COGENT Establishes An International Coconut Genetic Resources Database (CGRD)

By Luc Baudouin¹, Roland Bourdeix², Francois Bonnot³, Ch. Hamelin⁴ and Andre Rouzière⁵

The coconut, Cocos nucifera L., is a small-holder crop, grown on 11.6 million hectares in 86 countries. It is the ‘tree of life’ as it can produce products for food, shelter and energy to farm households, and various commercial and industrial products. Fully developed and strategically used, it could increase food production, improve nutrition, generate income, create employment, enhance equity and protect the environment. The coconut, however, faces several problems that affect its production and competitiveness such as low yield, unstable market for its traditional products, pests and diseases, natural calamities, ageing of palms, and genetic erosion.

High-yielding and locally adapted coconut varieties need to be developed to address some of the above-mentioned problems and ensure sustainable coconut production. To achieve this objective, efficient use of diverse coconut genetic resources is imperative. In many cases, the range of germplasm in each country is not sufficiently wide to meet breeding requirements. Diverse germplasm may be found in other countries which can only be known if information is available. Thus, there is a need to document and share germplasm data in order to allow coconut breeders to select and access germplasm in other locations for use in their breeding work.

In recognition of this need, the International Plant Genetic Resources Institute (IPGRI) and the International Coconut Genetic Resources Network (COGENT) initiated a collaborative project with the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) in 1992 to develop an International Coconut Genetic Resources Database (CGRD). Network member countries are collaborating through COGENT to gather and submit data to the database. CIRAD is the implementing agency for this project which is funded by the French government.

The purpose of the CGRD is to document and disseminate passport and characterization data on conserved germplasm, facilitate international information exchange and promote access to populations which breeders require to achieve their breeding objectives. Efforts are being made to include molecular analysis data of the germplasm in the CGRD. To operate the database, CIRAD has developed a software that would enable each member of the network to incorporate their own data, have access to the data of the other members and share information. The database is updated regularly and shared with coconut breeders worldwide.

To date, passport and characterization data of 1316 accessions in 24 sites in 20 COGENT member countries have been incorporated into the database (Table 1).

Coconut breeders can now use the data in the CGRD to select and request germplasm for their breeding work.

Coconut Database Management (CDM)

The success of the CGRD depends on the effective gathering and submission of adequate data by COGENT network member countries. To help these countries gather and document data more effectively, the Coconut Database Management (CDM) software is being

(Continued On Page 2)
New IPGRI-APO Regional Director

Dr. Percy E. Sajise has been appointed as the new Regional Director of IPGRI Office for Asia, the Pacific and Oceania (APO) with effect from 10 January 2000. He was formerly the Director of the Southeast Asia Ministers of Education Organization-Regional Center for Graduate Study and Research in Agriculture (SEAMEO SEARCA) based in the Philippines.

Dr. Sajise is a citizen of the Philippines. He obtained his MSc and PhD in Plant Ecology from Cornell University, U.S.A. He also holds a BSc in Agricultural Botany from the University of the Philippines at Los Baños (UPLB). Prior to his SEARCA stint, he held notable positions as Division Head and Development Action Coordinator of the Institute of Environmental Science and Management (IESAM) at UPLB (1989 - 1994); and Director of the Program on Environmental Science and Management at UPLB (1978 - 1986).

In addition to the above, Dr. Sajise is currently the Chairman of the Philippine National Work Group on Biodiversity Research and has been a member of a variety of different local and global committees. He served as Executive Secretary of the Asian Association of Agricultural Colleges and Universities (AAACU) and as Coordinator and Chair of the Southeast Asian Universities Agroecosystem Network (SUAN). He also served as Co-Principal Investigator of a project on Conditions of Biodiversity Maintenance in Asia from 1994 to 1999. Dr. Sajise was also a Professor at the University of the Philippines, and a member of the CIFOR Board of Trustees.

We welcome Dr. Sajise to IPGRI-APO.

(Continued From Page 1)

