PLATINUM JUBILEE OF COCONUT RESEARCH AND DEVELOPMENT IN INDIA (1916–1991)

SOUVENIR

CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
KASARAGOD - 671 124, KERALA
INDIA

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A VEDIC HYMN ON COCONUT – THE KALPA VRIKSHA

प्रथमवयसि पीनं तोयमल्पं स्मरन्तः ।
शिरसि निहित भाराः नारिकेलाः नराणाम् ॥
सलिलममृतकल्पं दद्युराजीवनान्तं ।
नहि कृतमुपकारं साधवो विस्मरन्ति ॥

Bharthruhari Subhashitham

(Courtesy: Khandige Shama Bhat of Neerchal & Dr. S. Shivashankar)

THE COCONUT PALM - A PARAGON OF VIRTUE

"In grateful remembrance of the scanty water it received during its infancy (as a seedling), the Coconut tree bears heavy bunches on its crown, and serves mankind with its sweet nectar-like drink to quench our thirst, throughout its life. Indeed, the virtuous ones never forget a good turn (however small) done to them."

(Translation, courtesy: Br. Vishwa Chaitanya,
Chinmaya Mission, Vidyanagar, Kasaragod)

'The Empress'

*(**Courtesy:** Coconut Development Board, Kochi)*

सत्यमेव जयते

PRIME MINISTER

MESSAGE

I am happy to learn that the Indian Society for Plantation Crops along with the Central Plantation Crops Research Institute will be celebrating the Platinum Jubilee of Coconut Research and Development at Kasaragod, Kerala, a pioneering Institute for coconut research in the country. It is also befitting that as part of the Platinum Jubilee celebrations it is planned to hold an International Symposium on Coconut Research and Development.

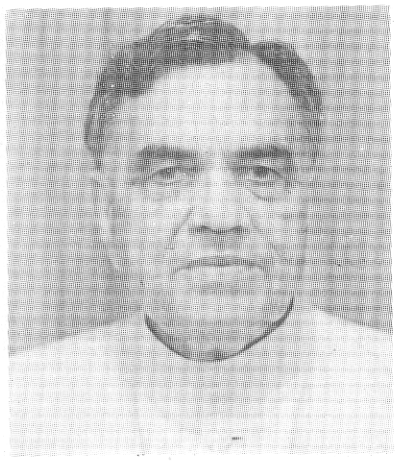
The Symposium will provide an excellent opportunity for scientists from India and abroad to come together and exchange notes with a view to further improve the production and productivity of coconut which plays an important part in the economic life of a large number of people in different countries, as it does in many parts of India.

On the occasion of the Platinum Jubilee celebrations, I felicitate the scientists and others associated with research in coconut production and development. I extend a very warm welcome to delegates from abroad and wish the Symposium all success.

P.V. Narasimha Rao

[P.V. Narasimha Rao]

New Delhi
November 20, 1991



कृषि मंत्री
भारत सरकार
नई दिल्ली-110001
AGRICULTURE MINISTER
GOVERNMENT OF INDIA
NEW DELHI-110001

August 27, 1991.

M E S S A G E

I am expremely happy to learn that the Platinum Jubilee of Coconut Research and Development in India is being celebrated on 26th November, 1991 followed by an International Symposium on Coconut Research and Development from 26th November to 29th November, 1991 under the auspices of the Indian Society for Plantation Crops in collaboration with the Central Plantation Crops Research Institute, Coconut Development Board and Regional Agricultural Universities. Coconut is important both as a horticultural crop and also as a source for vegetable oil.

In the present context of the emphasis is being attached to the rapid expansion in the sources of availability of vegetable oils in the country, this Symposium assumes special significance as it can make useful suggestions on the further development of coconut in the country specially from the point of view of increasing availability of vegetable oils. As the Symposium is attended by experts not only from this country but also from other coconut producing countries all over the world, I am sure that the deliberations in the symposium would be of very high order and would result in valuable and far reaching recommendations and conclusions being made.

I wish the platinum Jubilee Celebrations and the Symposium a success.

(BAL RAM JAKHAR)

GOVERNOR OF KERALA

RAJBHAVAN
TRIVANDRUM

September 7, 1991

MESSAGE

I am happy to hear that the Central Plantation Crops Research Institute, Kasaragod, will be celebrating the Platinum Jubilee of Coconut Research and Development in India on November 26, 1991.

Coconut, which has been recently declared as an oilseed crop by the Central Government, is the backbone of the Agricultural economy of the State. However, the recent trend in the prices of the coconut and the decline in the production and productivity of the crop is causing anxiety both to the farming community and to the planners. I understand that one of the major problems confronting the coconut farmers in the region is the root (wilt) disease and the Institute has a major mandate to contain the malady.

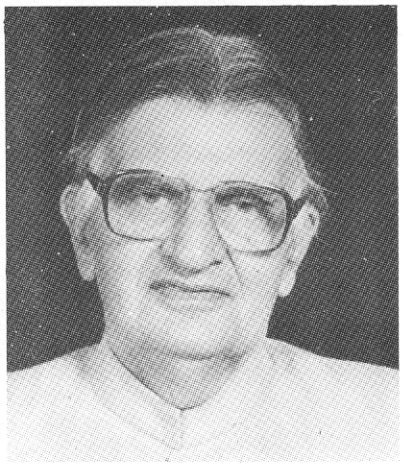
I am glad to note that leading Scientists working on coconut both in India and abroad will be discussing at length the various aspects at the International symposium. It is also gratifying to note that the organisers have taken the right step in including 'Kisan Mela' with the objective of creating awareness among the coconut growers of the problems and prospects of coconut cultivation.

I am sure the deliberations will throw much light on the problems and ameliorative steps to sustain coconut production and help the grower in a meaningful way.

I send my warm greetings and best wishes for the success of the Platinum Jubilee Celebrations.

B Rachaiah 9/9/91

(B. RACHAIAH)



GOVERNOR
KARNATAKA

RAJ BHAVAN
BANGALORE

20th September, 1991.

MESSAGE

I am glad to know that the Platinum Jubilee of Coconut Research in India is being celebrated jointly by the Central Plantation Crops Research Institute, the Indian Society for Plantation Crops, Coconut Development Board and other organisations at Kasargod from 26th to 30th November, 1991.

I send my best wishes for the success of the celebrations and for the economic upliftment of coconut farmers.

(KHURSHED ALAM KHAN)

RAJ BHAVAN
MADRAS-600 022
12.10.1991

MESSAGE

I am glad to know that an International Symposium on Coconut Research and Development is being organized on 26th November at Kasaragod to commemorate the Platinum Jubilee of Coconut Research being undertaken by the Central Plantation Crops Research Institute, Kasaragod.

Coconut is a traditional crop of India. Besides being the richest source of vegetable oil, coconut is also valued as a food-crop. It is now grown in an area of 1.5 million hectares with an annual production of 9283 million nuts. However, the coconut crop is prone to be affected by diseases of unknown etiology. The other inhibiting factor in the growth and development of the crop is the fluctuation of prices. The proposed Symposium assumes significance in this context. I am confident that the participants will have fruitful deliberations in making a realistic assessment of the achievement in Coconut research and development and also develop strategies for improving the coconut production and productivity in the country.

I wish the Silver Jubilee celebrations all success.

(BHISHMA NARAIN SINGH)

K. KARUNAKARAN
CHIEF MINISTER, KERALA

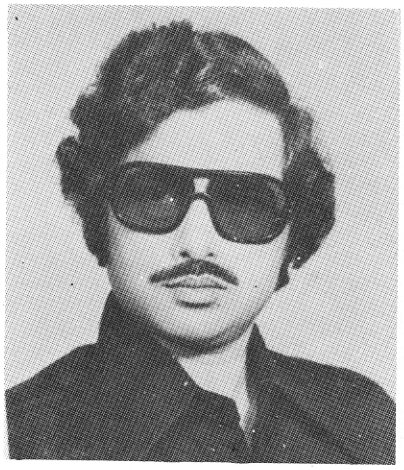
THIRUVANANTHAPURAM

September 3, 1991

MESSAGE

I am glad to know that the Indian Society for Plantation Crops is celebrating the Platinum Jubilee of Coconut Research and Development in India in collaboration with the Central Plantation Crops Research Institute and Regional Agricultural Universities. I hope that the proposed Kisan Mela would be very beneficial to our coconut farmers, and the Souvenir you are bringing out in this connection enfolding articles from leading national and international Scientists working on coconut research very useful to the coconut growers all over the world and others related to the coconut development and trade. I wish you all success.

(K.KARUNAKARAN)



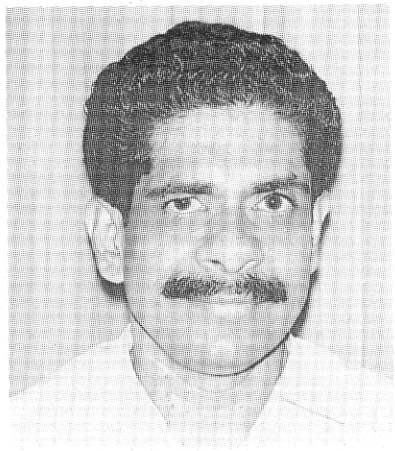
CHIEF MINISTER

CMP G37/91
Vidhana Soudha
Bangalore
13th September, 1991

MESSAGE

I am glad to know that an International Symposium on Coconut Research and Development and Kisan Mela are being organised at the Central Plantation Crops Research Institute in connection with the Platinum Jubilee of Coconut Research in India. I trust that the organisers of the celebrations will make a realistic assessment of the progress of research and development in this crop achieved so far and also come out with useful suggestions to solve the problems facing the cultivators of coconut. I send my best wishes to the Platinum Jubilee celebrations of Coconut Research and Development in India.

(S. BANGARAPPA)



MULLAPPALLY RAMACHANDRAN

कृषि और सहकारिता राज्य मंत्री
भारत
नई दिल्ली-110001

MINISTER OF STATE
FOR AGRICULTURE & COOPERATION
INDIA
NEW DELHI-110001

September 4, 1991

MESSAGE

I am glad to know that Coconut Research in this country has completed 75 years. I appreciate the decision to celebrate the Platinum Jubilee by organising an International Symposium on Coconut Research and Development at Kasaragod.

Coconut occupies a prominent place among the plantation crops grown in India. It provides livelihood for more than 10 million people. The role and importance of coconut in the life of the people in states like Kerala cannot be over emphasised. However, there are constraints in the development of coconut cultivation. One of the major problems facing the coconut farmers is 'root-wilt disease' to which we need to provide a satisfactory solution. Though we can be proud of our long years of research support to coconut cultivation, there is no room for complacence. We need to tackle the problems faced by the farmers to increase production and productivity of this all-too-important crop. I trust that our scientists would evolve strategies to effectively combat the coconut production problems. I hope that the Kisan Mela planned at the end of the International Symposium will be successful in disseminating the latest technology in crop production, product-diversification and processing.

I wish all success to the Platinum Jubilee Celebrations.

(Mullappally Ramachandran)

सत्यमेव जयते

राज्य मंत्री
कृषि अनुसंधान और शिक्षा विभाग
पशु पालन और डेयरी
कृषि मंत्रालय
भारत सरकार
कृषि भवन, नई दिल्ली-110001

MINISTER OF STATE
DEPTT. OF AGRICULTURAL RESEARCH AND EDUCATION
ANIMAL HUSBANDRY AND DAIRYING
MINISTRY OF AGRICULTURE
GOVERNMENT OF INDIA
KRISHI BHAVAN, NEW DELHI-110001

August 26 , 1991

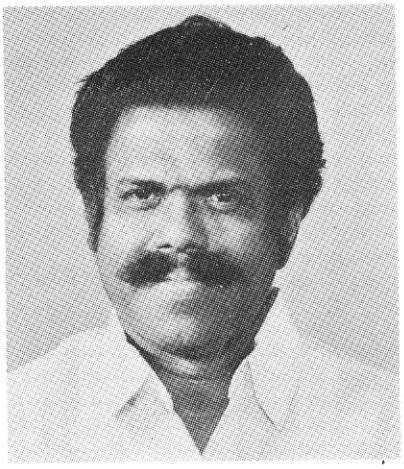
M E S S A G E

I have great pleasure in sending my best wishes for the success of the Platinum Jubilee of Coconut Research and Development in India, being celebrated at the Central Plantation Crops Research Institute of the ICAR in November, 1991. I look forward for a fruitful deliberation at the International Symposium which will focus on various problems being faced in coconut cultivation. The Conference, I am hopeful will evolve new strategies for need-based R & D activities and its effective transmission to the field which will be beneficial to the coconut cultivators.

I wish all success to the organisors of this Conference.

26.8

(K.C. LENKA)



P. P. GEORGE
MINISTER FOR AGRICULTURE

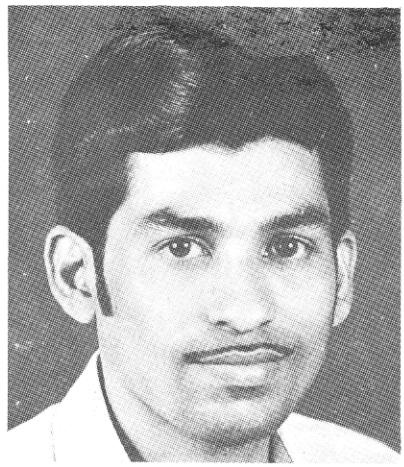
THIRUVANANTHAPURAM

DATE: 23-10-1991.

M E S S A G E

A lot of valuable scientific data has accumulated on the applied and basic aspects of the coconut palm over the last seventy five years. Still, we have to go a long way in tackling the problems such as the root (wilt) disease, post harvest technology, coconut wood processing etc.. This is the occasion to take stock of the achievements and to formulate new strategies to meet the challenges ahead of us. On this happy occasion, I extend my best wishes to all Scientists engaged in coconut Research and the farming community which is benefitted by the results of research.

P. P. GEORGE



C. T. AHAMED ALI
MINISTER FOR LOCAL ADMINISTRATION

Telephone { Office: 67849, 67772, 66176
Res: 63181, 60451

THIRUVANANTHAPURAM

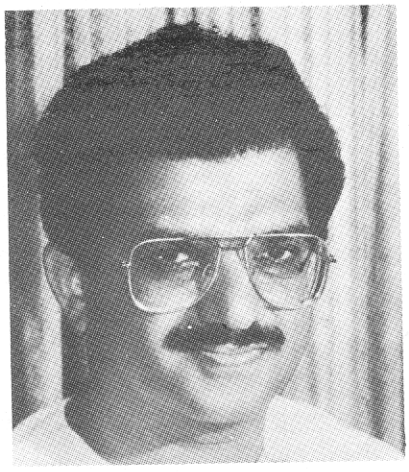
30 . 9 . 1991

Dear Dr. M.K.Nair,

It gives me immense pleasure to note that the CPCRI at Kasaragod, the Constituency which I represent in the Assembly, is organizing the Platinum Jubilee of Coconut Research and Development during November, 1991. From the programme, I am delighted to note that the Organizers have given equal importance not only to the research and developmental aspects of the coconut by conducting an International Symposium but also the dissemination of latest knowledge to the farming community through Kisan Mela. Their approach to involve all the Organizations connected with coconut production in the deliberations of Platinum Jubilee is highly commendable. As a native of Kasaragod, I have seen the Institute growing over the years with multifarious activities on the research front. The problems of coconut cultivation are being tackled by the Scientists with many meaningful projects and the coconut growers are benefited by the Institute. We look forward to the significant recommendations emerging from the Symposium and Kisan Mela to meet the great demands placed on this multipurpose crop, a Kalpa Vriksha.

I congratulate the organizers and send my warm greetings for the success of the Platinum Jubilee Celebrations.

(C.T.AHAMED ALI)



D. VEERENDRA HEGGADE
DHARMASTHALA – 574 216
KARNATAKA STATE.

PHONE: Office: 21
Res : 22

PATRON
PLATINUM JUBILEE
of
Coconut Research and Development in India

Date 19.10.1991

DRAFT MESSAGE

The Coconut Palm not only supports vast multitudes of rural people in the Southern States of the country but also is the centre of farm activity, specially in the coastal regions of Karnataka and Kerala. I am happy to note that the coconut research and developmental activities started in the country about seven and a half decades ago by the CPCRI and its predecessors had contributed substantially for increasing the productivity of coconut in the country. The research findings emanated from this Centre, if translated effectively to the farmers, can change the economic status of coconut farmers towards their betterments. I am happy to be associated with the Platinum Jubilee Celebrations of Coconut Research in India, as the Patron of the Celebrations' Committee.

I congratulate the research workers, past and present, for their achievements in improving the standard of coconut farmers in the country. I am sure that the International Symposium following the Platinum Jubilee Celebrations will be an occasion for the Scientists from all over the World to meet and discuss and take stock of the present status, and formulate future priorities.

I wish the Platinum Jubilee Celebrations and connected functions, all success. May Shree Manjunatha Swamy bless you.

