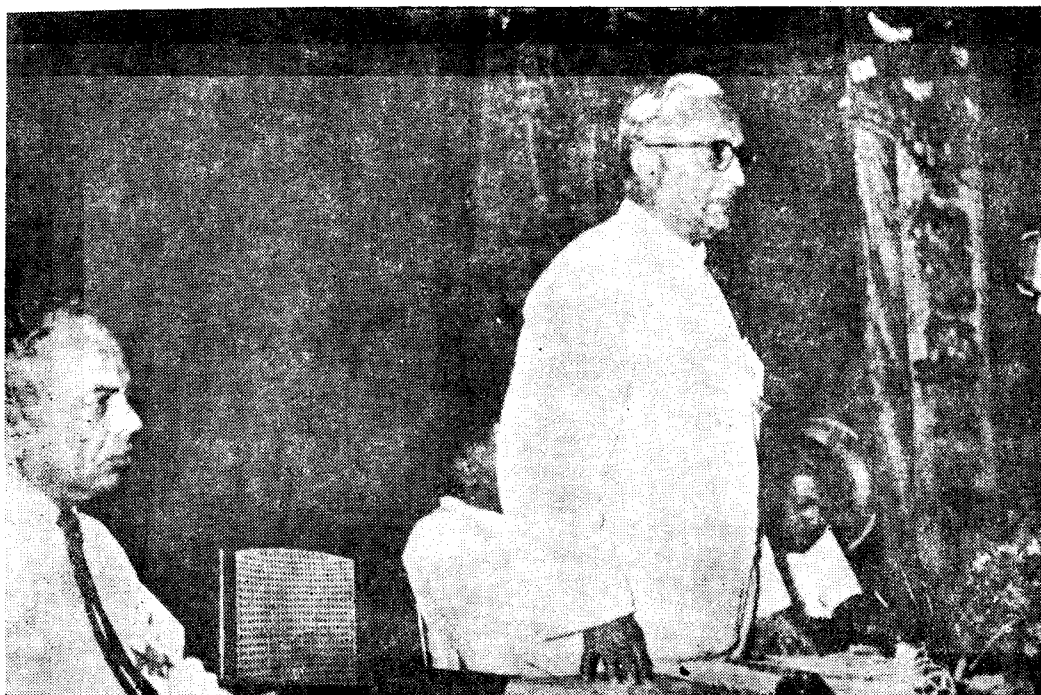
22-2-1972
Dr. DIOGENES COBRAL do Vale
Prof. Plant Science, Dept. Federal
University of Ceare, Fortaleza-Ceara, Brazil

I am very well impressed by the areca palm station. Excellent organization, young and capable staff. Congratulations.

5-4-1972
Dr. H R ARAKERI
Member, NCA, New Delhi

I am glad I was able to visit the Station now at last. It was developed into a good Station. The staff especially in the initial stages must have worked very hard under very adverse conditions with pioneering spirit. There are very well laid out experiments in progress. There is very good relationship maintained between the staff and the growers in the area.

<p>12-9-1972 Sri. SUKHDEV SINGH Director of Research Punjab Agri. Univ. Ludhiana</p>	<p>I really enjoyed visiting the Institute. Apart from the research work the layout, planning and setting of the place is very impressive.</p>
<p>3-11-1972 Sris. L. T. THIMMAPPA HEGDE and T. S. CHANDRASEKHAR RAO President/Secretary, Sagar Areerca Growers Association, Sagar.</p>	<p>We are very happy to visit the Research Station. Within a span of 15 years, the Res. Station has achieved tremendous progress.</p>
<p>28-5-1973 Prof. D. J. RASKI Dept. of Nematolog, Univ. of Davis, USA</p>	<p>—</p>
<p>18-8-1973 Sri. M. G. SATHE The Sathe Biscuit & Chocolate Co. Poona</p>	<p>The pioneering work the Institute is doing in cocoa planted is commendable. I hope this Institute will be instrumental in making cocoa and chocolate industry in India stand on its own legs.</p>
<p>Dr. DEVID E. ETHERIDGE Visiting Forest Pathologist, Victoria, B. C., Canada</p>	<p>—</p>
<p>4-6-1978 Dr. HARBANS SINGH Chief Agrl. Expert, Min. of Agri. GOI, New Delhi</p>	<p>Excellent work is being done. I have no doubt that the results of the research work here will help in the exploitation of our potential to full extent.</p>
<p>29-11-1978 Sri. A. S. BOSE M. P., Rock Dal Compound, Somajiguda Hyderabad</p>	<p>I am extremely happy since I had an opportunity to visit this Farm. The leaders are working with good coordination with the agriculturists of the area and outside.</p>
<p>14-2-1980 Dr. N. S. RANDHAWA DDG (SAE) ICAR New Delhi</p>	<p>The contribution on intercropping of areca-nut is praiseworthy.</p>



SRI C. M. POONACHA

HON'BLE MINISTER FOR RAILWAYS, GOVT. OF INDIA ADDRESSING THE FARMERS DURING FARMERS' WEEK CELEBRATIONS AT CARS, VITTAL (24-1-1968).

Dr. A. B. JOSHI

DEPUTY DIRECTOR GENERAL, ICAR SITTING NEARBY.



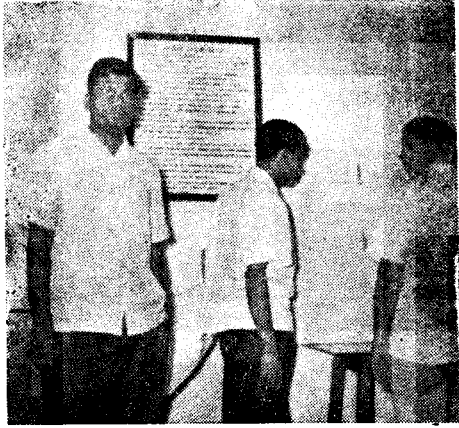
Dr M. S. SWAMINATHAN

DIRECTOR, IARI VISITING THE LABORATORIES AT CARS, VITTAL AS CHAIRMAN OF ACHIEVEMENT AUDIT COMMITTEE (JUNE 1966)



SRI A. P. SINDE

HON'BLE MINISTER OF STATE FOR FOOD AND AGRICULTURE, GOVT. OF INDIA WITH DR K.V.A. BAVAPPA. DIRECTOR OF THE INSTITUTE AT CARS, VITTAL (3-1-1970)



**Dr. B. P. PAL, DIRECTOR GENERAL
and SRI K. P. A. MENON**
SECRETARY, ICAR INSPECTING THE
LABORATORIES OF CARS, VITTAL (1968)



Dr. B. P. PAL
DIRECTOR-GENERAL, ICAR INSPECTING THE
EXPERIMENTAL FIELDS AT CARS, VITTAL (1968) •



**EXPERTS TEAM FROM THE UNIV. OF MYSORE AT
CPCRI (RS), VITTAL PRIOR TO RECOGNITION OF
THE INSTITUTE AS CENTRE FOR POST-GRADUATE
STUDIES (1971)**



Dr. M. S. SWAMINATHAN
DIRECTOR GENERAL ICAR GOING ROUND
THE FIELDS AT VITTAL (1976)

PLAN OF THE CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
RESEARCH CENTRE - HIREHALLI