Table 1: Sources of data in the CGRD

<table>
<thead>
<tr>
<th>Country</th>
<th>Site</th>
<th>Number of Accessions</th>
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<tbody>
<tr>
<td>Bangladesh</td>
<td>BARI</td>
<td>4</td>
</tr>
<tr>
<td>India</td>
<td>CPCRI/Kasaragod</td>
<td>212</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Pakistan Agricultural Research Council</td>
<td>32</td>
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<tr>
<td>Sri Lanka</td>
<td>Coconut Research Institute/Lunuwila</td>
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<tr>
<td><strong>Total for South Asian Region</strong></td>
<td></td>
<td><strong>326</strong></td>
</tr>
<tr>
<td>Thailand</td>
<td>Chumphon Hort. Research Centre</td>
<td>52</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Bone Bone Expt. Garden/S. Sulawesi</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Mapanget Expt. Garden/N. Sulawesi</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Pakuwan Expt. Garden/W. Java</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Sikijang Exp. Garden/Riau</td>
<td>25</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippines Coconut Authority/Zamboanga</td>
<td>224</td>
</tr>
<tr>
<td>Malaysia</td>
<td>MARDI/Hilir Perak</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Department of Agriculture/Sabah</td>
<td>48</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Dong Go Experimental Centre</td>
<td>31</td>
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<tr>
<td><strong>Total for Southeast Asian Region</strong></td>
<td></td>
<td><strong>555</strong></td>
</tr>
<tr>
<td>Fiji</td>
<td>Coconut Centre/Taveuni</td>
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<tr>
<td>Papua New Guinea</td>
<td>CCRI/Keravat</td>
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<td></td>
<td>Jim Grose Research Station/Madang</td>
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<tr>
<td>Vanuatu</td>
<td>Coconut Research Station/Saraoutou</td>
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<tr>
<td>Samoa</td>
<td>Min. of Agriculture, Forestry, Fish. &amp; Meteorology</td>
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<tr>
<td>Solomon Islands</td>
<td>Yadina</td>
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<td><strong>Total for South Pacific Region</strong></td>
<td></td>
<td><strong>164</strong></td>
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<tr>
<td>Benin</td>
<td>Coconut Research Center/Semi Podji</td>
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<tr>
<td>Côte d’Ivoire</td>
<td>Station Cocolter Marc Delorme/Port Bouet</td>
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<tr>
<td>Tanzania</td>
<td>NCDP/Dar Es Salaam</td>
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<td><strong>Total for African Region</strong></td>
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<td>Brazil</td>
<td>EMBRAPA/Araçaju</td>
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<td>Jamaica</td>
<td>Coconut Industry Board/Kingston</td>
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<td>Mexico</td>
<td>Centro de Investig. Cientifica de Yucatan</td>
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<tr>
<td><strong>Total for Latin America-Caribbean Region</strong></td>
<td></td>
<td><strong>96</strong></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td></td>
<td><strong>1316</strong></td>
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</table>

Through this system, it would be possible to aggregate and analyze data on several variables/characters required to fill in the CGRD. An interesting feature of the CDM is the module for cartographic representation of the palms in each field, making it possible to display and modify palm characteristics on a map.

Several activities for the CGRD project are proposed by CIRAD, which include training of researchers on the use of the CDM software, on the management and transfer of data to the CGRD and provision of technical support to national programmes.

The CGRD has made a significant contribution to the documentation and dissemination of coconut genetic resources data worldwide. The CGRD will thus provide tremendous help to breeders in their selection of germplasm for their use in developing improved coconut varieties for resource-poor farmers.
During the 8th COGENT Steering Committee meeting in Ho Chi Minh City, Vietnam in September 1999, the proposed activities of COGENT in 2000 were presented and endorsed by the Steering Committee members. These activities are divided into several components, namely: coordination and capacity building; documentation and information; germplasm collecting, conservation, characterization, evaluation and use; and socioeconomic and development aspects.

Under the coordination and capacity building component, the activities planned for 2000 include enhancing the effectiveness of ongoing projects; strengthening the five subnetworks through strengthening national coordination; rationalizing policy on network membership; recruiting additional members based on agreed policy; and formulating collaborative projects and activities.

Activities planned under the documentation and information component include publishing the COGENT Newsletter and project/meeting reports; and developing the COGENT webpage, and database on coconut literature and farmers’ varieties. Meanwhile, activities planned for the germplasm collecting component include reviewing and finalizing the consultant’s report on the collecting strategy before submitting it to the SC and IPGRI, and circulating it to the member countries.

The conservation activities include developing a Germplasm Health Operations Manual for the International Coconut Genebanks (ICGs); finalizing the proposals for ICG-Southeast and East Asia, South Asia, South Pacific, and Africa and the Indian Ocean (AIO) subnetworks; finalizing the site suitability study reports for ICG-Latin America and identification of suitable donors; and implementing the DFID-funded embryo culture project in 11 countries.

For germplasm characterization, evaluation and use component, the activities include implementing the CFC-funded multilocation trials in six countries; accelerating characterization data gathering to include basic molecular marker data in the CGRD; and monitoring progress of work in 18 countries involved in the evaluation of hybrid and varietal performance by the Asian and Pacific Coconut Community (APCC). Lastly, the activities planned under the socioeconomic and development aspects include developing strategies for in situ conservation under coconut-based farming systems; and feasibility studies for enhancing incomes using multipurpose varieties in Bangladesh, Indonesia, Papua New Guinea, Philippines, Thailand and Vietnam.
Several well-established, high-yielding coconut hybrids were imported from other countries in 1984 and 1986 as part of the national improvement programme of local coconut varieties in Vietnam. The imported seednuts were sown and the seedlings planted in seven different adaptability trial sites in various agroecological zones beginning 1985.

The trials aimed to evaluate the performance of the imported hybrids in comparison with local coconuts in order to choose suitable varieties for different agroecological zones of the country. Another objective is to establish trial sites that could also serve as demonstration plots before the hybrids are finally selected and planted on a large scale. Since the trials were conducted in two different times with different hybrids, the results are reported in two separate parts; Trial No. 1 (1985) and Trial No. 2 (1987).