Heggade

(D. VEERENDRA HEGGADE)

Land of Beckoning Palm

PLATINUM JUBILEE OF COCONUT RESEARCH & DEVELOPMENT IN INDIA 1991

A Freak Coconut Tree

Shri K Karunakaran,
Hon'ble Chief Minister, Kerala

Shri P P George,
Hon'ble Agriculture Minister, Kerala

Shri C T Ahamed Ali,
Hon'ble Minister for Local Admn., Kerala

Shri M Ramanna Rai,
Hon'ble M P, Kasaragod

Shri M C Jose,
President, District Council, Kasaragod

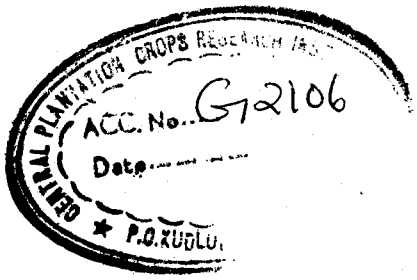
Shri P Kamalkutty, I.A.S.
Collector, Kasaragod

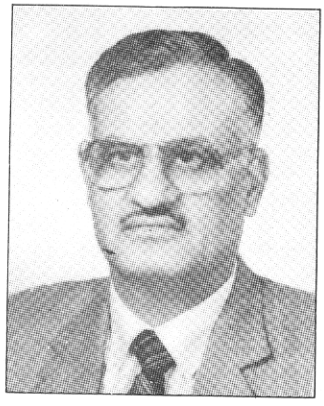
Shri M N Krishnamurthy,
Supdt. of Police, Kasaragod

Shri Hameed Ali Schemnad,
Municipal Chairman, Kasaragod

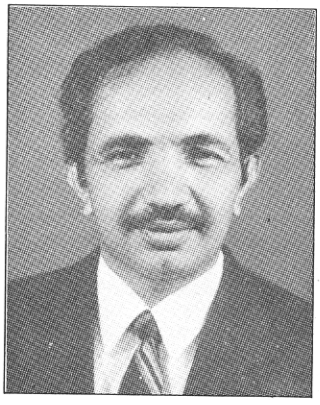
Shri Mahin Haji,
President, Mogral Puthur Panchayat

Dr M K Nair
Director, CPCRI, Kasaragod





Dr K L Chadha
Dy. Director General (Hort.)
ICAR, New Delhi
Chairman



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Director, CPCRI, Kasaragod
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Coconut Development Board, Kochi

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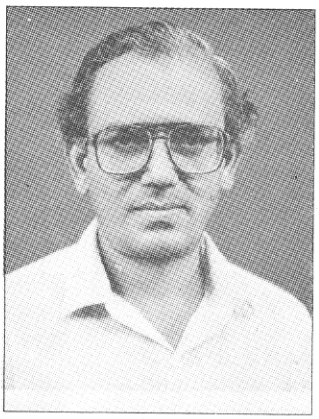
Chairman



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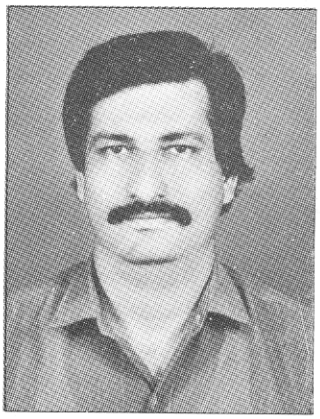

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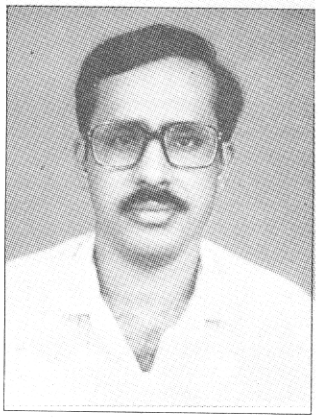

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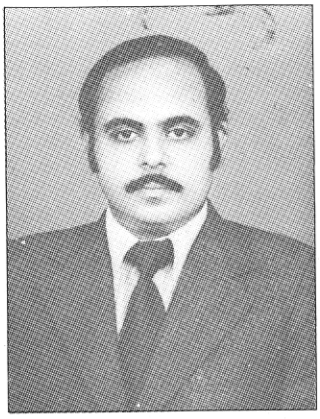
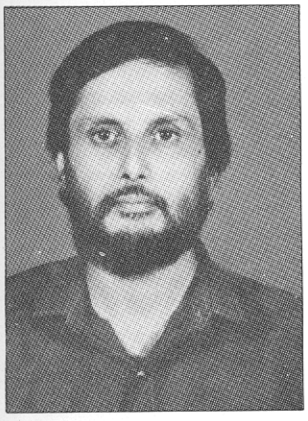
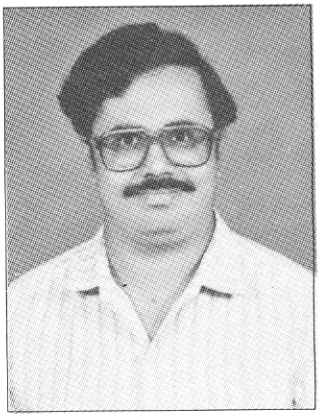


H H Khan



M R Hegde



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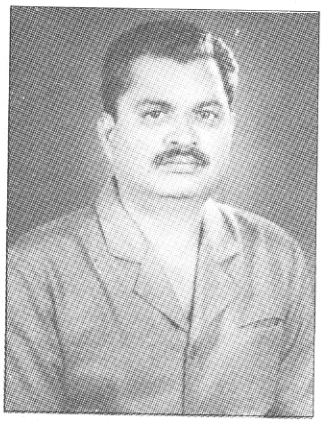

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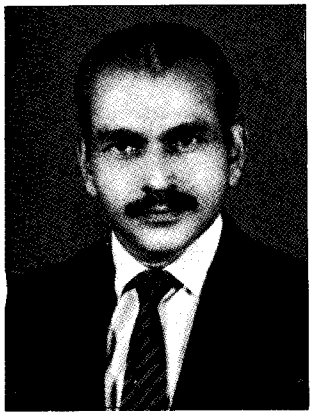

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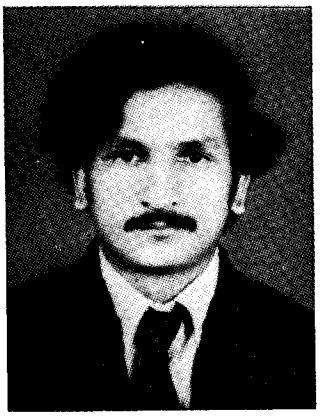

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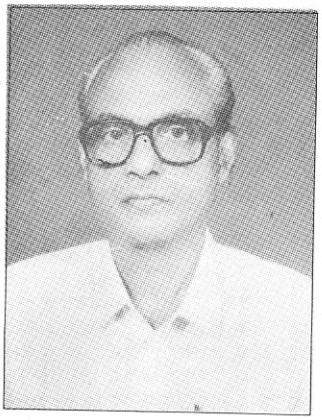

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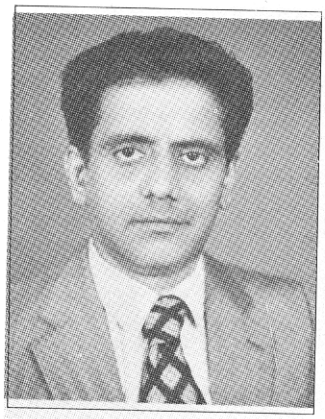
Chairman



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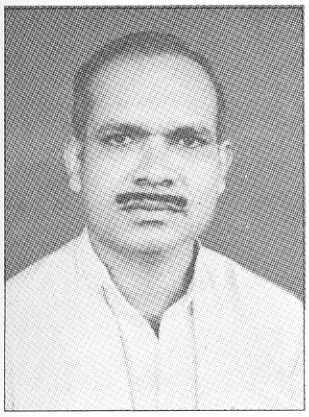
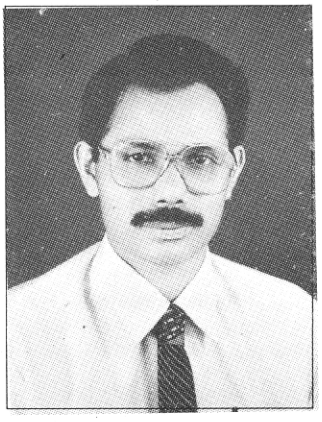


V T Markose
" Chairman

Mohammed Yusuf
Co-Chairman



A S Sukumaran
Convenor

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John Kurian

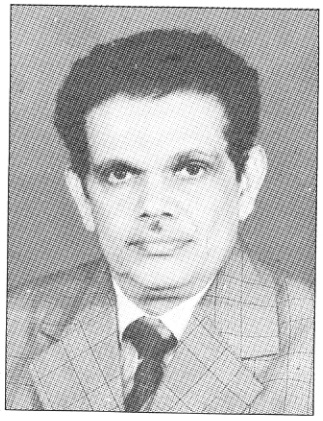
M K Muliyar

T B Nandakumar

B Remany

Sajan

Sudha Sukumaran



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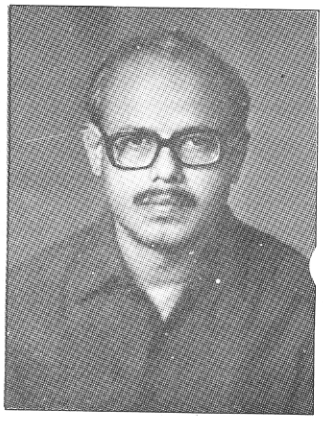

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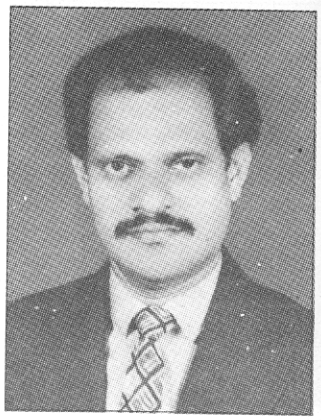

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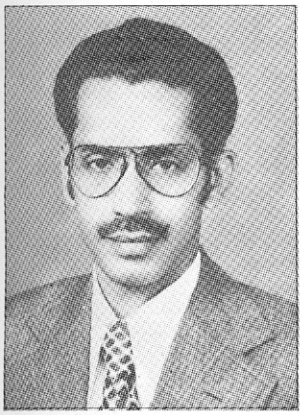

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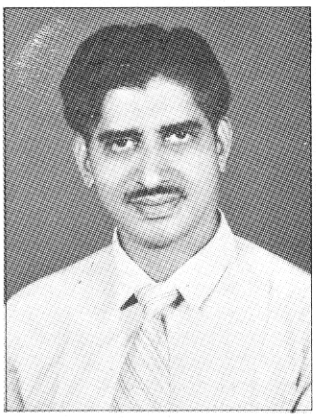

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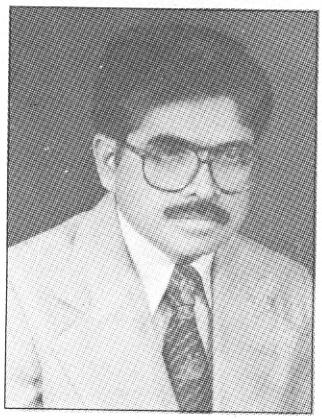

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INTRODUCTION

Dr. K.L. Chadha
Deputy Director General (Horticulture)
Indian Council of Agricultural Research, New Delhi - 110 001

Seventy five years in the history of a Research Institute might seem a long period but considering the long life cycle of the Coconut Palm, spanning nearly a century, this is not really so. The erstwhile Coconut Research Station which started with a humble beginning in 1916 under the control of the then Govt. of Madras Presidency's Oilseed Specialist at Coimbatore, has developed into one of the biggest Research Institutions under the ICAR system. The expansion of the Central Coconut Research Station as Central Plantation Crops Research Institute (CPCRI) took place in 1970-71 with the amalgamation of the Central Arecanut Research Station at Vittal with its regional research centres in Karnataka, Kerala, West Bengal and Assam. Subsequently, spices, oilpalm and cashew research were also added to CPCRI and thus its activities centred around 14 crops. However, due to its long history of research efforts on coconut by a dedicated team, some of whom will be honoured on this occasion of the Platinum Jubilee of Coconut Research and Development in India, this crop has occupied a premier position in the mandate of CPCRI.

During the late eighties, the mandatory crops of CPCRI were restricted to four namely, coconut, arecanut, oilpalm and cocoa, as a result of establishment of the National Research Centres for Spices at Calicut and for Cashew at Puttur. Coconut, however, continues to have the major attention. Following its recognition as a tree-based oilseed crop and inclusion in Technology Mission for Oilseeds with a goal-oriented research for the achievement of a production breakthrough and self-sufficiency in the oilseed sector, coconut continues to be a priority crop. Though we can see that Coconut R&D efforts have steadily grown since 1916 both in terms of manpower, infrastructure facilities and the streamlining of research programmes, it is now time for all of us who are involved in this 'Kalpavriksha' crop, to reflect on the achievements of the last 75 years, identify gaps and analyse the cause for low national as well as average production and productivity of coconut. There is no doubt that the plant breeders have identified and released a number of improved varieties and hybrids capable of giving more than twice or thrice the national and state average yields. It is also proved that management alone can double the yields of the existing ordinary tall variety, even under early disease situations.

Root (wilt) disease continues to plague the minds of the farmers, scientists and the administrators, as it still forms the single major constraint for achieving a production breakthrough. Although the CPCRI scientists have clearly established the MLO etiology of this dreaded disease in Kerala, the only lasting solution has to come from the Breeders in the form of a resistant/tolerant cultivar/hybrid with the refinements now available in the field of molecular genetics. Apparently healthy, partially resistant/tolerant genotypes occurring in natural populations have also come to light from surveys conducted by this Institute in 'hot-spots' of Kerala. It is time for us to break new ground and unravel the genetic basis of resistance to biotic and abiotic stresses in order to effect gene transfers in this complex heterozygote. Modern biotechnological tools such as cell and tissue culture, and the use of r-DNA technology including direct incorporation of genes, offer challenging opportunities to solve the country's old scourge, the root (wilt) disease of coconut.

In the areas of agro-techniques and management much useful information is available such as efficient water and fertilizer management and packages for enhancing the productivity of the small homestead coconut gardens. Both at the Institute and in various Coordinating Centres, experimental demonstrations have shown various compatible crop combinations of coconut-based farming systems suited to the local needs of farmers. It now remains to be seen how far these technologies have found adoption by the small and medium farmers and proved cost-effective. From the very beginning, the extension linkage at this Institute has remained weak and this needs our serious attention; so that research findings reach their logical destination. It is therefore, most essential that we identify and understand this serious "extension gap" and take suitable remedial measures so as to retrieve this tree-based oilseed crop from the low levels of productivity. Now that, a National Research Centre for Oilpalm is on the anvil, coconut will none the less continue to occupy a premier position at this Institute in Kerala and other states. The challenge lies, therefore, with the scientists from all disciplines of crop production, protection and improvement to put their heads together with the extension agencies and work as one team, to take coconut production and productivity to an altogether new peak, giving special emphasis to small and medium farmers.

A view of the old building of the Institute

COCONUT RESEARCH IN INDIA

Dr. M.K. Nair
Director
Central Plantation Crops Research Institute, Kasaragod-671 124.

Coconut research and development work was initiated in India during the year 1916 with the establishment of four research stations under the then South Kanara District of erstwhile combined Madras Presidency. The four research stations were at Pilicode, 58 KM north of Kannur, representinng laterite gravely soil; Nileshwar, 10 KM north of Pilicode representing red sandy loam soil; another centre 2 KM further north representing coarse sand; and Kasaragod, 120 KM north of Kannur, representing red loamy soil. Thus, 1991 is the Platinum Jubilee year of Coconut Research and is now being celebrated at one of the centres, namely, Kasaragod, from 26 to 30 November, 1991. With the establishment of these centres, research on coconut gained momentum and some of the milestones in coconut research and development during the last seven and half decades are listed below:

1. 1947-Establishment of the Indian Central Coconut Committee and transferring of Kasaragod Station to the Committee's administrative control.
2. 1948-Establishment of a Research Station at Kayangulam, 110 KM north of Trivandrum, to undertake research on pests and diseases of coconut in general, and root (wilt) disease in particular.
3. 1948-Establishment of Kumarakom Coconut Research Station on the eastern end of Vembanad of Kottayam District.
4. 1948-Establishment of Balaramapuram Coconut Research Station at Pachallor by the State Government.
5. 1966-Abolition of Indian Central Coconut Committee and handing over the administrative control of the Kasaragod and Kayangulam Stations to the Indian Council of Agricultural Research.
6. 1970-Establishment of CPCRI with Kasaragod as its headquarters and merging Kayangulam Research Station with CPCRI, and establishment of Research Station at Sipighat (Andamans)
7. 1971-Initiation of All India Coordinated Research Project (AICRP)on Coconut and Arecanut.
8. 1972-Establishment of Ratnagiri, Dapoli, Razole and Veppankulam Centres under AICRP and Seed Farm at Kidu (Karnataka) under CPCRI.
9. 1975-Establishment of Arsikere, Pilicode, Mahuva, Coimbatore and Ambajipet Centres under AICRP.
10. 1977-Establishment of Konark Centre (AICRP), and Field Station at Irinjalakuda under CPCRI.
11. 1980-Establishment of Mandori Centre (AICRP)
12. 1982-Establishment of World Coconut Germplasm Centre in Sipighat, Andamans.
13. 1985-Establishment of Kahikuchi Centre (AICRP).
14. 1986-Establishment of Jalalgarh (Bihar), Jagadalpur (MP)and Aliyarnagar (TN) Centres (AICRP).

Significant achievements

During the seven-and-half decades of coconut research spearheaded by CPCRI, the primary objective has been to find solutions to important problems facing coconut industry in the country. Some of the major achievements in coconut research are worth recapitulating during the Platinum Jubilee Year.

The most significant contribution in the early part of coconut research in India was introduction of exotic germplasm accessions during 1924 from the Philippinnes, Malaysia, Fiji, Indonesia, Sri Lanka and Vietnam which formed the nucleus population for many research programmes. The germplasm collection was further intensified during 1952, and first indigenous survey for germplasm collection was started in 1958. A further significant addition of 24 exotic collections was made during the year 1981 under the FAO/IBPGR-funded expedition, from six Pacifiic Ocean countries. At present,

the Institute is maintaining perhaps one of the world's largest assemblage of coconut germplasm consisting of 40 indigenous and 86 exotic accessions.

Hybrid vigour in coconut was first discovered in 1937 and then exploited by the scientists working at Kasaragod and Pilicode. The discovery of hybrid vigour by Dr.J.S. Patel added a new dimension to coconut improvement in the country. More than 87 combinations of hybrids have been evaluated over the years, at CPCRI and various Coordinating Centres, and so far, nine hybrids were released for cultivation, the yield potential of which varies from 98 to 160 nuts per palm per year.

Systematic evaluation of both indigenous and exotic accessions have resulted in identifying some of the superior types and so far two varieties viz. Lakshadweep Ordinary (Chandralaksha) and Benaulim Green Round (Pratap) based on the selection have been released.

Considering the tedium involved in the traditional method of production of coconut hybrids, refinements have been brought out in the hybridization technique. Using this technique, hybrids are being produced large-scale at various centres in this country.

Screening for drought tolerance has resulted in identifying drought tolerant coconut varieties and hybrids.

Field experiments over the years have resulted in recommendation of fertilizer dosage for optimum productivity in various soil types. Optimum spacing and cultural practices in different soil types have also been worked out.

A simple and cheap drip-irrigation technique developed for coconut garden supplies the daily requirements of water in dry months eliminating the loss of nutrients by leaching.

Most suitable leguminous cover crops for cultivation in coconut basins from the point of view of nodulation, nitrogen assimilation and biomass production have been identified.

The diversified needs for farming community and the need for increasing the productivity from unit area of coconut garden led to the evolution of coconut-based farming system. Coconut based multi-storeyed cropping and mixed farming systems can not only substantially increase the net return from unit area but also increase the employment potential by 3-folds.

Coconut root (wilt) disease has been estimated to cause an annual production loss of about 968 million nuts in addition to the loss in number of leaves, copra weight and oil content. The notable achievement in root (wilt) research programme in recent years has been the identification of mycoplasma-like-organism (MLO's) in the phloem tissues of root (wilt) affected palms. The disease was found to be transmitted by a lace bug *Stephanitis typica*, as proved by transmission trials.

Biological control of pests of coconut has been effectively demonstrated by the scientists at CPCRI. Biological control of the coconut caterpillar *Opisina arenosella* Walker, with the indigenous larval, prepupal and pupal parasitoids is now a reality. The viral pathogen, *Baculovirus oryctes* is today documented as the most successful microbial control agent employed against an insect pest. This bio-control agent was successfully introduced into Minicoy Islands to control rhinoceros beetle and now introduced in Andamans also.

Research on post-harvest technology on coconut has given encouraging results during the last two decades and a number of useful mechanical devices were developed by the scientists at CPCRI. Some of the more popular devices are copra dryers using agricultural waste as fuel and an electronic copra moisture-meter.