**Trial No. 1 (1985)**

In 1984, under the cooperative programme with the French Government, the Oil Plant Institute (OPI) of Vietnam (the former Research Institute for Oils and Oil Plants of Vietnam), imported four coconut hybrids from Côte d’Ivoire. All seednuts were sown in the Binh Thanh Station nursery, Ho Chi Minh City in July 1984, and the seedlings were then transplanted in 1985 to seven sites in different agroecological zones, from the sandy soil of central Vietnam to the alluvial soils with fresh, brackish or saline water of the Mekong Delta. Due to the limited quantity of seedlings of imported varieties, the hybrids planted at each trial site varied from one to four types.

**Trial No. 2 (1987)**

In 1986-1987, through the 3-year UNDP-FAO project entitled “Research & Development of Coconut in Vietnam”, OPI imported three more hybrids; JVA 1 and JVA 2 from the Philippines and CRI C65 from Sri Lanka. The seednuts were sown in Dong Go Experimental Centre, Ben Tre province. The seedlings were also planted in the Dong Go Experimental Centre, and the Phu Dong Farm in the Tien Giang province.

**Results**

Due to budget restriction, the observations were limited to the following trial sites; the Luong Hoa Lac, Dong Go...
Experimental Center and the Giong Trom Farm for Trial No. 1, and the Dong Go Experimental Center for Trial No. 2. The hybrids were planted in a randomized complete block design with 2-8 treatments, 5-6 replications and with Green Ta as local control. Observations were carried out in two stages of development of the coconut palms using the French IRHO procedures of measurement for adaptability trials.

The hybrids planted in 1985 had shown higher economic efficiency than the local varieties under the same planting and maintenance conditions. This was evaluated according to the criteria of total nuts, copra and oil per tree, where the hybrids always had significantly higher values than the local Ta and Dau. Among the sites, which have different conditions of soils, water and maintenance, those with more favourable conditions gave higher efficiency.

For the hybrids planted in 1987, the vegetative growths were nearly the same for all varieties. However, the flowering and bearing rates of the hybrids were better than the local varieties.

There were no unfamiliar harmful agents observed from the imported seednuts. Most of the existing coconut pests and diseases of Vietnam had not caused any serious damage and there had been no distinct difference between the hybrids and the local varieties with regards to the damage levels.

1 Coconut Breeder, OPI, Vietnam
2 Coconut Scientist, OPI, Vietnam

Coconut plays a significant role in the national economy of India, especially in the areas of rural employment and income generation. In recent years, India has attained the top position in coconut production of the world. With an area of 1.89 million ha and a production of 13088 million nuts in 1997-98, coconut contributed 70 billion rupees (US$1.7 billion) annually to the country’s Gross Domestic Production (GDP).

Coconut is grown under varying soil and climatic conditions in 18 states and three union territories. The Coconut Development Board (CDB) manages the developmental work while research on coconut is being carried out at the Central Plantation Crops Research Institute (CPCRI) and its regional stations, and various centres of All India Coordinated Research Project on Palms (AICRP), which is under the Indian Council for Agricultural Research (ICAR).

The National Agricultural Cooperating Marketing Federation (NAFED) is the central nodal agency for the procurement of milling and ball copra under the price support scheme of the Government of India. The price support scheme is to ensure farmers a minimum support price that is set by the Commission for Agricultural Costs and Prices (CACP) set up by the government.

Coconuts are utilized both as tender and mature nuts. As much as 48% of the coconut production is used for edible and religious purposes, 10% as...
tender coconut, roughly 30% as milling copra for oil extraction, 8% for the manufacture of edible copra and the balance is processed into products such as desiccated coconut and coconut cream. In India, it is estimated that about 40% of the total production of coconut oil is consumed for edible purpose, 46% for toiletry use and about 14% for industrial uses. The demand for coconut by 2002 is projected at 24 000 million nuts at 10% growth rate. The projection of coconut area by 2002 is 2.67 million ha with a growth rate of 6%.

Coir and coir products earned about US$ 2922 million in 1998-99. Coir as geo-textiles is a recent end use application of the coir fibre in the world market. It has an immense potential as an income generating product for coconut farmers in India and for export.

CPCRI holds the world’s largest germplasm collection of 132 accessions (46 indigenous and 86 exotic) field planted and bearing. Kidu in Karnataka, India was selected as the site for the International Coconut Genebank for South Asia (ICG-SA) where 200 accessions are expected to be planted. The institute has one of the oldest and strongest research facilities in the world with the mandate to develop appropriate production, protection and processing technologies for palms.

Activities include the release of Laccadive Ordinary (LO), Philippines Ordinary (PO), Chowghat Orange Dwarf (COD) X West Coast Tall (WCT), WCT X COD and LO X COD coconut for cultivation based on their better performance over local talls. Seventy-six ex vitro established plants belonging to different accessions collected from the Indian Ocean Islands were transferred to the net house for field planting. Other areas of research include embryo culture and DNA marker technology.

The productivity of coconut based on high-density crop model could be maintained at higher levels even with sub-optimal doses of fertilizers by proper recycling of biomass in the system. Vermicompost, prepared from coconut waste and coir pith, was found to be an ideal carrier in the preparation of biofertilizers of nitrogen fixing Beijerinckia indica and phosphate solubilizing bacteria. Research on physiological genetics of drought tolerance has led to the understanding of gene action for drought tolerance.

New surveys were conducted in hot spots in Kerala to identify root (wilt) disease tolerant elite mother palms. A cheap and effective control measure has been recommended for leaf rot disease. Control method for biological suppression of major pests like rhinoceros beetle and Nephantis serinopa have been identified.

Eriophyid mite infestation is regarded as a serious pest in the Kerala and Tamil Nadu provinces. Root feeding with 10 ml Monacrotophos diluted with 10 ml water given three times at monthly interval has been found to be effective in controlling the pest. A technology for the production of oyster mushroom from palm wastes has been standardized.

The objectives of the research activities of the All India Coordinated Research Project on Palms (AICRPP) are to i) collect, conserve, catalogue and evaluate germplasm, new hybrids and high yielding varieties in coconut; ii) standardize agrotechnique for various agro-climatic regions and develop appropriate farming/cropping system compatible with the main crop; and iii) develop effective and efficient disease and pest management strategies.

An important activity of the institute is to disseminate research results to the extension agencies and the farming community through pamphlets, training programmes on various aspects of production technology, exhibitions and production of quality planting material for supply to the farmers and research centres. These are strengthened through Krishi Vigyan Kendra (KVK) and the Institute Village Linkage Programme (IVLP).

Coconuts are utilized as tender nuts.

1 Director, CPCRI, India
2 Principal Scientist & Head Crop Improvement Division, CPCRI, India
3 Scientist(Economic Botany), CPCRI, India
Coconut, together with rootcrops, is the most important staple food in Vanuatu. It is grown on an estimated area of 91,000 hectares. Eighty per cent of the production is by smallholders with an average area of 3.4 ha per family. Copra remains the main source of income for the rural population especially in the isolated islands. Copra exports constitute 30 to 50% of total export earning with an annual production between 35,000 and 40,000 metric tons.

Coconut research in Vanuatu started in 1962 with the establishment of the Saraoutou station in the northern island of Santo. Since 1994, the station has been integrated into the Vanuatu Agricultural Research and Training Center (VARTC) and is managed by Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), a French research institution. Coconut research remains an important activity for the center, together with cocoa, rootcrops (yam, taro, sweet potato), coffee, kava (*Piper methysticum*) and livestock. VARTC is the implementing agency of projects funded by the Vanuatu Government, French institutions, European Union and IPGRI. The agency collaborates with several networks such as the Pacific Regional Agricultural Programme (PRAP) and COGENT.

Vanuatu’s coconut research programme focuses on coconut breeding and genetic improvement through: the management of an important field genebank and hybrid trials; implementation of a regional project and its participation in COGENT activities; physiological method of predicting productivity of coconut palm; and optimization of the coconut-based farming systems. Four scientists, including two senior scientists from CIRAD, and five research assistants are currently working on this programme.

Coconut breeding and genetic improvement

At the national level, VARTC provides planting material (seednuts and seedlings) to farmers and establishes a breeding programme to improve the performance of the local tall cultivar by crossing it with other ecotypes.

The main objective of the programme is to increase the yield and resistance to the coconut foliar decay disease. This viral disease, transmitted by the insect *Myndus taffini*, is endemic in Vanuatu. The local coconut ecotypes are resistant but all the exotic ones (and most of the hybrids) are more or less susceptible and die rapidly. Only two hybrids show a good resistance to the disease; Vanuatu Red Dwarf x Vanuatu Tall (VRD x VTT), and Vanuatu Tall x Rennell Tall. Due to its good production potential of 3 metric tons copra/ha at 240 grams copra per nut, farmers give preference to the Vanuatu Tall x Rennell Tall. At present, a breeding programme is being developed to improve the performance of this hybrid by selecting the best parent populations of VTT and RIT, and testing several crossings.

In the domain of genetic resources, VARTC is managing one of the most important field genebanks in the South Pacific. It comprises of 38 distinct ecotypes (14 dwarf and 24 tall) and 14 local populations introduced from Africa, Asia, South America and the Pacific area. This genebank is regularly rejuvenated and enriched with new populations collected in the country. The collecting is currently being carried out in the framework of two COGENT projects funded by the International Fund for Agricultural Development and the Asian Development Bank. Through participatory surveys with the rural communities, several islands are prospected in order to collect information on local names and uses of coconut populations, and to get an overview of the coconut genetic diversity in Vanuatu.

At the regional level, VARTC has been implementing, since 1989, a project called “Production and Dissemination of Improved Coconut
Cultivars” (PDICC), in the framework of PRAP funded by the European Union. Eight countries collaborate in this project, namely, Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Island, Tonga, Tuvalu, and Vanuatu. Between 1992 and 1999, 39 new hybrid crossings were created by hand pollination and eight trials were successfully established in Saraoutou station. This represents a total surface area of 57 ha with approximately 8800 palms under observation. Each trial incorporates hybrids created by crossing diverse dwarf cultivars with a tall cultivar from other Pacific countries. The results of these trials will permit the construction of a database which would be beneficial for the research and extension services within the region. The countries will be advised to reproduce the best crossings by using their own germplasms and seed gardens.