Platinum Jubilee year of coconut is an appropriate occasion to recall the invaluable contributions of some of our dedicated and pioneer coconut scientists who worked at Kasaragod in the past. The tradition set up by them will be a source of inspiration to the present research workers and one can hope that with the vastly improved research facilities now available, the younger scientists will be able to meet the challenges effectively.

Diamond Jubilee Building of the Institute


LACCADIVE ORDINARY LO
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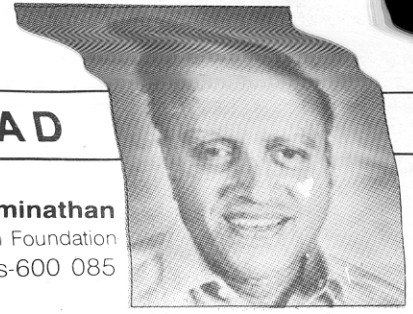
CONUT RESEARCH – CHALLENGES AHEAD



Dr. M.S. Swaminathan
Chairman, M.S. Swaminathan Research Foundation
14, 2nd Main Road, Kottur Gardens, Kotturpuram, Madras-600 085

The research carried out on coconut at the Central Plantation Crops Research Institute during the past seventy five years may not seem long when one realizes that the economic life of a coconut palm is 80-100 years. Nevertheless, this is a time for introspection to take stock of past achievements and future challenges.

The state average as well as national average of coconut yields per palm and per unit area of land have remained more or less stagnant. Breaking the yield barrier is thus a major reserch problem. Several productive hybrids have been released and a chain of seed gardens in different coconut growing states of India have begun production of these superior hybrids between Tall and Dwarf cultivars. It remains to be seen what dent this advent of new hybrids will make in increasing average yields. This is largely an extension-cum-management problem rather than a research problem as such.

The second major problem confronting the coconut researcher is the prevalence and spread of diseases. Root (wilt) continues to be a single major malady and challenge. Although we have progressed in taking this disease from the state of the 'unknown etiology' and 'uncertain etiology' to one of definite MLO-etiology involving an insect vector, root (wilt) seems to be on the march to new areas across its traditional borders. In spite of attractive compensation being paid for removal of all diseased palms in border areas, the reluctance of the farmer to implement this is a major constraint. The compensation amount has been increased from Rs. 75/- to amounts ranging from Rs.150/- to Rs. 350/- depending upon the stage of disease and yield of the affected palm. Nevertheless, the researcher is not able to guarantee the non-recurrence of the disease in the healthy seedlings supplied to farmers free of cost. Since antibiotic therapy or any other form of prophylaxis is impractical in a massive palm, and since there may be residue problems accompanying such treatments, breeding for resistance seems to be the only lasting solution to this century-old malady.

I had suggested in 1976 ISOCRAD, the undertaking of a critical survey of natural populations for disease-free high-yielding 'Super' palms in "hot spots". I am happy that this aspect has received the attention of the breeders and geneticists, and a full-fledged team is operating in the hot-spots around Kayangulam and Kottayam. Several high-yielding, disease-free palms, have been identified and a systematic crossing programme initiated to evolve a gene-pool of resistant/tolerant palms in the root (wilt) affected hot spots of Kerala. It is only through the evolution of such resistant palms that the researcher can win the confidence of the coconut farmer and help him rejuvenate the disease-ravaged gardens, which results in a staggering loss of over 960 million nuts per year in Kerala.

While conventional methods of breeding, using naturally occurring sources of resistance/tolerance will have to be continued, speedy results can be achieved only when we can evolve sensitive biochemical and molecular genetic methods for identifying such resistance at earlier stages in terms of DNA fingerprinting and use of RFLP and RAPD mapping to identify precisely the resistant genotypes. Conventional methods of proving Koch's postulates for disease transmission and expression is a long and tedious procedure in coconut, where this disease can occur at any age starting from seedling to adult palm. Thus, there is no escape from resorting to refinements in genetic analysis of the resistance mechanism in this perennial palm. In fact, we need to develop an altogether new concept of resistance/tolerance since the palm can take up the disease at any age. Since the pathogen has a faster rate of evolution and mutation, and the palm stays in the dynamic ecological niche for several decades, the chances of a new race of MLO being evolved does pose a continuous challenge to the coconut breeder. In annual crops like wheat or rice, when one cultivar or hybrid breaks down to a new race of the pathogen, the breeder has a number of new varieties/hybrids in his assembly line to give to the farmer. But such a rapid replacement of varieties/hybrids is unthinkable in a palm with a long gestation and yield stabilization period. One must think in terms of a multiple gene basis for resistance that will help sustain the palm

in a dynamic environment. Philippines had conceived a 40-year cycle of replanting coconut gardens with high yielding hybrids.

Although yield is the primary target for improvement, a time has come when greater attention needs to be paid towards quality consciousness in coconut, both with regard to the fresh kernel and oil, which form a major source of food. Some evidence is available in oil palm for a genetic basis for oil quality in terms of the ratio of saturated vs. unsaturated fatty acids which determine the end-use of this vegetable oil-for human consumption on the one hand and for industrial use in soap manufacture on the other. If such a varietal concept could be developed in coconut, we can perhaps evolve varieties specific for a particular fatty acid composition, as has been shown in segregating *tenera* populations in oil palm. There is not much information available regarding segregation for these ratios in coconut populations. Hence, it would be useful to generate data in this regard, to see if this could be utilized purposefully for developing cultivars for specific end-uses.

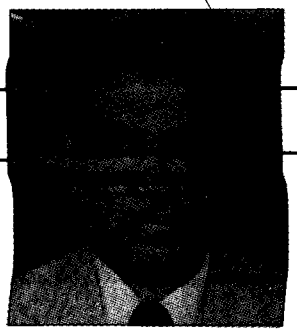
Much excitement was generated following the first successful reports of clonal coconut plants from tissue culture both in India and U.K. However, it seems still a long way before this could be commercialized. as is claimed by I.R.H.O., Montpellier for oil palm. The preliminary success obtained at CPCRI with seedling leaf tissue culture needs to be repeated with adult palm tissues in order to realize our dream of clonally multiplying the elite, disease-free 'Super' palms. One must also exercise caution in view of the initial setbacks experienced in oil palm clones planted in Malaysia, which were obtained from root callus by Unilever Ltd., U.K. The somaclonal variations observed were quite alarmingly abnormal and hence great caution is needed before planting large areas with tissue-culture derived clones, since uprooting a wrong clone and replanting is a labour-intensive and expensive procedure. We must not lose sight of the fact that the greatest strength of the monotypic coconut palm is its heterozygosity, which has helped it sustain the ravages of nature during its long history of cultivation. We must not destroy this heterozygous advantage but preserve these rare types for future through clonal propagation. With the advent of new hybrids and cultivars and the rapid replanting of senile plantations taking place, gene erosion is a global phenomenon and we face the danger of losing for ever the valuable native genetic resources. The rapid clonal propagation of rare palms and their conservation both *in situ* and in *vitro* by both short-term and long-term storage (through cryopreservation), are areas of research that need our immediate attention. Conservation of coconut genetic resources should also receive greater support in resource allocation.

I hope the second International Symposium on coconut Research and Development will focus attention on some of the above problems and help find solutions in the shortest possible time.

CPCRI holds a World Coconut Germplasm Assemblage

CPCRI has perhaps the largest coconut germplasm holdings comprising of 127 accessions from 26 countries, of which 86 are exotics (70 Talls and 17 Dwarfs) and 41 are from within India. A World Coconut Germplasm Centre (WCGC) has been established in the Andamans - which also serves as an off-shore quarantine station - and so far 24 accessions from 7 Pacific Ocean Countries and seven indigenous collections have been planted at WCGC. All the accessions have been catalogued as per IBPGR Descriptor for Coconut and evaluated for their performance, as well as reaction to the dreaded root (wilt) disease of Kerala.

REMINISCENCES



Dr. K.V.A. Bavappa
Former Director
Central Plantation Crops Research Institute, Kasaragod

When the ICAR decided to merge the Central Coconut Research Stations at Kasaragod and Kayangulam with the Central Arecanut Research Station, Vittal and its five Research Centres at Palode, Peechi, Hirehalli, Mohitnagar and Kahikuchi, in 1968 to set up CPCRI, I was working as the Arecanut Specialist at Vittal. The post of Director, CPCRI was advertised in mid 1969. I applied for the post under certain peculiar situations. I was selected as the Director of the Central Arecanut and Spices Committee, Calicut, in 1968 by the Ministry of Agriculture, which post I had declined at the instance of Dr. B.P. Pal, the then D.G. ICAR. He recommended me for a merit promotion at Vittal itself. Unfortunately, the Govt. of India order on merit promotion had not been received when the advertisement for Director, CPCRI appeared. The delay was worrying me. Also was the fact that my first love was always research and hence I thought that I must have a go with this post.

Along with others I appeared before the ICAR Selection Committee and did not care very much for the outcome. When late Mr. E.V. Nelliat who was undergoing post graduate course at IARI then, wrote to me a congratulatory letter, I was not surprised either.

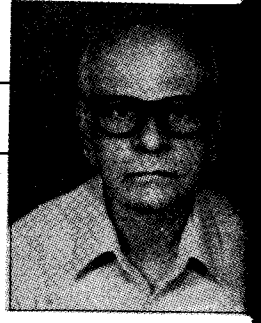
However, my problems started almost immediately thereafter. Two eminent scientists waged a war against me through their journal "The Agricultural Digest" and charged the ICAR that it has selected an unqualified person as the Director, CPCRI.

A few other incidents are still fresh in my memory as far as the Institute management is concerned. After I took charge of the post in January 1970 I started reorganizing the work and one decision that I had to take related to the field experiments laid out in the main block. The seedlings in these experiments had been underplanted, and to ensure precision, the old trees had to be cut and removed. In the seventies, felling of coconut trees was still being considered as a crime and the reaction of public was beyond imagination. Reports appeared in many papers that the new Director is doing a 'mass murder' as a part of his 'cultural revolution' at the Institute! Since this was a decision taken at the Farm Advisory Committee meeting along with the senior staff, we went ahead with our plans and many useful data emerged out of this decision.

Yet another area in which I had to face stiff resistance was in the enforcement of discipline. Once, one of the supporting staff disobeyed the Farm Superintendent. On enquiry it was observed that there was a prima facie case to proceed against him. He was suspended for seven days. Following this, a section of workers struck work and obstructed the office staff. With the assistance of the District Collector and Commandant SARP at Kannur, the obstructing workers were removed to the police station daily and let off in the evening. Questions were raised in the Kerala State Assembly about this. Mr. Hameed Ali Shemnad then M.P. phoned me and suggested that being a newcomer to Kerala, I may not be familiar with the local labour problems and it was better that I withdrew the suspension order. The entire Institute scientific staff was of the view that discipline should be maintained at any cost, and hence I stood by the earlier decision. This indeed helped in improving the morale of the staff and work atmosphere of the Institute.

As one who firmly believed that freedom in research is the key to success, full liberty had been given to those who wanted to work. The success in MLO research on root (wilt) disease of coconut by Dr. Solomon and his colleagues which had been challenged by many and which I understand has now been proved beyond doubt, is one such outcome of such an effort. Similarly, Mr. C.R. Raju in my judgement could get an initial success in the clonal propagation of coconut. CPCRI has a work atmosphere and culture of its own. As its first Director, myself along with many others who toiled tirelessly had put a few foundation stones for the future generation to build an edifice relevant to the changing times. In my own humble way I had right through given enough thought about the future of the Institute, and I have the satisfaction that it is in safe hands and that a much better tomorrow is the silver line that we see in the horizon today.

REMINISCENCES



Dr. K.M. Pandalai
(Former Director,
Central Coconut Research Station, Kasaragod)

Given an opportunity to me to select any period or part of it, of my scientific research and/or teaching career of over 33 years for a re-doing, I would unhesitatingly ask for my connection with the coconut research which I actively pursued during the period 1949-1966. The reason is simple. It was then that I was attached to the Central Coconut Research Stations at Kayangulam and Kasaragod (now CPCRI) where I had occasion to partake and for a while lead the teams of research workers whose scholarship in this line and enthusiasm to work helped me lay the foundation in the domain of coconut research. Earlier, I had the good fortune to help and collaborate in the shaping up of the CCRS, Kayangulam (1955-1966). I had all along enjoyed the advisory help and guidance of the late Mr. C.M. John and Dr. K.P.V. Menon, the memory of which will ever remain green in mind - a matter of very immense pleasure and gratitude. It was my richly gratifying feelings and modesty, that enabled me to take up the leadership of both the Research Centres, at one time or other.

Right now, I feel so grateful to the organizers of this symposium for giving me the opportunity to present myself among you, and also to write a few lines on my reminiscences, as one of the active partners in the team that pursued and pioneered Coconut Research in this country.

At the time when we started the work at Kayangulam in 1949, and at Kasaragod in 1955, we had only just the irreducible minimum facilities for advanced researches. Despite the inadequacy of infrastructural facilities such as a good and well equipped laboratory, available field material, adequate number of qualified research personnel, funds, incentives and last but not the least, living accommodation for the staff, by patient endeavour, hard work, everwilling team spirit and collaboration, we achieved our goal to a great extent. Our constant contact with coconut cultivators with a view to identifying their problems in coconut cultivation helped us to serve them better and to be more useful to them in the long run. Seeing that their preference was to get quality coconut seedings and necessary scientific advice, we endeavoured to prodece superior coconut seedlings by scrupulous selection and rejection, and supply them though only in small numbers, and at low cost (fifty paise per coconut seeding). Seedings included the West Coast Tall, several exotics and the newly developed TxD hybrids (Tall x Dwarf). I am glad that this line of work has become very popular and demand for the hybrid seedlings is ever-increasing. I recollect also the great efforts some of my colleagues made in collecting selected quality seed nuts from specific areas like Perambra (Kuttiyadi Farm) and Chowghat village, to be sent to coconut nurseries in Assam, West Bengal, Oriasa, etc. These endeavours were very much appreciated by the general public and formed one of the major and popular priority items of work at Kasaragod. In recent years, I had the good fortune of seeing several of the coconut gardens in the above places where our seednuts and seedlings have formed the source of superior planting material, giving satisfaction to the cultivators.

I have no intention to touch or highlight the several different items of work done in the different sections and the results published, as these have been duly reported and publicised. Investigations by recent workers have revised or modified, for instance, the fertilizer schedules and doses, as also the use of more modern and effective fungicides and pesticides.

I am to recall one or two incidents regarding the visit of some of the Reviewing Committee experts. During my tenure at Kasaragod, while some of the experts were helpful and appreciative, others were even critical sometimes, without considering the limited resources and facilities available to the scientists at the time. I may recall a pertinent episode which has remained indelible in my mind and this pertains to the visit of the celebrated and distinguished scientist late Prof. J.B.S. Haldane FRS. The visit was during the month of July, when the south-west monsoon always used to be in full fury during this period and our spirits were also at a low ebb. It all started with an incident that occurred the previous night in the train, when Prof. Haldane lost his spectacles, and with that some of his good mood also, when he reached Kasaragod.

Prof. Haldane was very critical and not even sympathetic while assessing out work in the Coconut Breeding Section. However, this statement is not to belittle the contributions of Prof. Haldane to Coconut Breeding, in postulating the theory of pre-potency. Subsequently, prepotency was exploited by the Coconut Breeders to raise elite coconut populations.

A little later, some senior Philippine Coconut researchers happened to visit our station on their way back from Colombo where they took part in an FAO Working Committee Meeting which I also had attended as the only ICAR delegate. These Philippine Scientists were full of high praise about our ongoing programmes. Similar appreciative compliments were also given by Mr. Cooke and Mr. Pieris of the Ceylon Coconut Research Institute as well as other experts attached to the FAO during their visits to Kasaragod.

In a retrospective like this, it may not be out of place to record one or two instances, trifling though they might appear to be, of the headaches that the Head of an institution often has to encounter. One such was the recovery of a small piece of land where the main gate of the research station was situated. Prior to the acquisition of the land by the CCRS, this area was in the ownership of a poor old man running a grocery shop in a small hut situated on this site. When our laboratory construction was just over and when the construction of the main gate had to be taken up, there was adamant protest from this old grocer who threatened legal action if we tried to dislocate him. The anticlimax was however, not delayed as one fine morning, the watchman came and informed me that the grocery shop was no longer there as the grocer had demolished it over-night and took away all his belongings. By evening of that day our main gate was already taking shape.

A similar but a different case of possible confrontation was about completing the boundary wall construction on the research station premises. A public footpath about 3 ffeet wide existed right across the experimental plots, and being used by the public for a long time, particularly by the passengers who used the facilities of the 'Kudlu Halt' railway station. There was a lot of talk, discussions, protests and propaganda against our plan to close this tresspass, which was a nuisance to the staff who were working in the laboratories right alongside. Again our equanimity was restored by a few public men who came and informed us that we are free to go ahead with the wall construction closing the pathway, although the alternative to them was the need to walk a little longer by another route. At any given time there used to be one or other incident of this kind, side-tracking our attention from the peaceful research atmosphere. However, we never allowed these impediments to cause any discomfiture affecting the progress of our work schedule, thanks to God.

Research workers do things in a much better way when goaded by good words and incentives rather than being pushed around by regulations, and burdened by the need to write monthly reports. This was evident in a particular case when a Conference of Coconut Research Workers was held at the Agricultural College, Vellayani in December of 1959. I notified sufficiently early that only those who would be in a position to present a good research paper at the 3-day Conference would be allowed to attend the same. I also gave them advisory suggestions and necessary guidance to help them prepare their papers. Thus, I was able to take all my colleagues to Vellayani to present their papers at the Conference, where I dare say, they gave a very good presentation and impression, as fifty per cent of the papers read were by Kasaragod scientists.

The grant of permission by Kerala University authorities as well as the ICAR to use the results of research at the research stations for submitting as Thesis for M.Sc. and Ph.D. degrees enabled some of our colleagues to earn these research degrees. This obviously was another incentive for carrying out earnest research which in turn reminds me of the very active library work which we had to do in connection with the writing of the Coconut Monograph during 1956-'58. A good lot of material accumulated since 1938, when Dr. J.S. Patel's "Coconut" book was published from Coimbatore, filled the void in coconut literature. In this connection, I would like to place on record the help and encouragement which we received from the late Dr. M.S. Randhawa, Dr. B.P. Pal, Mr. K.P. Madhavan Nair, Mr. C.M. John, Dr. J.S. Patel, the I.C.Coconut Committee, and above all our colleagues from both the Research Stations. I have often wondered why even after three decades after the publication of our Coconut Monograph, it has not been possible to bring up-to-date the vast research results published since 1958, or to at least issue a revised second edition of our Monograph incorporating the recent advances in coconut research.

Our work by and large being a crop-oriented one, and that too specialized on a single crop, job opportunities for our junior researchers were not bright. Nevertheless, some have indeed left us to take up better jobs elsewhere.