Training courses on coconut breeding and production of hybrid planting materials are also organized.

Coconut palm physiology and optimization of coconut-based farming systems

The objectives of the agro-physiology programme are to foresee the productivity and yield of stands, and optimize the cultivation techniques and farmers’ incomes. Management of coconut plantations was traditionally based on empirical knowledge. Although it was of high demonstrative value, it did not take into account the functional physiology of coconut trees and partners, or their response to the climate. Prediction value was thus, limited in time and space. The physiological method was chosen with the help of models developed by the research programme. The software tools represent and predict productivity from physiology and climate data.

On VARTC experimental plots, numerous physiological parameters determining the coconut architecture and the response to climate are measured, namely; the rate of organ production and growth rate (dry mass) of every coconut compartment, light interception and transmission by canopies, photosynthesis, respiration rates, organ composition, and tree transpiration (assessed with the help of sap flow gauges placed in the trunk). From these measurements, allocation of dry mass to the compartments is inferred and 3-D mock-ups are built. The carbon balance is being computed and compared to the dry matter balance.

All parameters are gathered into a mechanistic construction, where the main aspects of functioning and development are summed up. For instance, the amount of light intercepted by coconuts can be computed on numerical mock-ups (Fig. 1). The response of the productivity of each partner to the amount of intercepted light is being established. Root growth and competition can also be estimated.

Virtual plantations are now being used to compare with the real ones in order to assess the validity of simulations. Various virtual coconut-based plantations will then be assessed on computers for optimizing yield, taking into account genotypes, type of association, density, age, etc.

Besides these basic research activities, surveys are being organized by rural communities in coconut growing areas to collect information on existing farming systems and to characterize the agricultural situations. In the future, different models of foodcrop/coconut intercropping systems will be tested in order to recommend to coconut farmers a sustainable agricultural production system with a more effective use of available land.

1 Plant Breeder, Head of Coconut Division, VARTC, Vanuatu
2 Plant Physiologist, VARTC, Vanuatu
Coconut Research and Development in Ghana

By Sylvester K. Dery

Coconut is the most important cash crop along the coastal belt of Ghana. The industry provides direct employment for approximately 8% of the total rural population. Coconut oil processing is one of the main occupations for women in the rural communities. Sometimes, it is the only income generating activity available to them.

At present, Ghana’s coconut research programme is focused on the following objectives:
- Developing and evaluating coconut ecotypes for high yield and tolerance to Cape St. Paul Wilt Disease (CSPWD)
- Finding the vector of CSPWD
- Conducting epidemiological studies of the CSPWD
- Improving coconut oil mills in villages
- Controlling the Oryctes sp and Pseudotheraptus devastans diseases
- Developing coconut-based farming systems

The incidence of a lethal yellowing type disease referred to as Cape St. Paul Wilt Disease (CSPWD) has had a major influence on the coconut research programme in Ghana. Previous and ongoing coconut research activities supported by the Government of France, the European Union under its Science and Technology for Development, the Overseas Development Administration (U.K) and the World Bank, have led to considerable advances in finding a hybrid tolerant to CSPWD.

The Coconut Sector Development Project was launched with support from Agence Francais Development in collaboration with CIRAD. The project aims to replant the zones devastated by the CSPWD with tolerant hybrids; improve the productivity of the unaffected farms by providing credit to farmers for maintenance and fertilizer; and improve the efficiency of the village mill.

The practice of growing coconut as a low-input monocrop (no fertilizer and minimal maintenance) has resulted in low yields, thus making coconut non-competitive in areas where other cash crops can flourish. Intercropping and the incorporation of small ruminants have been shown to increase the profitability of coconut cultivation. These coconut-based farming systems are being studied in Ghana. Although vector management as an option for CSPWD control may not hold much promise, knowledge of the vector can help breeders reduce the resistance-screening period considerably.

Studies on the epidemiology of Cape St. Paul Wilt Disease (CSPWD) are being conducted in collaboration with Rothamstead Experimental Station (U.K) and N.R.I. (U.K). Molecular biology methods are being used to study the latent periods of CSPWD. The control of a major coconut pest, the rhinoceros beetle Oryctes sp., using pheromones and metharhyzium, is also being studied.

Coconut oil processing in Ghana is conducted mainly in village oil mills using the wet method. The efficiency of this method is very low and even after a second milling, extraction efficiency is still between 60 - 65%. This makes the resultant residue too oily to be used as animal feed. Funding has been secured from Agence Francais Development to improve the oil extraction efficiency. This activity is also being done in collaboration with CIRAD.

The activities described would hopefully contribute to Ghana’s research programme on improving rural employment and agriculture industry linkage through the increased production of coconut.

1 Coordinator, Coconut Research Programme, Oil Palm Research Institute, Ghana.

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Coconuts Names from the Rennell Island

This list is extracted from the ‘Dictionary of the Language of Rennell and Bellona Islands - Volume III (Part 1)’ by Samuel H. Elbert. It clearly confirms that many coconut types co-exist on the Rennell Island.

niu ‘agiki (n. ‘angiki) A coconut tree with nut whose flesh forms quickly

niu ‘atua A coconut tree with nut whose flesh forms slowly

niu ghope A kind of coconut with light yellowish nuts, perhaps named for the flesh of the tuber

niu kehu A common kind of coconut with rather orange nuts

niu mata mea A kind of coconut with reddish husk at the end with the eyes

niu ngau An introduced coconut with edible husk

niu taka A coconut whose flesh is loose and drying

niu tea A kind of coconut with a hard shell

niu uga (n. unga) A kind of coconut with reddish-coloured nuts

niu ‘ui. A kind of coconut with dark green nuts
According to the Coconut Genetic Resources Database (CGRD) version 1999, the Rennell Island Tall cultivar (RIT) is represented worldwide by 19 accessions and 2695 individual palms. At least 11 germplasm conservation centres are involved in this conservation process, namely, Brazil, Côte d’Ivoire, Fiji, India, Indonesia, Jamaica, Papua New Guinea, Samoa, Solomon Islands, Tanzania and Vanuatu. The registered accession sizes are highly variable, from only two palms in India to 561 in Côte d’Ivoire.

Côte d’Ivoire exported more than ten thousand RIT seednuts from 1970 to 1981. Among the countries involved was Benin, which received 300 seednuts in 1978; Cameroon with 1570 seednuts from 1975 to 1979; Malaysia with 950 seednuts in 1974 and 1979; Mexico with 1500 seednuts in 1979; Mozambique with 150 seednuts in 1974; Thailand with 549 seednuts in 1974 and 1976; and Sao Tome, which received 275 seednuts. The largest introduction was done in Indonesia, with more than 5000 seedlings imported from Côte d’Ivoire in 1976. Seednuts were also collected from four palms showing the *spicata* form on the Rennell Island in 1964 and the following years. *Spicata* is a special form characterized by inflorescence with a large number of female flowers growing directly on the central axis, and with very few or no spikelets. About 43 of those palms have been established at Banika and Yandina Estate, in the Solomon Islands. In 1974, 11 palms from the remaining progeny showed *spicata* habit (Friend 1976).

The seednuts from the Rennell Island are selected for their large size. The fruits are also among the biggest and heaviest in the world. The fruit shape is quite variable, from oblong to pear shaped. Some of the fruits have a long tit or lug at the bottom, which is quite specific to the RIT cultivar. The colour of the young fruits range mainly from green to brown-red, although yellow or orange ones are occasionally found. The fruits have a good composition with a high content of solid albumen and free water. Inside the husk, the nut is drop-shaped and pointed at the top (at the germination side). On the opposite side, the nut is often terminated by a sort of shell point of about 10 mm long that grows inside the husk.

In Côte d’Ivoire, the stem is bulky and starts with a very big bole, the broadest within the introduced cultivars, where the vertical growth is a little bit faster than the West African Tall. The leaf is quite short when taken into account the huge stem development. Flowering begins 55 to 60 months after planting. The inflorescence is wide and bends quite rapidly after opening. It has a very long peduncle and quite a number of spikelets.

The floral biology has been observed in Côte d’Ivoire. The RIT belongs to Category II as defined by Rognon (1976). It has an indirect autogamy, a short female phase with little overlapping between the male and female phase of the same inflorescence, but with a considerable overlapping of the phases of successive inflorescence.

RIT characterization data for seven countries can be found in the CGRD version 1999. These data describe the following characteristics: germination rate, stem morphology, leaf, inflorescence and flower morphology, fruit component analysis, and yield. Data for the fruit composition came from Tanzania, Thailand, Philippines and Côte d’Ivoire. The mean weight of the whole fruit ranges from 1443 grams in Tanzania to 1707 grams in Côte d’Ivoire. The fresh albumen weight varies from 491 grams in Tanzania to 593 grams in Thailand. The mature fruit production is given
only for Côte d’Ivoire, which produces 48 fruits per palm per year, and the Philippines with 78 fruits per palm per year.

RIT is tolerant to the phytophthora diseases in Côte d’Ivoire (Franqueville et al. 1991) and in Indonesia (Darwis 1992). The RIT is sensitive to the Lethal Yellowing Diseases (LYD) in Jamaica (Been 1979), Tanzania (Schuiling et al. 1992) and Ghana (Sangare et al. 1992). This cultivar was also classified as sensitive to the coconut foliar decay of Vanuatu (Calvez et al. 1985), although some progenies of individual palms have shown an interesting tolerance level. In Papua New Guinea, the Scapanes Oryctes or Black Palm weevil complex is the major insect problem in the island region and parts of the mainland. Both RIT and its hybrid with the Malayan Dwarfs are sensitive to it (Faure and Moxon 1998).

It is difficult to list all the crosses where RIT was involved as parental material due to its wide utilization in the breeding programmes. The hybrid Malayan Red Dwarf x RIT is diffused in many countries in the Pacific region. The improvement of this hybrid began in the Solomon Islands during the Joint Coconut Research Scheme, but it was unsuccessful. In Vanuatu, the RIT has been crossed with at least six dwarf and seven tall cultivars. The hybrid between the Vanuatu Tall and the RIT is tolerant to coconut foliar decay (Calvez 1980) and is disseminated to farmers who appreciate the increase in yield and the size of the nut compared to the local Tall. This hybrid is currently being improved using the RIT progenies tolerant to the foliar decay disease.