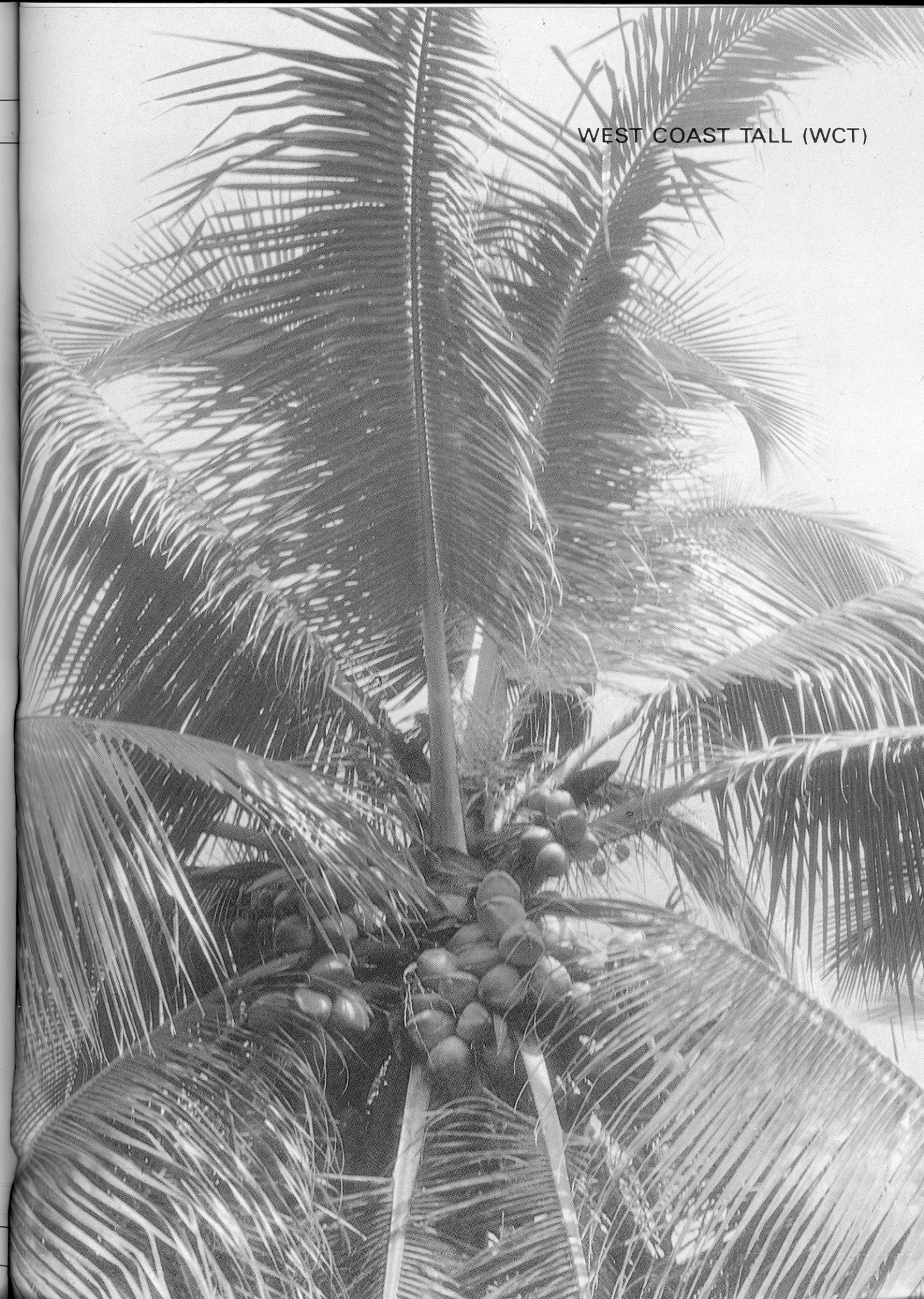
As in every other research institute, it would seem there are a few who use the facilities of a laboratory for a time only as a stop-gap tenure seeking pastures anew. I cannot recollect anything new about the funds set up and their position of availability, or the constraints which prevailed. Our programmes were more of a routine type at the initial stages rather than scheduled and sponsor-aided projects. Ours was mainly AP cess-fund based and I do not remember feeling any difficulty with regard to purchase of lab. equipments, and other requirements, except occasionally when the superiority complex of the administrative set up came to clash with the more superior status of a scientific research professional. However, instances of such types were rather few. By about mid-sixties when I retired on 30-4-1966, there was the rush of a new orientation in the matter of crop research. Several new changes soon followed, the CCRS metamorphosing into the present CPCRI and so on. It is highly gratifying to note that CPCRI has been in a position to pin-point the etiology of root (wilt) disease, though a lasting remedy for this disease is yet to be evolved. No doubt, there has been a very significant and encouraging upheaval in the cultivation and production of high yielding and disease tolerant, exotic and hybrid varieties during the last two decades. Pest-control studies using more modern pesticides and biological control schemes as well as various other measures of disease control have also been made possible. Trends are right now very much ahead in enhancing copra production and other industrial products based on the coconut.

Lastly, I would like to mention a feeling of being ignored, which has been in the minds of some of the retired workers. Their contributions may not be outstanding or only briefly important, but their association in research council meetings, other scientific conferences or for a discussion, or in some consultative/advisory/supervisory/planning capacity would certainly be useful. Once again, I thank the C.P.C.R.I. authorities and Organizers of this Symposium, and pray for still greater and useful achievements and breakthroughs in Coconut Research in the near future.

Quote from Silver Kris

The American novelist James Normal Hall loved to narrate stories of Mama Tu, an ancient wizened Tahitian woman famous for her profound knowledge of medicinal plants. One day she advised him "The eyes of the coconut always look down before the nut falls. The coconut palm is man's friend and will not allow him to be injured by its falling fruit". Hall was skeptical. "A year or two ago I heard that a man in the Hitta district had his arm broken by a falling coconut" he said. "I know him" said Mama Tu. "It was the right arm that was broken. He was always beating his wife. He was justly punished.

(Collected by S. Shivashankar)


WEST COAST TALL (WCT)

COCONUT : PAST, PRESENT AND FUTURE

Dr. PV Shenoi*,
Spl. Secretary & Director Technology Mission on Oil seeds
Dept. of Agric and Co-operation
Ministry of Agriculture Govt. of India

Introduction

Coconut palm is an important part of the lives of inhabitants of more than 90 countries in the world:and in India, it has a recorded history of over 3000 years. The importance of Coconut, the Tree of Heaven", or the Kalpavriksha" can be appreciated more when we consider the diversity of its use. Besides food, shelter and employment, coconut also provides raw materials for a variety of traditional rural industries such as copra processing, milling for oil and manufacture of coir products. The contribution of this crop to the vegetable oil production in the country is about 3.5%, being 2.2 lakhs out of a total edible and non-edible oil stock of about 65 lakh tonnes. It is the only perennial source of edible oil in India. It is an important crop for Kerala as its share in the agricultural income of the State is estimated at 30%.

Extent of coconut cultivation in India

The area and production of coconut in India was only 5,96,000 ha and 3448 million nuts, respectively in 1950. During the last four decades, the area has increased to 1.5 million ha and that of production to 9283 million nuts. The crop is mainly grown in the eastern and western coasts of Kerala, Karnataka, Tamil Nadu and Andhra Pradesh. India occupies the third position in both area and production. A comparsion of coconut area and production of the major coconut growing countries is given in Table 1.

Table 1 Area and production of coconut in different countries during 1988

	Area (000ha)	Production (000MT)
Philippines	3360	10500
Indonesia	34444	10268
India	1509	9283
Srilanka	419	1937
Malaysia	289	700
The world	10930	4369592

*Presently Assistant Director–General ICRISAT, Patencheru, Hyderabad.

Domination of small holders

Coconut cultivation in the country has extended to both traditional and non-traditional areas such as Bihar, Madhya Pradesh and North-eastern India. It is grown in 12 States and 4 Union Territories. Unlike the other commercial crops grown in the country, coconut is essentially a small holder's crop. It is grown mainly in homesteads and small holdings. There are about 5 million coconut holdings in the country with 98% of such holdings occupying below 2 hectares, as seen in Table 2.

Table 2. Size of coconut holdings in India

Size of holdings (ha)	Percent of holdings in different States			
	Kerala	Tamil Nadu	Karnna-taka	Andhra Pradesh
Less than 0.2	37.1	69.1	52.5	56.5
0.2 - 1.0	52.8	26.0	42.9	41.7
1.0 - 2.0	7.9	3.2	3.6	1.8
2.0 and above	2.2	1.7	1.0	—

Role in National Economy

It is estimated that nearly 10 million people depend directly or indirectly on coconut culture and industry for their livelihood. The average value of production of the crop is around Rs. 13,000, million; and the export earnings amount to around Rs. 300 million through coir and coir products.

Present Demand for Coconut and its Products

The demand for coconut in mature and tender nut forms is steadily rising. Coconut water from nearly 200 million nuts are consumed at tender nut stage. The present demand for edible copra and desiccated coconut is 45,000 and 7,000 tonnes respectively, per annum. The average output of milled copra is around 3,45,000 tonnes and of coconut oil is around 2,20,000 tonnes used for both edible and non-edible purposes.

Present Research Support

Coconut research in the country is being carried out by the ICAR, directly at Central Plantation Crops Research Institute, Kasaragod and also through its All India Co-ordinated Research Project on palms operating in different State Agricultural Universities. The research support is mostly adequate.

Research findings

The Scientists of CPCRI and the country have identified varieties and hyybrids for different agro-climatic conditions. The high yielding varieties and hybrids are capable of oil yields of 1.5to 3.0 tonnes/ha/year.

Agro-techiques for tall varieties have been standardized. It has been brought out clearly that yield can be increased by 200% to 300% with manuring coupled with irrigation. While the national average is 40 nuts/palm/ year, judicious manuring alone could help produce 55 nuts and manuring coupled with irrigation can produce 94.8 nuts/palm/year.

Strategies for managing root (wilt), Ganoderma wilt and crown chocking diseases have also been evolved.

Economics of coconut-based farming systems have been worked out at CPCRI, Kasaragod. According to that study, intercropping with elephant-foot-yam, ginger and tapioca is fairly remunerative under rainfed conditions. The net return per ha was the highest in the case of coconut + elephant foot yam (Rs./- 18,550/-). followed by coconut + ginger (Rs. 14,350/-) and Coconut + Cassava (Rs./- 11,150/). The coconut-based multi-storeyed cropping under irrigation involving cocoa, pepper and pineapple gave a net return of Rs. 30,300/ha compared to Rs/- 23,200/- from irrigated coconut raised as monocrop. If family labour wages are also taken into account with the net profit, the total return to the family soars to Rs./- 37,350/ha in this system.

Income of Rs. 50,000 Per Hectare

The coconut-based mixed farming involving production of fodder in the inter-spaces of coconut, training of pepper on coconut palm, growing vegetables and banana around farm house, rearing of five heads of milch cows and 30 rabbits gave a net annual return of Rs.29,500/ha. Since the system is highly labour-intensive, the total annual return to the family, including the family labour wages was Rs. 50,000/ha. The estimated cost of production of coconut grown as monocrop, in respect of rainfed and irrigated conditionns, under the ideal management at CPCRI, Kasaragod for 1988 factor-produced costs is Rs. 1.34/nut and 1.27/nut, respectively.

Present Problems

Kerala, being the major coconut producing state in the country, suffers badly due to root (wilt) disease; and in the other three states viz. Tamil Nadu, Karnataka and Andhra Pradesh, *Ganoderma* wilt is a serious problem for which remedial measures are yet to be finalised.

Though the scientists have identified/evolved high yielding varieties/hybrids, the avalability of quality planting metrial is inadequate. The country at present has 963/ha under seed garden in Kerala, Tamil Nadu, Karnataka and Orissa States. The production of hybrids is limited to 3 lakh seedlings/year which is extremely inadequate. Most of the TxD hybrids are being produced using the available Tall mother palms in the farmer's field. Inadequate irrigation facilities very often make these palms to suffer due to drought; and in severe drought, the palms become barren.

Present Development Support

The coconut development in the country is being primarily promoted by the Coconut Development Board through the State Agriculture/Horticulture Departments. The Board is presently engaged in setting up seed-cum-demonstration plots in different states, subsidizing the States for production of quality planting material including hybrids, area expansion, replanting, providing irrigation facilities,and rejuvenation of root (wilt) affected gardens. The major programmes of the Board are as follows:

(i) production of quality coconut seedlings including TxD hybrids
(ii) establishment of hybrid seed gardens for the production of DxT hybrids
(iii) establishment .of Demonnstration-cum-Seed Production Farms for coconut
(iv) expansion of area under coconut.
(v) establishment of coconut plantations on canal embankments
(vi) establishment of coconut plantions in Khaslands in Tripura
(vii) financial assistance to coconut growers for the removal of root (wilt) affected palms

(viii) promotion of biological control of coconut pests
(ix) promotion of irrigation facilities
(x) promotion of primary processing and marketing activities
(xi) establishment of a Coconut Techonology Development Centre

Future Prospects for Coconut

The demand for coconut is asssesed as 10,400 million nuts in 2000 AD against the present production of 8160.8 million nuts in the country. This calls for a 27% increase in the production, with an annual growth rate of 2.7% and compound growth rate (CGR) of 2.04% in production. The increase in production for the last 40 years was only 4713 million nuts which works out to an annual increase of 117.82 million nuts, that is 3.47% average increase annually. The CGR in this case comes to 2.23% per annum. This can be achieved through area expansion besides increasing the productionn and productivity of the existing plantations. The Coconut Development Board has identified 4.65 lakh ha for area expansion in non-traditional areas, and another 3.9 lakh ha have to be found out so as to make a total area expansion of 8.55 lakh by 2000 A.D. Area expansion is a difficult proposition in view of the huge financial investment required to bring the area under coconut. A production target of 10,400 million nuts will be possible by adopting the technology already available with us ensuring the production of quality planting material of the high yielding cultivars and hybrids. The other avenue for improvement is the provision of irrigation facilities and making the farmers fertilizer-conscious for coconut plantation.

The root (wilt) disease of coconut is a major problem in the premier coconut growing state of Kerala, which needs special attention both in terms of research and adoption of management strategies for increasing productivity in the disease-affected gardens. Similarly, the other diseases like Thanjavur/Ganoderma wilt and Tatipaka disease prevalent in two other Southern States of Tamil Nadu and Andhra Pradesh, need attention in terms of identifying the causal organism and evolving control strategies. Cost reduction is a very crucial factor in coconut production. Unless the price is remunerative to the cultivator and reasonable to the consumer, the production programmes could not go on. Therefore, techology for intensive intercropping/mixed cropping/ mixed-farming systems, needs to be adopted to increase the income from unit area over unit time. Product diversification, organized marketing for the coconut and its products are parts of the strategy which need attention.

The author is extremely grateful for Dr. Rethinam Asst. Director General, (PC) ICAR, New Delhi for the data provided.

Vehicles running on coconut oil A dream come true

Why not automobiles on coconut oil? No, it is not a joke, but has really been tested. A Filipino named Vik Antonio Medel claims that coconut oil can be used as an alternative to petroleum-based fuel. The brand name of his cocogas is 'ECKOCO', which is 80% coconut oil and 2% catalysts. This is not a single story. Another Filipino, a physician, holds a Philippine patent for refined coconut oil-fuel as a substitute for automotive diesel fuel. He actually conducted test runs in his diesel jeep on cocoil fuel covering a total of 1200 km. He was glad to see that his jeep engine was cooler while running on coconut oil and did not emit any smoke. Also it consumed less coconut oil than diesel oil to cover the same distance.

(Collected by B. Chempakam)

Two Hundred And Fifty Years of Coconut Research

Two hundred and fifty years ago, in 1741, a book written in Indonesia and published in Holland, gave a very full account of the coconut palm. It covered everything that was then known about the agricultural botany and the social significance of this uniquely important plant. In particular, it gave the first detailed descriptions of thirteen different varieties, some of which can still be found today. By a happy coincidence, the event has been commemorated by the International Board for Plant Genetic Resources (IBPGR) who held a Workshop at Bogor, Indonesia from 7-11th October, to set up a Coconut Genetic Resources Network Steering Committee. Now, scientists concerned with this pan-tropical crop can develop a world-wide strategy for its rational and safe conservation and better use of its genetic resources.

The book was "Herbarium Amboinense" and it described the plants and animals of the East Indies. It was written by Georg Rumf, better known as Rumphius. He lived on the Island of Ambon, in Indonesia from 1653 to 1702. By any standards he had an eventful life. When he was 18 he sailed from the Netherlands to the tropics but was taken prisoner en route and held in Portugal for three years. Eventually, he joined the Dutch East India Company and went to Ambon, but his life continued to be full of trauma. His library was burned down. His wife and daughter were killed in an earthquake. The first six volumes of the book were lost when the ship carrying them to Europe was sunk off the coast of Africa by a French warship. Fortunately copies had been made. Sixty-one of the illustrated, engraved plates were stolen and had to be replaced. On top of all these disasters, for more than 30 years of the 40 it took to write the book, he was blind.

The final book, in six volumes consisted of 1,660 pages, nearly 700 plates and described about 1,200 plants. And, because of its importance, the chapter on coconut was given pride of place in the first four chapters of the first volume. The coconut text is not only a classic that subsequent authors have copied (often without knowing) but also a practical account that modern scientists can get information from. Unfortunately, the original text in 17th century Dutch was only translated into Latin. A modern English language version is now being prepared by a three man team from Holland, England and Indonesia.

(COURTESY: Dr. H.C. HARRIES)

STRATEGY FOR PRODUCTION OF PLANTING MATERIAL

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Introduction

A major constraint in breaking the yield barrier in horticultural crops in India has been the inadequate production of quality planting materials. This is more so in the case of seed propagated perennials such as coconut. The coconut, known as 'Kalpavriksha' or 'Tree of Heaven is largely grown in the East and West Coasts of India and is now gaining popularity in the non-traditional areas also. The area has been covered largely from the seedlings of the traditional tall varieties. The seeds are collected from the selected mother palms in the farmers' field and the supply made either by government agencies or by farmers themselves. Besides, bulk of non-descript material have also been supplied by innumerable private nurseries.

Varietal concept

Seventy-five years of research efforts in the country had resulted in the release of two varieties viz. 'Chandra Kalpa' (Laccadive Ordinary) and 'Pratap' (Banawali Green Round), and nine hybrids viz, Chandra Sankara (COD × WCT), Laksha Ganga (LO × GB), Chandra Laksha (LO × COD), Kera Ganga (WCT × GB), Ananda Ganga (AO × GB), WCT × COD, VHC1, VHC2 and ECT × GB which are capable of yielding 13.20 to 24.94 kg copra/palm/year. This has created an awareness among the coconut farmers and they now have become conscious of the yield potentialities of these improved varieties. Though the area increase has been at an average rate of 13500 ha per annum, during the last decade, the percentage of improved varieties/hybrids covered in the area expansion programme has been negligible, due to non-availability of adequate planting materials.