In Côte d’Ivoire, the RIT has been crossed with nine dwarfs and eight tall cultivars. In fact, all the tall cultivars introduced are now systematically crossed with the RIT and the West African Tall (WAT) (Bourdeix et al. 1991). The hybrids between the RIT and the Cameroon Red Dwarf (CRD), and the Malayan Red Dwarf (MRD) and the WAT, have also been improved based on Individual Combining Ability tests (Bourdeix et al. 1993). In Africa, the performance of the Rennell Tall hybrids does not seem to be stable. Under good soil and climatic conditions, they achieve very high yields, but during drought periods or on soils with low fertility, their production sometimes proves disappointing. In Côte d’Ivoire, one of the two improved hybrids currently distributed is a Rennell Island Tall cross (with the CRD as female). It is recommended to be used only in the most suitable zones.

The Philippines and Indonesia have tested, respectively, at least nine and six hybrids, including the RIT as parent. In Jamaica, the RIT has been crossed with at least three cultivars. These hybrids are also being tested in Papua New Guinea, Tanzania and Thailand.

Controversy remains about the numerous seednuts collected from the Rennell Island. Even on the island, the coconut population is said not to be very homogeneous. M.A. Foale, who visited the Rennell Island in 1964, said that the pure true-to-type Rennell, with big and pointed fruits, is found mainly around the volcanic lake on the eastern part of the island. There is a mix between the Rennell Island and the ordinary type along the coastal area, known as the Solomon Island Tall, which has smaller oblong fruits.

References
Coconut enjoys an exalted position in the Hindu religion and culture. It is offered to deities in temples and used in many traditional and religious rituals, and festivals. Thousands of coconuts are broken during festive seasons, and no important function can commence without first breaking open a dehusked coconut. According to Lt. Kol (B) K. Sathaya, President of the Hindu Darma Mamandram and a Council Member of the Hindu Sangam Association in Malaysia, one needs to understand the philosophy behind a certain ritual to fully observe its significance. The same principle applies to the role of coconut in Hinduism.

Philosophically, the coconut is chosen because it represents the body and soul of a man. In the case of the coconut, one has to pry open the smooth surface of the nut, pull off the rough husk, and break open the hard shell to get to the soft kernel. In Hinduism, the same principle applies to a man’s soul. The soul is believed to transcend three bodies, namely 1) ‘toola’ - gross body or the physical body; 2) ‘shuksmra’ - the subtle body; and 3) ‘karana’ - the casual. The breaking of a coconut by a priest symbolizes the opening of the soul to the knowledge and wisdom of God.

In Hinduism, the highest offering a devotee can give to God is himself or herself. This form of sacrifice is symbolically represented by the coconut. When a coconut is broken or sliced, it will reveal the whiteness of the kernel and the purity of the water. These represent the pureness of the ‘atma’ (soul) being offered to God. This ritual is called ‘atma nivedalam’ (offering of soul). It can only be performed at the foot of a deity or the feet of the Lord (paduga), by an ordained priest or holy man.

The breaking of coconut to propitiate Lord Ganesha, the God of wisdom, is very popular. When a devotee breaks a coconut for Lord Ganesha, it represents the devotee’s plea to be bestowed with the Lord’s wisdom and knowledge. The breaking of a coconut also symbolizes the temple of Lord Ayappa, located in Sabrimala, in the months of November to January every year. They carry coconuts and smash them at the foot of the 18 steps leading into the inner sanctum of the temple. Some coconuts are filled with ghee. The devotees break the coconuts into half and pour the ghee over the idol when they reach the temple. They then throw the empty cups into a fire pit situated near the steps. The pilgrims would also carry 5 - 7 additional coconuts to be broken at several temples along the way to Sabrimala. Every year, it is estimated that around 100 million coconuts are used for these purposes.

During the Chath festival celebrated in Bihar, Uttar Pradesh and other states in India, thousands of women would converge on the banks of the holy river Ganga, carrying coconuts as offering to the sun. Medam, the Malayalam month for April, heralds the beginning of the New Year. During this month, the Keralites celebrate Vishu, a major ceremony whereby auspicious objects, including coconuts, are arranged the previous night, so that one would wake up in the morning to be greeted by them. A festival called Narial Pournami is observed along the sea coast at the end of the rainy season where devotees offer coconuts to Varuna, the sea God.

Aside from the whole nuts, other coconut products are also used. Coconut water, for example, is used to pour over deities, and to wash the bones of a cremated body. Traditional lamps in temples are lighted by using coconut oil, while the food offered to Gods in the Kerala’s temples is cooked using coconut husks and spathes. They are also used in the preparation of the sacrificial fire. Coconut toddy is offered to deities in rituals connected with sorcery. Coconut shells, husks and wood are used as part of the cremation fire, while a coconut seedling would be planted at the place of cremation.