Present status of planting material availability

The available information indicates that about 11 million seedlings, mostly talls, are produced annually in the country of which 5.5 million are contributed by the governmental agencies (Table 1) and the rest by the private growers.

Besides the above, CSF, Aralam, CPCRI-Seed Garden, Kidu, and the Co-ordinating Centres like Aliyarnagar, Ambajipeta, Ratnagiri, Arsikere and Veppankulam are in a position to produce about 2.52 lakh Tall, 0.91 lakh T × D and 0.23 lakh D × T seedlings annually. Two private hybrid seed gardens, viz. Deejey Farm, Madurai (TN), and East Coast Hybrid Coconut Farm, Tadepalligudam (AP) are also producing hybrids to the tune of about one lakh per annum.

Table 1 : Details of planting material production in the country

Sl. No.	State	Hybrids (Nos.)	Talls (Nos.)
1.	Kerala	90,950	12,60,350
2.	Tamil Nadu	700,000	700,000
3.	Karnataka	40,000	10,00,000
4.	Andhra Pradesh	60,000	5,00,000
5.	Orissa	3,00,000	3,00,000
6.	Bihar	—	1,00,000
7.	Tripura	—	1,00,000
8.	West Bengal	—	1,00,000
9.	Others	—	2,00,000
	Total:	11,95,000	43,00,000

Source : Coconut Development Board, 1991.

Status of coconut hybrid seed gardens

During early seventies, the hybrid seed gardens were set up in the country with 50 : 50 centre: state assistance at Navlok (TN), Dharmaveera and Kannamangalam (Karnataka), and Biswanahakani (Orissa). Except Kannamangalam Farm, the other seed gardens have reached the stage of producing hybrids. Kannamangalam seed garden did not reach the take-off stage and was discontinued. However, for want of adequate irrigation facilities, lack of optimum management due to financial constraints and inadequate infrastructural facilities for hybrid production, these farms have not attained their full production capacity. The recently started seed garden at Ettankulam (TN) also is facing the same problem. Many times the central assistance could not be used for want of a matching grant from the states. Considering these constraints, the Coconut Development Board had started seed-cum-demonstation farms in different states during the Seventh Plan Period, which are run by the Board directly. The present infrastructure of seed gardens in the country is given in Table 2.

Table 2 : Present status of seed gardens in the country

State & Farm	Planted area (ha)	Potential materials available
ANDHRA PRADESH		
*(1) East Coast Hybrid Centre Ittikalagunta West Godavari		D, GB, T, MOD, MYD T, ECT
(2) ARS Ambajipeta, East Godavari		D, GB T, ECT
KARNATAKA		
(3) Dharmaveera Farm, Bellara	200	D, COD T, WCT
(4) NRCC, Farm Shantigodu		D, COD, MYD, CDG, T, AO
(5) CPCRI Seed Farm, Kidu	43	D, COD, CGD, GB T, WCT, AO, LO, TT
KERALA		
(6) CSF, Aralam	110	D, COD, MYD, MOD, MGD T, WCT, LO
(7) Seed Garden Complex, Nilambur	300	D, COD, MYD T, WCT, LO
(8) CPCRI, Kasaragod	—	D, COD, MYD, MOD, MGD, CGD T, WCT, LO, AO
(9) Chowghat area farmers' fields		D, COD
ORISSA		
(10) Coconut Seed Garden Bishwanahakani, Cuttack	50	D, COD, MYD, MGD, T, WCT
(11) Horticultural Farm, Konark	5	D, COD T, WCT
(12) Horticultural Farm, Sakhigopal	—	T. Sakhigopal, Tall
TAMIL NADU		
(13) Coconut Hybrid Seed Garden, Navlok	50	D, COD T, ECT
(14) Coconut Tall Garden, Neyveli	50	T, ECT
(15) Coconut Hybrid Garden, Ettankulam, Tirunelveli	100	D, COD, MYD, MOD, GB T, ECT, AO
(16) Coconut Seed Garden, Ranipet	50	D, COD, MYD T, ECT
(17)* *Deejay Hybrid Garden, Madurai	80	D: MYD, MOD T: ECT, AO, TT, WCT
COCONUT DEVELOPMENT BOARD-SEED-CUM-DEMONSTRATION FARMS		
(18) Mandya, Karnataka	20	D, COD, MYD, GB
(19) Neriyamangalam, Kerala	20	NA.
(20) Tripura	40	N.A.
(21) Bihar	40	,,
(22) Bastar, M.P.	40	N.A.
(23) Assam	40	,,
(24) Andhra Pradesh	20	,,
	1258	

**Private seed gardens with known parental source*

D: Dwarf, T: Tall, WCT: West Coast Tall; TT: Tiptur Tall; AO: Andaman Ordinary; COD: Chowghat Orange Dwarf; CGD: Chowghat Green Dwarf; MOD: Malayan Orange Dwarf; MYD: Malayan Yellow Dwarf; MGD; Malayan Green Dwarf, GB: Gangabondam.

As on today the available information indicates that 1258 ha seed gardens are available in various states. Some of them were started only during the Seventh Plan period and some are in the process of completion of planting. Functioning of the gardens requires to be reviewed critically and infrastructure facilities like assured irrigation and adequate contigent expenditure, proper training etc, need to be provided. If these corrective measures are taken, these gardens will definitely produce considerable hybrids.

Planting material requirement

The strategy for production of planting materials in coconut is based on (i) the area expansion in the traditional and non-traditional areas. (ii) regular replanting and under-planting in the traditional areas for replacing senile, overaged and unproductive palms, and (iii) rehabilitation of root (wilt) affected areas in Kerala by replanting, underplanting, etc. It has been estimated that an area expansion of 0.691 million ha under coconut is possible in the country. To meet the growing demand for coconut which is used as an important source of vegetable oil, and many day-to- day uses, it is necessary to increase the production both through area expansion, and also the rejuvenation of old, senile and unproductive, disease affected gardens. Taking all these facts into account, the requirement for planting material would be as follows:-

Details	Requirements (million)
(i) Area expansion © 60,000 ha per annum in traditional and non-traditional areas	10.5
(ii) Replanting, under-planting and rehabilitation in root (wilt) affected areas in Kerala at the rate of 2%	3.0
(iii) Replanting and under-planting in other states at 2% per annum.	2.5
Total	16.0

Developmental efforts

The Working Group constituted by the Planning Commission/Government of India for indentifying the priority areas for Horticulture and Plantation Crops for the Eighth Five Year Plan, has indentified the production of planting materials as a priority area. The various schemes identified for this programme are : (i) production and distribution of T × D hybrids, (ii) maintenance of hybrid seed gardens established in Kerala and Tamil Nadu, (iii) establishment of new seed procurement unit, (iv) establishment of demonstration-cum-seed production farms (v) establishment of new seed gardens in Karnataka and Kerala. In addition, the development departments of the State Governments have also set up targets for this programme. No doubt that these developmental efforts will definitely help to increase the production of quality planting materials and are estimated to produce 0.675 million hybrid seedlings per annum. This is far below the estimated total planting material requirement of 16.5 million per annum.

Constraints

(i) The bulk of seed nuts of Tall cultivars are collected from the selected mother palms from the gardens of the farmers, and hence there is necessity to depend on the farmers all the time. Sometimes quality has to be sacrificed because of this dependency.

(ii) Even for the production of Tall × Dwarf hybrids, the government agencies will have to depend solely on the farmers gardens for selected Tall mother palms.

(iii) Though two varieties and nine hybrids have been released so far, these have not created an impact in the field since the identified Tall and Dwarf parental palms for producing these hybrids are not available in adequate number.

(iv) The seed gardens established earlier were meant to produce more of Dwarf × Tall hybrids and these gardens if properly maintained can produce adequate D × T hybrids.

Future thrust

(i) With the existing set up it will not be possible to produce the required quantity of quality planting materials of released Tall x Dwarf hybrids, and hence it is necessary to establish additional seed gardens with more number of identified Tall mother trees and lesser number of Dwarf palms for pollen source.

(ii) The performance of the existing seed gardens needs to be reviewed and remedial measures taken up for making these gardens purposeful and productive.

(iii) The central institutes and agricultural universities need to be encouraged for producing more nucleus parental materials for which financial assistance either in the form of one-time revolving fund or annual funding need to be considered.

(iv) The infrastructural facilities for the nurseries need to be reviewed and shortcomings to be corrected.

(v) Considering the present situation of depending on private nurseries and indiscriminate supply of spurious planting material, it is suggested that a registered coconut nursery system may be introduced and the quality control be imposed. For such registered nurseries, the CDB or state governments may supply the seed nuts and before distribution of seedlings roguing and certification should be done.

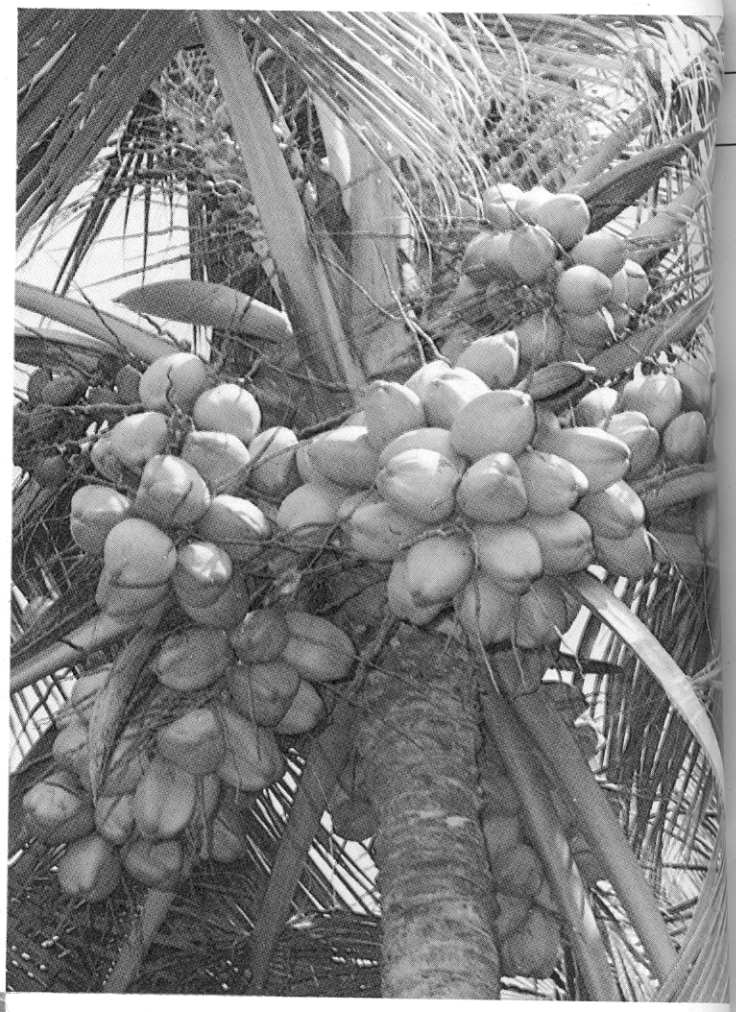
(vi) Movement of seedlings from disease-affected areas of Kerala and Tamil Nadu to healthy areas should be banned by rigourosly imposing the Seed Act. Seed and seedling movements to various parts of the country should be organized from the healthy areas only.

Coconut being a perennial crop with a long gestation period of 4 to 5 years, any mistake done in the selection of quality planting material will be revealed only at bearing stage, by which time considerable funds and time would have already been lost. Hence, more thrust should be given to produce high yielding quality planting materials for successful and profitable coconut cultivation.

MALAYAN YELLOW DWARF
(MYD)

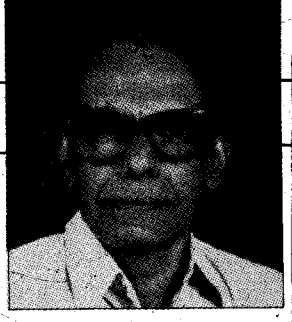
MALAYAN ORANGE DWARF
(MOD)

WCT × COD – **Kerasangara**



COD × WCT – **Chandrasangara**

MEMOIRS OF A COCONUT BREEDER



K. Satyabalan*
Retired Project Coordinator Palms. (CPCRI)

A breeder of a perennial palm like coconut may find it difficult to write about his experiences covering a period of three decades, because he may not have much to write considering the long life of the coconut palm and the limitations met with in its improvement. In this article, I have tried to recollect a few incidents which created in me an affection, admiration and a desire to study in detail this fascinating palm which is considered to be the "queen of palms" in the world.

Selection and Hybridization

I joined the Central Coconut Research Station under the Indian Central Coconut Committee (now known as the Central Plantation Crops Research Institute under the Indian Council of Agricultural Research, at Kasaragod), as a Research Assistant in Botany on 27 October, 1952, and worked under the late Sri C.M. John, who was then Director and Botanist till 1955. The variability in the performance and nut characters of the exotic cultivars of coconut planted earlier in Field XI of the Station compared to our local Tall, evoked in me an interest to study them, and it was found that the Laccadive Ordinary Tall palms introduced from the Laccadive Islands are more promising than others under similar conditions.

Since very few exotic cultivars had been introduced earlier, it was decided to introduce more exotic cultivars from some important coconut growing countries in the world. During the period 1955 to 1959 introduction of exotic cultivars, pollination work for the production of hybrids of different combinations and planting of hybrids produced were continued.

The promising performance of the hybrid with local Tall as female and Chowghat Green Dwarf as male parents reported by earlier workers in the Coconut Research Station, Nileshwar prompted me to take up in right earnest, hybridization work for the production of intra-and inter-varietal hybrids. Since Chowghat Dwarf was the only [illegible]used till then, production of Tall × Dwarf hybrids [illegible]howghat Green Dwarf and Chowghat Orange Dwarf on the different bunches of the same Tall palm with different pistillate and pollen parents was done to identify the optimum parental combination for the production of high yielding hybrids.

Exploitation of Hybrid Vigour

A few hybrids of Tall × Dwarf of different combinations were planted in 1956 in the vacant areas available in Hill Block West of the Research Station. Their performance studied for many years during 1967-1979 showed that they were early bearing and high yielding. Their performance indicated Chowghat Orange Dwarf to be a better pollen parent than Chowghat Green Dwarf. Detailed studies on the yield attributes and nut and copra characters of the hybrids with those of their parents indicated the manifestation of hybrid vigour in the yield attributes and in the nut and copra characters, except in the husk content in the fruits of the hybrids.

N.C.D.

Another interesting thing which caught my attention in 1956 was the performance of seven palms out of eight planted as dwarfs in Field XI during early forties. These palms were found to be very high yielding when compared to the remaining ones in that field. This was interesting and intriguing as I was under the impression that dwarf palms are self-pollinated and we could get only dwarf seedlings from the nuts of dwarf palms. On enquiry I came to know from my senior colleagues that they were natural hybrids of open-pollinated dwarfs (NCD). I learnt that such off-type seedlings were known as "Komadan" in Central Travancore area by a family named Komadan. This indicated that we could obtain 'hybrids' from COD in nature itself without resorting to artificial hybridization. We could get about 20 per cent of the seednuts sown in the case of Chowghat Orange Dwarf and about 3 to 5 per cent in the case of Chowghat Green Dwarf, as natural 'hybrids'. A few of the seedlings from both progenies of the two dwarfs were planted in the available area in East Block of CCRS in 1957. During this year, Sri R.V. Pillai also joined the Botany Section as Research Assistant. The behaviour of selfed and open-pollinated progenies of selected high yielding palms of West Coast Tall (WCT) growing at Kasaragod and planted at the Coconut Research Station, Nileshwar, was studied to

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compare their performance, and the effect of selfing leading to inbreeding depression in them. In 1959, Dr. C.A. Ninan joined as Botanist.

Genetics of Dwarfs

After my study leave for post-graduation from Agricultural College, Coimbatore, I rejoined in 1961 and continued the work initiated earlier. Based on the yield records of West Coast Tall palms available for a long period at the Station, the bearing tendency of palms of different yield groups was studied. Studies on the genetics of dwarf palms was continued and it was surprising to note that even by selfing the dwarf palms, 'off-types' less vigorous than those resulting from open-pollination could be obtained. The performance of these off-types also was more or less similar to those obtained from open-pollinated nuts. This indicated the putative hybridity of the off-types obtained from the dwarf palms. This also indicated the complex genetics of dwarf.

Prepotency studies

During the period that followed, a number of interesting items of research was taken up. Correlations worked out between the seedling characters in the nursery and the performance of these seedlings in the field later as adult palms indicated that, collar girth and leaf production in the nursery was genetically correlated with the yield of adult palms. The need to identify the 'prepotent' palms among the high yielders for raising the yield level of future plantations was pointed out by some workers as it was found that all high yielding palms do not yield high yielding progenies. From the studies on growth, it was found possible to identify the probable prepotent palms based on their progeny performance at the fifth month from the time of germination.

In 1966, a new set of Tall × Dwarf hybrids viz. WCT × Gangabondam, Laccadive Ordinary × CO Dwarf and Laccadive Ordinary × Gangabondam were planted in Hill Block East to compare their performance and identify the promising combinations. Off-types obtained from Chowghat Orange Dwarfs after selfing, open-pollination following emasculation, and also those obtained by controlled hybridization with Tall were planted to compare their performance, and the findings were reported during 1981 and 1982.

The Indian Council of Agricultural Research took over the Central Coconut Research Station in 1966. It was renamed later in 1970 as the Central Plantation Crops Research Institute (CPCRI). During 1971-'73, I was deputed to work on coconut in Fiji Islands by the Government of India under the I.T.E.C. programme.

My work in Fiji Islands

During my deputation from 1971-'73, I worked as Senior Research Officer (Coconuts) in Fiji Islands. I was also Administrator, Wainigata Research Station, Savu in Vanua Levu, one of the two developed large islands in Fiji. Coconut plantations in Fiji are mainly located in Vanua Levu, Taveuni and other small uninhabited islands. I was in-charge of the Coconut Section in the Research Division of the Department of Agriculture and was responsible for the research work on coconut.

I guided technical officers and field staff in their research projects. My work also included taking classes on the scientific methods of coconut cultivation for the students of Fiji College of Agriculture in Suva. A series of extension pamphlets on different aspects of coconut growing were prepared in English and Fijian languages for distribution among farmers. The charts and exhibits explaining the different aspects of coconut culture prepared for the Annual Field Day of the Station in 1972 attracted a lot of farmers and were appreciated by all, since most people were thoroughly unaware of the improved methods of cultivation of coconut. A small hut (called 'bure' in Fijian) was constructed with materials obtained from coconut leaf, timber, coir rope, etc. to show to the visitors the use of these materials in the construction of their 'bures'.

I remember with gratitude the excellent co-operation and assistance I had received from the staff and their families at the Station during the period of my short stay there. The experience I had and the help received during the days when 'Hurricane Bebe' and the cyclone 'Juliet' struck Fiji Islands, are still green in my memory.

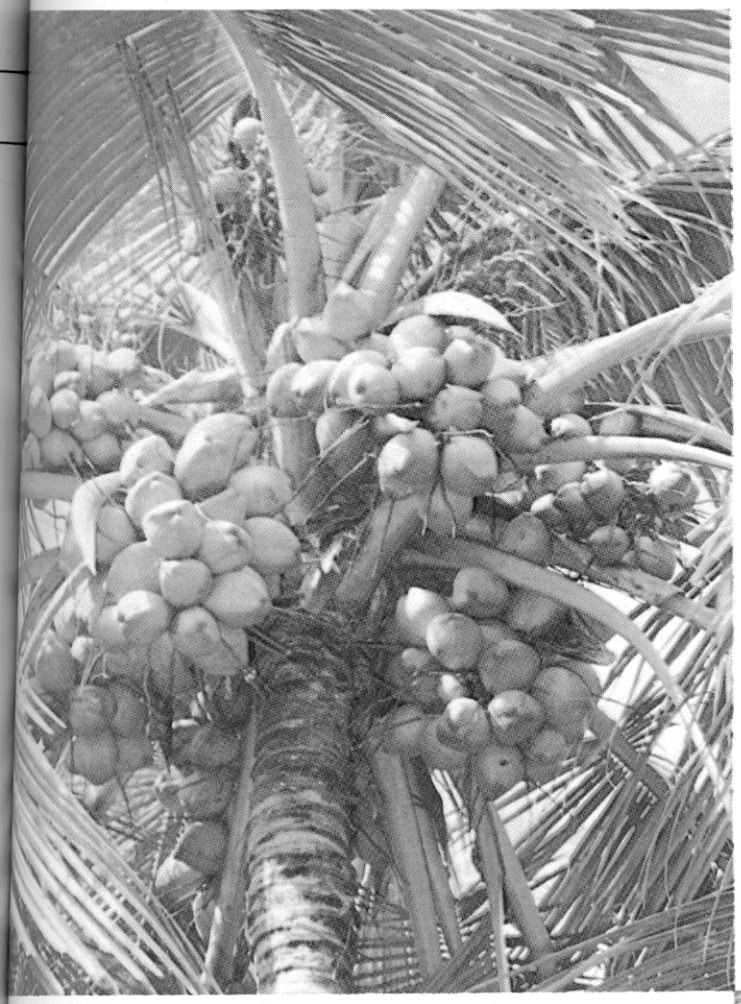
In conclusion, I express my gratitude to the Government of India for deputing me to Fiji Islands and to the Government of Fiji for the excellent facilities, co-operation and assistance I received during my period of deputation.

Oil Palm Breeding

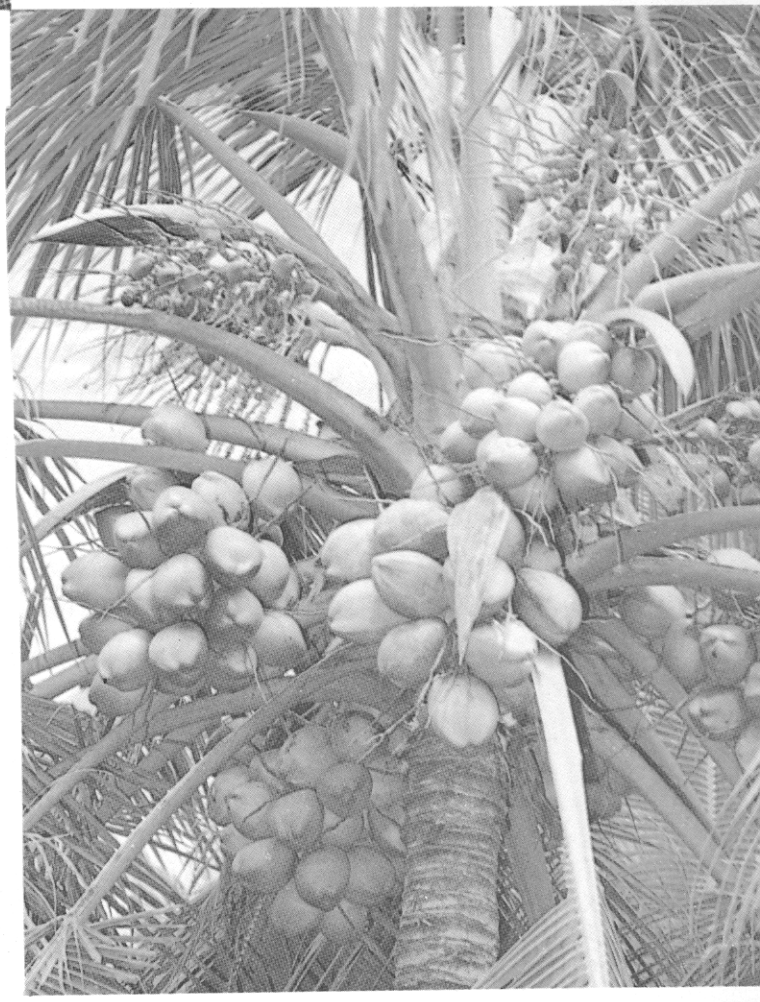
After my return from Fiji Islands, I was promoted as Junior Plant Breeder in 1974 and later selected as Breeder (Oil palm) in 1975. As I was elected Convenor of the Organizing Committee for the International Symposium on Coconut Research and Development (ISOCRAD-I) which was held during the Diamond Jubilee of Coconut Research in India in December 1976, I was transferred back to Kasaragod in 1975 itself.

Performance of Coconut Hybrids

Under the Project System of the ICAR, as Scientist S2, I was the Leader of the project on 'Exploitation of



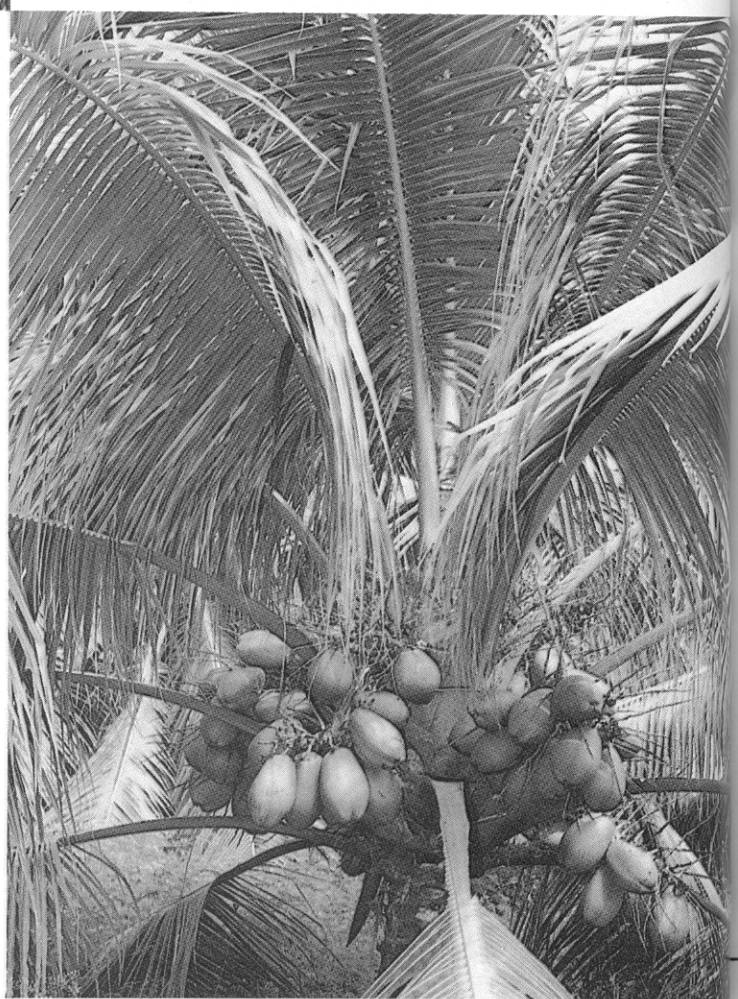
LO × GB – **Lakshaganga**



LO × COD – **Chandralaksha**

CHOWGHAT ORANGE DWARF
COD

GANGA BONDAM
GB



hybrid vigour in coconut' and an Associate in the projects on 'Introduction and study of germplasm material in coconut' and on 'Oil palm Breeding'. The setback in growth, first in the nursery and then in the field after planting, prolong the pre-bearing period which could be reduced if proper care is taken to avoid or minimize the setbacks in the early stages of growth of the palm. During 1978-'79, I was associated in a survey jointly conducted by the Institute, Kerala Agricultural University, Directorate of Coconut Development and Department of Agriculture, Kerala, to study the performance of hybrids and varieties supplied to farmers in Kerala which helped me to understand the problems faced by the farmers in planting them and the erratic performance of some hybrids and varieties.

I was appointed Project Cordinator of the All India Co-ordinated Coconut and Arecanut Improvement Project of ICAR in 1980. During 1980-'81, I visited the Co-ordinating Centres in Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, West Bengal and Gujarat before my retirement in 1981.

As Emeritus Scientist

After retirement, I was made Scientist Emeritus of ICAR to continue the work on the genetic improvement of the coconut palm under two items of research, namely, 1) Prepotency studies in West Coast Tall, and 2) Combining ability of parents in CO Dwarf female × WCT male hybrids. The study indicated that identification of prepotent palms among the high yielders is possible based on the growth characters of their progeny at the fifth month of growth from the time of germination in the nursery. Studies on the combining ability for the production of promising hybrids in CO Dwarf female × WC Tall male crosses have indicated that selection of Orange Dwarf (as female parent) on the basis of low shell content of the nut and selection of WC Tall (as pollen parent) with high copra content may yield a higher percentage of heterotic hybrids, which indicated their combining ability.

The breeding work which I started in 1952 was concluded in 1983 when I finally left the Institute. In spite of the long period of active sustained work, I have found it difficult to understand the complicated genetic architecture of this wonderful palm. However, I have one satisfaction that I have usefully spent my professional life-time to understand coconut genetics. In conclusion, I express my gratitude to all those who have helped me and were associated with my work during this long period. Without their assistance and co-operation it would not have been possible for me to carry out my researches to my satisfaction. Particularly I cannot forget those who have helped me and are no more with us today.

Coconut Loves Children – not myth, but a reality

According to an observation reported in the book "Medical secrets of your food" authored by Dr. Aman, among all the trees that grow on earth, it is believed that coconut tree is endowed with a wonderful sense of understanding human voice. He observed vigorous growth of coconut trees in school compound, where children play, jump and scream in their innocent shrill voice. Love coconut, it loves you too.

(Collected by K.M. George)

TRADITION GIVES WAY TO MACHINES

Smt. **Minnie Mathew,** I.A.S.
Secretary, Coir Board

Coconut industry in India is mainly confined to copra making, oil milling and coir manufacture. But export trade of India in coconut products is practically restricted to coir and coir products. The annual production of coir in India estimated at 201,700 tonnes represents about 70 per cent of the total world production. India has virtually the monopoly in the production of white fibre and coir yarn. The export of coir and coir products during 1990 amounted to 27,926 tonnes valued at Rs. 48.33 crores.

The importance of coir industry in our country can be gauged from the fact that in addition to earning substantial foreign exchange, about half-a million workers belonging to the weaker sections of the society are provided with gainful employment.

As a result of the various schemes and programmes being implemented by the Coir Board, since its inception in 1953, the coir industry could survive in its traditional area and make significant contributions in the field of product diversification, despite competition from synthetic and other natural fibres.

When the country is celebrating 75 years of coconut research, an assessment of the current coir industry would be highly rewarding. With this aim, Smt. Minnie Mathew, IAS, Secretary of the Coir Board was approached. In an interview Smt. Minnie Mathew spoke to Mr. Nanda Kumar on various research and developmental activities undertaken by the Coir Board. Here are some excerpts from this interview.

Q. Coir Board functions as a promotional body for the overall development of coir industry in the country.What are the main functions of the Board?

A. Promotion of exports through appropriate programmes, development of a domestic market, registration of coir industrial establishments, extension of export related services to exporters, and skill development through training programmes, are some of the important functions of the Board. Scientific, technological and economic research are also undertaken, assisted and encouraged by the Board.

Q. White fibre and brown fibre are produced in the country. What are the end uses of these fibres?

A. The term 'white fibre' denotes the fibre extracted manually from husk which has been soaked in saline water for 8-9 months. Brown fibre on the other hand, is extracted through a mechanical process out of dry coconut husk and green unretted husk. White fibre production is concentrated in Kerala and it is entirely spun into coir yarn which is then woven into mats, mattings and floor covering. It is also used for manufacture of ropes and cordage. Brown fibre which consists of bristle fibre and mattress fibre has other end uses. Bristle fibre is used for making brushes while mattress fibre is used primarily for the manufacture of mattresses, upholstery and as insulation material. Bristle and mattress fibres combined together are used exclusively for the production of rubberised coir for manufacturing car seats, mattresses, filter and insulation. A small portion of the brown fibre is converted into coir yarn.

Of the total production of 201,700 tonnes of coir, 125,900 tonnes is accounted for by white fibre and 75,800 tonnes by brown fibre.

Q. Coir production is one of the main agro-based cottage industries in Kerala which still employs old traditional methods for the extraction of fibre, spinning of coir yarn and manufacture of coir products. Do you have any programme to modernize the coir industry in the State, which contributes to 75 per cent of fibre production in the country?

A. Many of our research programmes are aimed at modernizing the production base of this traditional industry. The spinning sector employs about 80% of the work force in the industy. For modernizing this sector and upgrading quality, a treadle ratt has already been developed. A semi-automatic loom has also been developed at the Central Coir Research Institute, Kalavoor. So far, powerlooms for weaving mattings were imported from abroad. The Board is now proposing the indigenous fabrication of a 2 Mtr. and 4 Mtr. powerloom in collaboration with MERADO, Madras.

Q. What are the technological accomplishments in the field of product diversification?

A. Our Research Institutes have undertaken collaborative studies with the Regional Research Laboratory, Jammu-Tawi and Regional Research Laboratory, Trivandrum for development of coir gypsum composites and coir polymer composites which could be used for the purpose of panelling and could soon become a substitute for wood panelling. The technique involves using coir-needled felt with binding material like gypsum or phenol-formaldehyde which is later pressed to form boards. Both the projects have been satisfactorily completed at the laboratory level. Our efforts are now to popularize this commercially.

Apart from trying to develop new products, efforts are being made to find new uses and new applications for the traditional products. One such programme involves the use of coir matting for cooling buildings by roof surface evaporation technique. This is a project taken up with the CBRI, Roorkee. Field tests are now being conducted to test and confirm the efficacy of using coir for this new application. Coir pith is a by-product from coconut husk which is available in large quantities in all coir producing areas. Pith causes severe environmental pollution. Hence efforts are on to utilize this product for economic purposes. Collaborative study has been undertaken with Tamil Nadu Agricultural University, Coimbatore for testing its application in agricultural farms. Introduction of coir geo-textiles i.e. coir netting for erosion control and civil engineering applications is considered to be one of the major successes in the area. Field experiments conducted in the Nilgiris, Nainital and Dehra Dun regions have already established the coir nettings can effectively contain hazards of erosion and also permit the growth of restorative vegetation. The international market for geo-textiles is presently dominated by synthetics. In the wake of the new environmental consciousness sweeping through most parts of the world, there is a growing demand for natural geo-textiles. On account of its strength, durability and longevity coir is an excellent natural geo-textile. To promote the use of this product Coir Board has, under the ITC/SIDA Programme, organized seminars in various locations in USA and Canada.

Q. What are the programmes for the promotion of domestic market?

A. Although coir is traditionally an export-oriented industry there is a large and growing demand for coir products in the internal market. The Board provides generic publicity so as to increase the consumption of coir and coir products. For this, the Board has established 24 showrooms and sales depots in important places throughout the country. Board has plans to start new showrooms and sales depots in important cities in a phased manner. To ensure quality, coir products sold through the Board's showrooms are subject to Coir Mark Scheme. The Board also encourages and extends financial assistance to State- supported agencies for starting new sales outlets.

Q. What about your export promotion programmes?

A. Promotion of exports is one of the statutory functions of the Board. A variety of programmes and services are being provided by the Board for promoting exports. This includes publicity for coir in the importing countries, market surveys, etc. Last year, exports amounted to 27,926 tonnes valued at Rs.48.33 crores. The assistance extended to the coir sector by International Trade Centre, Geneva and Swedish International Development Agency has immensely encouraged export performance in the coir sector. The major programmes undertaken under the ITC project include sponsoring market delegations, product adaptation, design development, strengthening of trade information system and assistance for participation in Trade Fairs.

The various services extended by the Board to the export-oriented coir industry included issemination of trade information and policy guidelines, extension services on processing/production techniques, implementation of floor price scheme, enforcement of floor price regulations through registration of export contract, etc.

Q. Are there any programmes for the Board to equip the coir industry with trained manpower?

A. Coir Board has set up a National Coir Training & Development Centre at Kalavoor and four Regional Coir Training & Development Centres located at Thanjavur, Arsikere, Rajahmundry and Bhubaneswar and a Demonstration-cum-Extension Centre at Nalbari in Assam. Besides conducting training programmes, the centres also play a pivotal role in the development of the industry in their respective states by extending technical assistance to the entrepreneurs in improving the quality of spinning, weaving, dyeing, etc.

Q. Coir Board provides various types of assistance to the processors, manufacturers and exporters. Do you have any programme to provide financial assistance to them?

A. As a part of the Central Co-operativisation scheme, various types of assistance are provided which include share capital assistance, managerial subsidy, marketing assistance and assistance for purchase or modernization or renovation of equipments under the scheme. Share capital assistance in the form of loan and managerial subsidy for appointment of paid Secretary to coir societies, equipment assistance to the primary co-operative societies in the form of grant and loan and marketing assistance to apex societies for opening sales outlets are provided to the co-operative sector. Financial support is given to Showrooms & Sales Depots sponsored by the State Govt./State Coir Corporations/Apex Federations/Co-operative Societies in the brown fibre sector. Financial assistance under this scheme would be available for meeting 50% of the rentals, 50% of the cost of interior decoration, publicity, etc.

Q. Coir industry in Kerala is reported to be facing several problems resulting in stagnation in white fibre production. Can you please tell me the main reasons for such a situation?

A. In Kerala, coir industry is a traditional one which still employs the old methods for the production of fibre and yarn. The production of white fibre is stagnant due to several factors. Non-availability of husk in adequate quantities, the high cost and the 3-Point Levy System are some of the factors, that are reported to have caused a fall in production of white fibre.

Q. The development of brown fibre sector is more rapid than white fibre sector. But don't you think that the development of brown fibre sector will ultimately affect the white fibre production?

A. The brown fibre and white fibre sectors of the industry are complementary to each other. It would be wrong to think that development in the brown fibre sector would be at the cost of the white fibre. Even today the gap between demand and availability in the white fibre sector is met by the brown fibre moving into Kerala. The two sectors can therefore, co-exist and grow together.

Q. What are the developmental schemes being implemented in the brown fibre sector?

A. Coir Board has a scheme under which financial assistance up to 25% of the cost of machinery and infrastructural facilities subject to the cost ceilings prescribed can be paid to entrepreneurs who come forward to set up coir units. Subsidy is also available for modernization and renovation of coir units. The Board conducts entrepreneur development programmes and also extends technical advice to coir entrepreneurs. The Board has also a scheme under which financial assistance is extended for setting up in-plant testing laboratories in curled coir units.

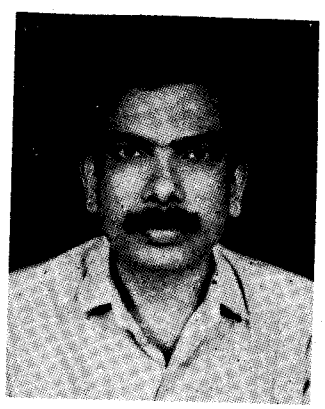
Q. What are the developments in rubberized coir sector?

A. The rubberized coir sector which uses substantial quantities of brown fibre is a major outlet for the brown fibre produced in the country. There are 37 rubberized coir units in the country. An estimated quantity of about 11,000 tonnes of curled coir is consumed annually by the rubberized coir units, largely in the areas of mattresses, pillows, cushions and seat cushioning in furniture and automobile industry. The demand for rubberized coir is rapidly increasing in India, thanks to growing consumer awareness of the multiplicity of end-use applications. However, export has been very significant, due to high ocean freight rate. In order to promote the exports of new and non-traditional items the Board during 1990-91 sanctioned an incentive of 10% of the FOB value of actual export of rubberlized coir products. The Board has also initiated several steps to maintain quality standards in this sector.

Q. Do you subscribe to the view that modernization of coir industry will adversely affect the employment generation in the sector?

A. As is well known, coir is a highly labour intensive industry which supports half a million workers in the rural areas. Hence, there is a very definite apprehension that introduction of modernization in the industry would lead to displacement of labour. However, these facts are not entirely correct. The industry today utilizes only 32% of the husk available. It should be possible for the industry to increase its utilization to at least 50% and thereby generate more employment and also generate fuller employment for the workers. Gradual modernization is absolutely necessary for the survival of this industry. Sri Lanka which is considered as India's biggest competitor in the international market is producing mechanized yarn and mechanized products. Hence, to maintain its position in the world market the Indian coir industry would also have to upgrade its technology and inject cost-effectiveness and quality upgradation. Unless this is done, it would be difficult to face the emerging competition in the years to come.

(Interviewed by Shri **T.B. Nanda Kumar** Publicity Officer, Coconut Development Board, Kochi-682 011



WOMEN IN COCONUT INDUSTRY

COIR SPINNING

LEAF PLAITING

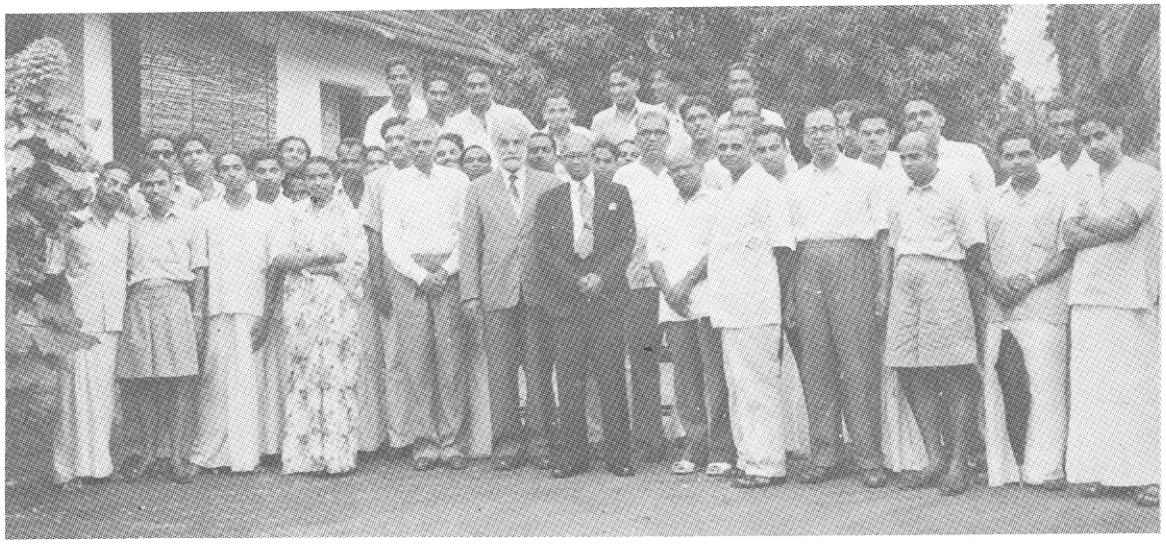
R.V. Pillai & M.K. Muliyar
Principal Scientists
Central Plantation Crops Research Institute
Kasaragod.

On a cold morning in February 1957, we met together at the 'Attara Kutcheri' in Cubbon Park, Bangalore. It was for an interview for the post of Research Assistant in the erstwhile Central Coconut Research Station, Kasaragod. Besides the two of us, Shri Vaitheeswaran and Shri M.S. Lakshamanachar were also selected, from a large gathering of aspiring candidates, by the Committee headed by the great Scientist Administrator, Late Dr. M.S. Randhawa, I.C.S., who was then President of the Indian Central Coconut Committee (I.C.Coc.C.) under which the Central Coconut Research Station (C.C.R.S.) was functioning.

Late Dr. K.P.V. Menon of the CCRS was the Director based at Kayangulam and Dr. K.M. Pandalai, the Joint Director was at Kasaragod. During the first fortnight of March 1957, we joined the permanent posts of Research Assistant. The main office along with Joint Director's office, the Farm office and entire Administrative Section were housed in a small tiled shed near Eriyal on the southern end of the present campus. The Joint Director, the Farm Assistant (Shri M.N. Nambiar), the only Research Assistant in Agronomy (Shri Rama Varma) and the senior most Fieldman (Shri C.A. Kunhiraman), were the lucky people who had residential accommodation in the campus close to the office, nicknamed as 'Hampankatta', or the junction.

The present main guest house had only one room and a hall as the Guest House portion and the remaining two rooms and the front verandah were used as the Agronomy Section. Late Shri. M.M. Krishna Marar, then Agronomist was occupying a portion of the enclosed verandah as his office while the two rooms were used by the Research Assistants and Fieldmen. The present Farm Office complex had a central copra drying yard with a small shed on the southern side which was popularly known as 'Simla House'. This served as the Recreation Club also earlier. Shri K. Satyabalan, the only Research Assistant in Botany, along with the Fieldman were occupying this shed. At that time, the Botanist's post was vacant consequent upon the retirement of Shri C.M. John, who held the posts of Director and Botanist. On the northern side of the drying yard, there was a big hall with a covered verandah on its northern side. The western portion of this building was occupied by late Shri S.R. Gangolly, Cyto-Anatomist, and Shri M.C. Nambiar (now Retd. Project Co-ordinator, Spices and Cashew), then Research Assistant in Cyto-Anatomy Section. The eastern portion was the chemistry Laboratory headed by the Joint Director, Dr. K.M. Pandalai with Shri P.K. Thomas as Research Assistant. The building housing the present Biotechnology and Soil science Laboratories, and Director's office of CPCRI was then under construction. This building was sanctioned under the First Five Year Plan development of the Station.

The Station at that time was popularly known as 'Coconut Farm' or 'Agricultural Research Station'. It had an area of 28 acres when the Oilseeds Department of Madras Govt. established it in 1916 along with Nileshwar



and Pilicode Stations. When the Indian Central Coconut Committee took over the Station in 1947, the area was increased to 100 acres by acquiring additional land. When we joined the station, the major experiments in Agronomy were on NPK studies, different cultural practices, permanent observations trial, and evaluation of different nitrogenous fertilizers.

In Botany, the main areas of research were on varietal studies, germplasm collection, conservation and evaluation, hybridization for evolving new hybrids, and identification of promising cultivars. Another major activity of the Station was the large-scale production and distribution of superior planting materials of coconut to farmers and government agencies at a subsidized rate.

When we joined here, to our dismay we found that the Research Station did not have any residential accommodation, Canteen or a Co-operative Society from where our daily needs could be purchased. In the vicinity of this campus, there was only one or two Kutcha tea stalls and a few small grocery shops, often without any provisions. For each and every need we had to depend on Kasaragod town situated 5 Km away from the Institute. Most of us were staying in Kasaragod town for want of suitable dwelling places around the Station. Only a single bus of 'Poyakkara Bus Transport' was plying between Talangara and Mogral Ferry, which many a time broke down on the way. Thus, often we had to walk to the Institute. But this walk was really pleasant, thanks to the company of late Shri U. Raghavan who was popularly known as 'UR', whose English vocabulary was of a high order, and he used to 'teach' us the English language as we walked. In those days, there were no taxis or any other motor-driven vehicles available on hire. Only a few horse driven 'Jutkas' were available for hiring. The Station had only a bullock-cart which was used for the transport of officials visiting the Station as well as for the Director's and Joint Director's trips to the town. We had the unique opportunity of travelling many a time to the town in this Bullock-cart and we cherish those journeys even today. The chairs used in that cart are available even now in our Recreation Club Hall. Since the NH-17 was not in existence at that time, to reach Mangalore we had to cross five ferries on the Mangalore-Chervathur Coastal Road (MCC Road). The usual transport available was the railway, and the road route was via Vittal. We had a Kudlu 'train halt' on the western side of the campus and all the Passenger trains used to stop at this halt. Many of our staff members around Kasaragod used this facility to come to Institute. After the formation of NH-17, the train halt became uneconomical and the railways discontinued the 'Kudlu Halt'.

The next phase of development of CCRS began in 1958 with the implementation of the Second Five Year Plan. The Administrative as well as the Research establishments were shifted to the new building in the early part of 1958. As a part of this development, another 40 acres of land near the beach, and 48 acres of land in the Hill Block were acquired. There was not much difficulty in taking over the Hill Block. Since other senior members were away, we were asked to take over the land from the Revenue Department. However, there was stiff opposition for taking over the Beach Block where many families including some of our own Supporting Staff, had to be forcibly evicted using Police help.

In order to take stock of the research achievements and planning for future strategy in the Second Five Year Plan, an All India Coconut Research Workers' Conference was organized by the I.C.Coc.C. at the Agricultural College, Vellayani in December 1959. Over 120 scientists working in various organizations participated in this Conference,

and probably this was the first presentation of our research results in a scientific conference. The activities of the Institute expanded and the staff strength increased along with other infrastructural facilities. During this period, the main thrust was on survey and identification of indigenous germplasm, laying out of large-scale fertilizer trials, crop weather studies, survey of coconut soils of Kerala, cytological and anatomical studies, studies on button shedding and barren nut formation, preliminary studies on irrigation, lime requirement in coconut soils, seednut storage, etc.

The Farm used to start functioning from 7.30 a.m. while the research staff used to work from 8.00 a.m. to 5.00 p.m., with a lunch break of 2½ hours from 11.30 a.m. to 2.00 p.m. There was absolutely no recreational facility at this Station, but those lucky people who had the privilege of getting some accommodation around Institute campus could take rest after lunch. Those who could not manage to get such accommodation, had to while away the lunch time in the laboratory itself. However, some people could profitably utilize this time by playing cards. Even though it was told that a club was functioning during Shri C.M. John's period, it was not active when we joined. Subsequently, some of us thought of reviving the Recreation Club, and as a first step purchased a Carrom Board and started playing during the lunch recess at the open rear verandah of the Guest House. From then onwards the Club continued to progress and has reached its present position. Later on, when Shri V.T. Markose joined as Research Assistant in Agronomy, he took the initiative to start a Canteen which has grown to a sizeable magnitude today.

The development of the Institute continued further when the third phase started in 1966 with the taking over of the Station by ICAR after abolishing the I.C.Coc.C. Since the ICAR felt that the C.C.R.S. cannot exist by itself at an All India level, the then Director-General, late Dr. B.P. Pal, F.R.S. and the Secretary, ICAR, Dr. K.P.A. Menon visited the *C.C.R.S., Kasaragod and C.A.R.S., Vittal and discussed the pros and cons of amalgamating these two Stations* along with the Research Centres of C.A.R.S. into an All-India Research Institute for the Agricultural Plantation Crops excluding tea, coffee and rubber. Thus, the C.P.C.R.I. came into existence in January, 1970.

The achievements made by the C.C.R.S. with the minimum basic facilities and manpower available are still fresh in our memory. The significant contributions made towards gathering basic knowledge about the palm and the vast data collected in those days still form the basis of current research programmes. With the augmentation of the research activities, infrastructure facilities and manpower, the massive Institution of C.P.C.R.I. with Research Centres and Seed Farms spread all over the country now covers other palms and cacao research besides coconut.

Coconut increases breast milk.

For better breast feeding, the Yaken of Basilan believe that women should have big breasts which can be had by drinking coconut water and eating coconut meat during pregnancy. The Island of Basilan lies in the southern part of the Philippines Archipelago.

In Chinese engagement ceremonies, particularly the Cantonese, a pair of old coconuts - the oldest that can be found in the market must accompany the dowry that is presented to the bride by the bridegroom's family on the day of the engagement. "We believe that the old coconut represents longevity. Therefore, a pair of old coconuts is given to the bride to express the hope that the couple will have a long life together" says a Cantonese Grandma.

(Collected by KM George)

KALPAVRIKSHA – MYTH AND REALITY

Purushothama Paika
Personnel Manager
Kerala Electrical and Allied Engineering Co., Ltd.
Kasaragod

According to Indian Mythology, *Kamadhenu* and *Kalpavriksha* are said to be the two exclusive reservoirs for fulfilling the desires of Gods and Goddesses living in 'Swarga' or 'Paradise' or Heaven. Kamadhenu is the holy cow and Kalpavriksha the holy tree. This 'tree of paradise or Heaven' which yields all desires of Gods is none other than our coconut tree. Therefore, conceptually coconut tree is as old as our ancient scriptures, such as the Vedas, Upanishads, Ramayana, Mahabharata, etc. Needless to say that such a sacred tree of our mythological era bequeathed to our modern times, has become an integral part of our Indian folklore. How far coconut tree has gone deep into our culture is, therefore, a matter of interest for those who respect, love and do research on coconut in the modern context. It is with this objective that an account of our age-old applications of coconut tree in Indian folk culture is given here under 7 heads taking Kasaragod region as a reference centre:

1. House-building

Coconut trunks are commonly used for roof making and column foundation purposes in thatched houses in rural areas. Dried, plaited coconut leaves placed closely are used for the cone-shaped roof cover. Petiole fibre (*Paantham*) is used for tying the above roof cover. Split trunks are used as rafters in building houses. Room partitions inside the house are also made of dried, plaited leaves. Thatched houses are provided with doors made of plaited coconut leaf. In summer season, house portico annexe called '*Pandal*' (Shade) is made with plaited leaves. The bathroom is usually made outside the house by placing the plaited coconut leaves in erect position on all sides, and tying with coir-rope or *Paantham*.

2. Furnishing and other household materials

A handful of dried coconut leaf midribs tied at one end forms a very convenient broom *(chool)* for house-sweeping purposes. In the rural household, the traditional bath-room mug *(Olangam)* is made out of a large coconut shell inserted on a long wooden handle. Smaller coconut shells are used as spoons or ladles for serving cooked rice and other food items. Outer bark of a coconut tree is usesd as firewood for preparing food. For retrieving the thick ground paste material out of the traditional grinding stone, coconut shell is used. Similarly, for any such work husk or fresh rachilla, disposable tooth brushes are made used. Dried coconut husk fibre is also used in place of firewood for preparing food. Dried plaited leaf is used as mats for sitting or sleeping purposes. Vessels are cleaned using dried husk. Similarly, for rubbing the body while bathing coconut husk fibre is being used. Guests are seated on plaited coconut leaf in the absence of benches or other furniture. From fresh as well as dried coconut husk or fresh rachilla disposable tooth brushes are made. Husk is also used for making powdered charcoal which is used as tooth powder. Husk fibre is also used for cleaning various sanitary-ware. Shell is used as burning charcoal for ironing purpose, and as a heat-generating device. Dried rachis is used as firewood.

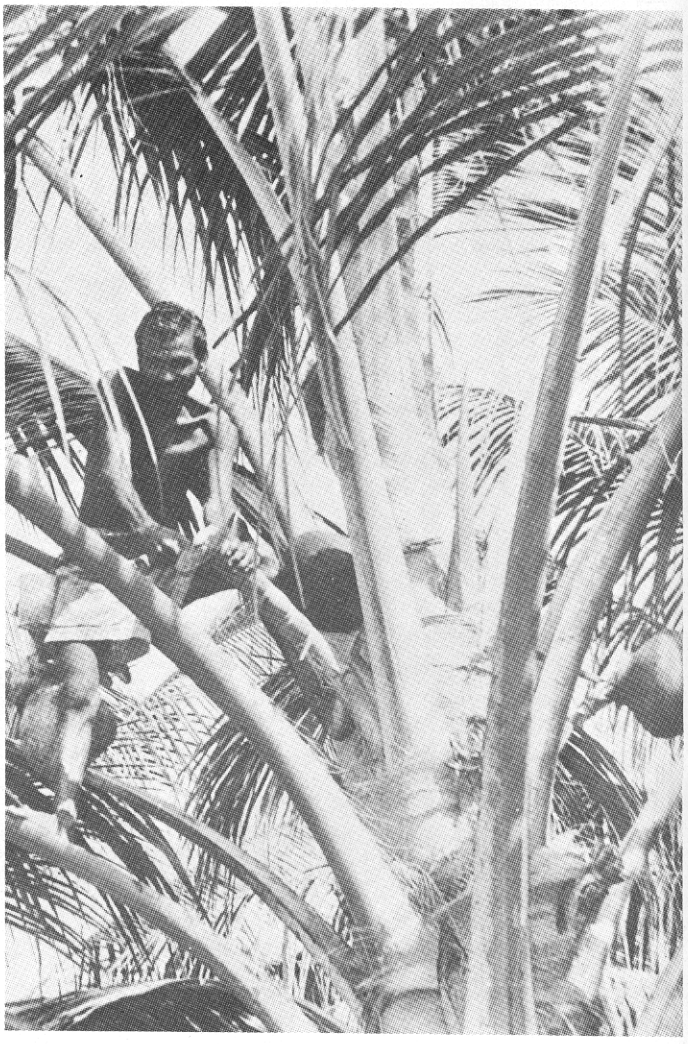
3. Home food

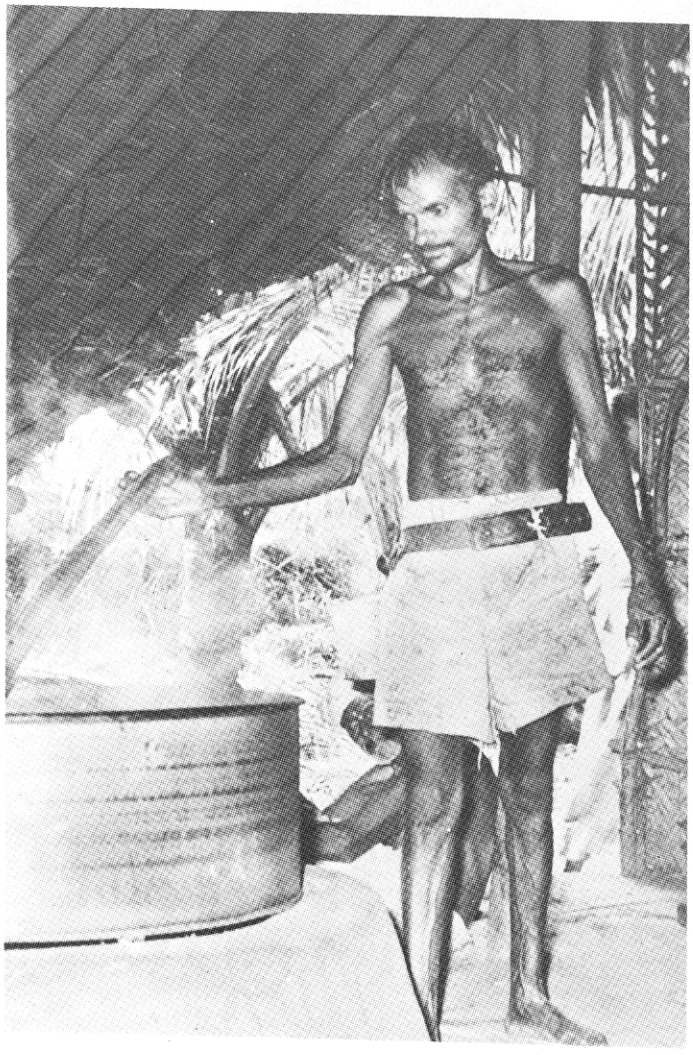
Coconut oil is invariably used for flavouring 'curries' or side dishes of this coastal region. Mustard is fried in coconut oil and added as a topping to improve taste and flavour of curry. Grated fresh kernel is ground to a paste for preparing vegetarian dishes like *Sambar, Erisseri, Pulisseri,* etc. Grated coconut is also used invariably for fried side dishes such as *Pallya, Thoran, Aviyal,* etc. and also mixed with baked or steamed rice powder called *'Puttu'*. It is also used for making *'Chutney'*, a side dish. Coconut oil is generally used for frying side dishes like *Pappad, Vadai, Murukku, Bajji, Bonda, Banana chips,* wafers etc. Coconut milk is invariably used for preparing dishes like *'Olen', 'Holigai', 'Payasam'* etc. Fresh coconut kernel pieces are eaten along with jaggery after body building exercises. Tender coconut water is used for fermenting rice paste to prepare *'Vellappam'* a popular breakfast dish. Coconut oil-cake mixed with raw rice waste is a cattle feed. Powdered tender coconut shell mixed with other ingredients is also used as a cattle feed.

4. Medicine

Ayurvedic tantric physicians prescribe tender nut water 'purified' with chanting mantras to cure allergic itches. Tender nut water is an invigourating and tasty drink to quench thirst and is prescribed as a liquid diet to recoup after illness. Toddy of a single tree stored for 40 days is used as a tonic. *'Elaneer Kozhambu'*, an ayurvedic medicine prepared from tender coconut is used as

Toddy, a beverage, fermented or distilled is produced from the sweetish sap yielded by the young flower and stalks when wounded or cut. Sweet toddy finds extensive use in the preparation of a variety of breakfast cakes and snacks. It is a good source of baker's yeast and is preferred in preparations of cooked food with good flavour and fluffy consistency.





The products derived from toddy are jaggery, treacle and vinegar. Jaggery is used in the preparation of sweet dishes and other delicacies. Treacle is the concentrated golden coloured syrup of sweet toddy, used as a bread spread in place of jam. Vinegar produced from fermenting coconut toddy is in common use in the preparations of fish and meat dishes and preserved food items.

medicated eye-drops. The extract of fresh coconut husk is also used as antiallergic. Traditionally in Kerala coconut oil is rubbed on the body before a hot water bath, which is believed to have a soothing and cleansing effect. The coconut root extract is used for preparing an ayurvedic ointment. Coconut oil is used periodically as an ear drop to cleanse the ear. Charcoal obtained by burning leaf mid-rib mixed with ghee is a good ayurvedic ointment. Dried and powdered coconut sprout is applied to cuts and wound to arrest bleeding. The jaggery made out of fermented toddy mixed with coconut oil is recommended as post-natal food. Coconut shell charcoal mixed in turmeric water is used to inhale in case of allergic throat and lung infection. Charcoal from coconut husk mixed with common salt is the traditional tooth powder in coastal Kerala. Coconut fibre is used by Ayurvedic physicians to extract tooth. Endosperm from germinating nut is an ingredient of several ayurvedic preparations.

5. Social and religious functions

For home, stage or street decoration, tender coconut leaves *'(Kurutholai)'* cut into narrow strips are hung in festoons. For inauguration of all functions, coconut inflorescence is placed in a brass or wooden jar (*'para'*) filled with paddy. For decoration of altar or 'welcome' arches, tender orange dwarf coconut (*Chenthengu*) bunch is tied on both sides of the gate. At the dawn of the Malayalam New Year Day, it is customary for the family members to start the day with a look at *'Vishukkani,* consisting of auspicious items arranged in the *'Pooja'* room (worshipping place) and coconut flower is an essential part of *'Vishukkani'*. Good omen or futurology is forecast by breaking the coconut on the ground and observing the direction of coconut 'eye' on the ground. For the popular religious deity of Northern Kerala *'Thaiyam'*, tender coconut leaves are used as a full-fledged costume. Similarly, in *'Yakshagana'*, the folk theatre of the coastal Karnataka, tender coconut leaves are used in the costume for depicting the supernatural characters. In marriage processions, ladies welcome the bridegroom holding a metallic plate with mirror and coconut flowers as the auspicious symbol. In *'Talappoli'*, traditional procession of welcoming chief guests/VIPs, tender coconut leaves are used. Tender coconut water is used for *'abhishekam'* or holy bath of the idol in temples. Tender coconut is a part of *'Panchagajaya'* the holy concoction of delicacies offered to God. In *'Tambila'*, *'Nema'* and *'Bhootakola'* all part of the deity rituals in Northern Kerala tender coconut is used as *'Prasadam'* or offering. *'Bhoota Kalasham'*, the welcoming part of the deities in performance is made out of tender coconut leaves. The customary offering of any devotee going to a Hindu temple consists of *'Hannukai'* (fruit), a set of five bananas and a coconut.

Hindu marriage rites are incomplete without coconuts. Guests who visit to bless the bride and bridegroom are served with a husked coconut before their departure. In *'Thulabharam'* - a temple ritual offering, the person is often weighed against coconut, or tender coconut or coconut oil.

In *Eethappan Tiriole Perunnal* (Palm Sunday) the tender coconut leaves are used for ceremonial procession in churches. In a very popular pilgrimage to the holy place of Lord Ayyappa called 'Shabarimalai' in the Western ghat (Pathanamthitta dist., Kerala) the devotees carry on their head husked coconuts filled with ghee for offerings. Breaking a coconut against the newly acquired/built house, vehicle, shop etc. is the traditional Indian way of launching the new asset.

Entertainments

In *Yakshagana* the regional folk dance-drama of Dakshina Kannada dist. (Karnataka) a brush made out of fresh coconut husk is used for colourful lines on the face of artists. Coconut oil is used for rubbing paint/make up from the face of artists participating in *Yakshagana*. Coconut oil is also rubbed in hand to prevent sticking of latex from jack fruit.

A very popular past time in the villages of West Coast is *Tenga Muttal* (Coconut fight), wherein specially selected husked coconuts are dashed against each other, and the owner of coconut which breaks loses the bet. Sterile coconuts are used as floats for learning swimming.

In *Kathakali* - the regional folk art of Kerala, coconut oil lamp on the stage is an essential item. Several crude musical organs or toys are made out of coconut leaves, and the coconut shell.

7. Alcoholic Beverages

'Kallu' or toddy is a popular and cheap alcoholic drink obtained by tapping unopened spathe. A very popular non-alcoholic drink *''Neera''* is also prepared by adding lime to the collecting vessel while tapping. Fermented toddy is used to be distilled to make coconut fenny with 30-35% alchohol.

8. General uses

Burning coconut shell is used by goldsmiths to melt gold and silver. Coconut petiole sheath is used as sole of chappals. Fresh coconut leaflets are smoked, plaited and

woven to make umbrella called *"Gorabe"* or *"Koramba"*. Toddy is boiled and sugars are allowed to crystallise to obtain coconut jaggery. Among the tribals of West Coast, earrings made out of dried coconut leaves are popular. Two coconut shells are used to make clattering sound to scare away parrots and other birds from paddy fields. Coconut shells can also be used for making buttons. Villagers even now use torch made out of dried coconut leaves and spathe during night.

Dried and processed coconut husk is used in mattresses, pillow and sofa sets as cushions. It can also be used as a filter. It is believed that medicated coconut is used in witchcraft *"Manthravāda"* to exterminate the enemy. Before cremating the dead, the body is kept on a freshly painted green coconut leaf. Tender coconut is laid on the funeral site or the graveyard. From the fourth day of death, tender coconut is used for performing last rites in front of the house. For the last-rites function called *"Vaikuntasamārādhanai"*, coconuts are placed before the elders to obtain permission to have dinner at the function.

From a brief account of many and varied uses of *'Kalpavriksha'* the tree of life, it will be noted that from birth to death coconut tree forms an integral part of social customs in addition to the utility of each and every part of the tree. It is a happy augury that, throughout the coconut growing regions of the world, multifarious research is being carried out on the possibility of increasing the yields, developing improved varieties and hybrids, and reducing the maladies affecting this vital crop. Even a highly developed country like Sweden has recently developed coconut logs for house roofs in place of RCC, in building low-cost houses for developing countries, from which *'Nirmithi'*, a housebuilding society of Kerala state has taken inspiration. It is the hope of our Cultural Research Centre and a challenge to the modern researchers on coconut to go further deep into the logic and spirit of the traditional applications of coconut tree as explained above, and develop further utilitarian items out of coconut for the benefit of mankind. The specific areas where more research is called for are in house building, food and medicine, the cardinal needs of our life.

It is hoped that our traditional uses of coconut tree in India in general, and Kasaragod in particular, may inspire the enlightened scholars of the world to discover new truths of our holy tree - *'Kalpavriksha'* the tree resource that never exhausts.

Acknowledgements:

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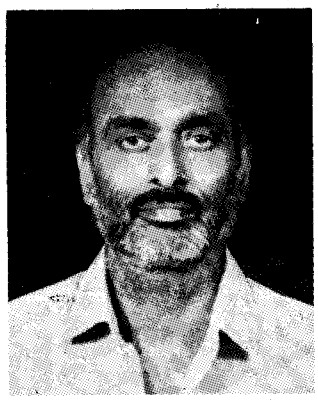
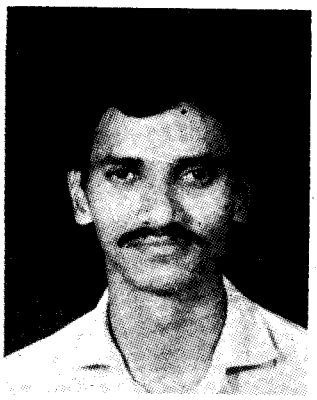
(Prepared with the help of **Shri M.V. Ballulaya** and **P. Chandramohan,** Cultural Research Centre, Kasaragod)





COCONUT ECONOMICS: THEN AND NOW

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CPCRI, Kasaragod 671 124, Kerala

Many people in the coconut growing world do not live long enough to celebrate their 75th birth anniversary, yet a nutty palm lives beyond its Platinum Jubilee Year to provide many useful things to human beings. It is not just a tree, but a magnificent Benevolent Fund - appropriately called the "Tree of life." During the past 75 years, the area, production, export and unit value in the world coconut sector have increased several folds, despite the fact that today there are many competitors to coconut oil unlike in the past. This lauric oil has still certain irreplaceable uses which make its demand to some extent inelastic. Lathering property is almost exclusive to it. Coconut oil is therefore, more or less equally placed between edible and industrial usage.

Supply Position

In the context of Indian scenario, coconut area has increased by 213% from 0.48 million ha to 1.50 million ha during the last seven and a half decades. Nevertheless, the supply-demand gap is widening as evident from its price trend. The present generation may not be aware of the fact that India was an exporter of coconut products till the early 1910's. India's export of copra and coconut oil was on an average 30,600 tonnes and 7,100 tonnes respectively per annum, during 1909-1913. However, India started importing copra thereafter, and in the late 1940's its import was on an average 38,300 tonnes a year from Sri Lanka and other countries at a cost of Rs. 12 million. There was a record import of coconut oil amounting to 64,000 tonnes valued at Rs. 448 million during the year 1962-63.

During the early 1930's, the production of coconut oil in India was about 105,000 tonees a year accounting for some 12-13% of the world production (some 900,000 tonnes). India's present level of coconut oil production (around 240,000 tonnes) is about 8% of the world coconut oil production which stands at 3 million tonnes. It may be worthwhile to mention here that only 37% of coconuts harvested in India are utilized for coconut oil extraction and the remaining 63% of nuts are used in a variety of non-oil forms.

Support price

When the coconut prices fall sharply, the coconut growers demand a support price programme. The Government of India had introduced price control on copra and coconut oil as far back as 15th December, 1946. The ceiling prices for copra and coconut oil were Rs. 884/ tonne and Rs. 1390/ tonne for Cochin market. The then Government of Madras Presidency also fixed the price for coconut for Malabar and South Kanara Districts at Rs. 125/1000 nuts and for other districts at Rs. 170/1000 nuts. However, the control was lifted on 20th June, 1947 on the recommendation of the 5th meeting of the Indian Central Coconut Committee held on 23rd April, 1947. The immediate effect was the shoot-up of prices but after sometime the prices began to fall gradually and there was a time when they touched levels below the control price.

Cost of production and farmgate price

It is difficult to say what was the cost of production and price of coconuts in India 75 years ago, but we know how much they were about 50 years back. In the year 1940, the total cost of bringing 1 ha of coconut garden to bearing was Rs. 1400. Today it is Rs. 25,000! Similarly, the annual maintenance cost for 1 ha coconut garden in the year 1940 was Rs. 80 as against Rs. 4,000 to-day. The major factor contributing to this rise is the increase in wage rate from 8 annas (equivalent to 50 paise) in 1940 to Rs. 35 in 1991. In 1940, the cost of production for 1000 nuts was Rs. 31 and 3 annas whereas their average price was Rs. 26 and 4 annas. The liberal import of copra and coconut oil into India at a cheaper rate was the major cause for the low and unremunerative prices for Indian coconuts.

The prospects of this crop improved immediately following the year of independence when the cost of production and prices were Rs. 80 and Rs. 137 and 9 annas respectively, for 1000 nuts. In other words, while the cost of production in 1948 increased by 156%, the price rose by 424% of that prevailing in 1940. Today the cost of production is estimated at Rs. 1500 and farmgate price is Rs. 3900 for 1000 nuts.

In March 1948, the retail price of a coconut was one anna (1/16th of a rupee) today it is more than Rs. 4 and the price of 1 Kg of coconut oil was Re.1, today it is Rs. 60. Barring some periods when the coconut prices had crashed in the past, in general the coconut growers

in India have been receiving good prices even after making allowance for the general rise in the level of prices of other commodities and services. The purchasing power of coconuts has now gone up higher than that in the past. The general shortage of vegetable oils has been a contributing factor to this happy state of affairs.

Lazyman's Crop

Despite this reward, coconut palms are taken for granted and they are not fertilized or irrigated or even cared for. The interest of the grower is limited to its harvests only. Small wonder, therefore, that coconut is often referred to as a "Lazyman's crop". As a result, most of the farmers do not realize the potential capacity of this remarkable palm. Our coconut farmers should remember that even at this prevailing cost, fertilizers make money; for a marginal cost of Rs. 12 on fertilizers and their application, the marginal return could be in the neighbourhood of Rs. 75/palm. If only they would care to apply the fruits of our 75-year long coconut research, they will certainly be more prosperous.

So my advice is: *When you think of coconut farming, call on CPCRI and when you think of coconut's prospects never look back as the future holds great promise.*

Misconceptions about coconut oil

Alas! Coconut oil, even now, is labelled as the villain in atherogenesis. But, in reality, coconut oil, with its high contents of Medium Chain Triiglycerides is beneficial in lowering serum and liver cholesterol levels, as is scientifically proven. In fact, other vegetable oils like soybean oil, sunflower oil, cotton seed oil, corn oil, safflower oil, ground nut oil etc are more harmful because of their higher content of long Chain Triglycerides (LCT), which contribute to the syntheses of lipoproteins causing heart disease. Moreover, it also causes cancer and gallstones in addition to enhancing the ageing process. Beware of these oils! Don't condemn coconut oil for its saturated fat. Let it remain as our safe nutritious dietary fat.

B. CHEMPAKAM.

SIGNIFICANCE OF OFFERING THE COCONUT IN WORSHIP

The Coconut represents the "Karma Phala" or the fruits of one's past actions, which are in the form of one's "Vasanas" or innate tendencies. Offering of Coconut in a temple or to a "Guru" symbolises the surrendering of such "Vasanas".

A Coconut has a nice smooth outer skin (the Pericarp), covering a mass of twisted and knitted fibre (the Mesocarp) within. Beneath this fibre, is a hard shell (the Endocarp) and inside this shell is the white kernel (the solid Endosperm or meat) which encloses the sweet water, often called Coconut Milk (the liquid Endosperm). Before a Coconut is offered to the Lord, the skin along with the fibrous mesocarp is removed leaving behind a tuft of fibre at the head of the Coconut. The shell is then broken and the tuft of coir is removed by the Priest to expose the three "eyes" of the Coconut. The milk or Coconut Water is thus allowed to flow out at the feet of the Lord Almighty.

The above ritual has a deep spiritual significance of symbolism. The outer skin of the Coconut represents the "Gross Body" which has an external show of Beauty, but carries in its bosom an abominable cluster of Desires and Attachments, which comprise the "Subtle Body". Man has therefore, to renounce all his Desires to the exception of one, which is to realize the Truth. The retention of the tuft on the Coconut, indicates this idea. When one approaches a Guru with this pointed desire, and in a spirit of total surrender and humility, the Guru breaks the hard shell of the "Intellect" and exposes the pure "Satvic Vasanas" (the white kernel of Coconut symbolises this) to the Lord. The last lingering Desire to realize the Truth is also transcended, as demonstrated by the plucking of the tuft away, *exposing the three "eyes" on the shell. The third "Eye" represents the "Eye* of Wisdom" known as the "Jnana Chakshu", which gives instutive vision of the "Self". The milk or the sweet water of the Coconut flowing out at the feet of the Lord represents the merging of the "Individual Self" with the "Infinite Universal Self", thus attaining "Moksha" or Salvation.

[Collected by **R.D. Iyer**]

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