There are many legends and anecdotes centered on coconut in India, particularly in Kerala. Whatever the truth may be, coconut palm is revered as a divine tree and the products used extensively in the Hindu culture and religious rituals throughout India. This gives credence to the saying in Kerala that ‘birth or death, coconut is indispensable’. Or, as Lt. Kol (B) K. Sathaya commented, coconut could just easily be chosen by its virtue of being able to last for a long time, available all year round, and have many practical uses that benefit the community.

1 President, Peekay Tree Crops Development Foundation, India
2 Communication Assistant, COGENT Secretariat, Malaysia
The four Pacific Islands countries (Cook Islands, Kiribati, Marshall Islands and Tuvalu) consist of numerous small islands and atolls scattered over a very large sea area. Coconut (with sea products) is one of the staple foods and main source of income for the population of the islands. The isolation of the islands and, in many cases, their harsh environment (saline, low-fertility and water-deficient soils) result in coconut populations with very specific characteristics and adaptation to atoll conditions.

The ADB-funded project for the four countries aims to collect available diversity of local coconut population which will be used to develop better varieties for the atolls, enrich the collection of the PNG hosted-International Coconut Genebank for the South Pacific (ICG-SP), and facilitate the exchange of important cultivars in the future with other countries. The morphometric description and the molecular markers analysis of these populations will not only generate information on genetic diversity within these collections but also improve the knowledge on the origin and the dissemination path of coconut in the Pacific Islands.

The objectives of the project are to train researchers in collecting and coconut breeding research techniques; collect seednuts and embryos of identified populations; send the embryos to the Secretariat of the Pacific Community (SPC), which will grow and subsequently transfer in vitro seedlings to the International Coconut Genebank (ICG) for the South Pacific in Papua New Guinea; gather passport data of identified populations and conserve germplasm in situ; plant the collected germplasm in the genebank of the four countries; and submit passport data to the Coconut Genetic Resources Database (CGRD).

The national project leaders are Mr. Tiara Mataora (Research Officer, Totokoitu Research Station, Cook Islands), Mr. Tokintekai (Agroforestry Officer, Ministry of Resources Development, Kiribati), Mr. Henry Capelle (Agroforestry Officer, Ministry of Resources and Development, Marshall Island) and Mr. Sam Panapa (Plant Protection Officer, Ministry of Natural Resources and Environment, Tuvalu). Mr. Jean-Pierre Labouisse of CIRAD, currently Head of the Coconut Division, Vanuatu Agricultural Research and Training Centre (VRTC), is the overall project coordinator.

Selected COGENT member countries in the Asia Pacific region will conduct a study entitled, “Feasibility studies on the establishment of integrated coconut processing projects to produce products from coconut husk and handicrafts from coconut shell and the identification of suitable varieties for the identified viable products”. The countries involved include Bangladesh, Indonesia, Papua New Guinea, The Philippines, Thailand and Vietnam. The target coconut products are geotextile, coir fibre, coir pith and handicrafts.

The objectives of the project are to assess the various aspects of producing and marketing processed coconut products from coconut husk and shell; recommend viable production modules for use in the participating countries; identify the coconut varieties suitable for the identified products; and source and ship coconut fibre-making equipment to the participating countries for testing.

The Bicol Agricultural and Rural Development Center, Inc. (BARDCI) is undertaking the study in the Philippines. BARDCI will assess the various aspects of producing and (Continued On Page 14)
marketing products from coconut husk and Makapuno palm; determine and compare the efficiency of seven fibre processing tools and equipment fabricated by an engineer in Guinobatan, Albay, and similar tools received from Vietnam; recommend economically viable production modules that can be implemented nationwide; and identify marketable high-value products that will enhance the incomes of coconut farmers in the Philippines.

Similarly, the Oil Plant Institute (OPI) in Vietnam was commissioned to conduct a feasibility study on the production and marketing of coconut fibre products from coconut husk, and coconut handicrafts from coconut shell; and to procure and ship coconut fibre processing equipment, for pilot testing, to other participating countries.

Activities will start in April 2000 for a duration of about three months.

The other participating countries will conduct similar activities when their participation is formalized.
Fourteen laboratories in 11 countries are conducting a 2-year research to refine the coconut embryo culture and acclimatization technology. The countries involved are Brazil, China, Cuba, France, India, Indonesia, Mexico, Papua New Guinea, Philippines, Sri Lanka and Tanzania. Mexico, France and Tanzania are funding their own studies. A survey questionnaire on the current application of coconut embryo in vitro was distributed to institutions worldwide at the start of the project. The survey showed that the poor results of the overall protocol were mainly due to low percentage of embryos developing into whole plantlets in vitro. The acclimatization phase of the in vitro plantlets was, however, relatively efficient.

The main part of the project was the testing of the four main in vitro culture protocols available from PCA, UPLB, CPCRI and ORSTOM, to those used by the participating laboratories. The aim was to compare the efficiencies of the protocols using locally available varieties.

The results showed improvement in the current technology was obtained. There was an increase in embryo germination and the number of whole plantlets obtained in vitro. There was also an increase in the survival rate of the seedlings after they were transferred from the test tube to the nursery. A pronounced genotypic effect was also detected in laboratory experiments using the local varieties.

Additional researches were also performed on topics such as the effect of various growth regulators on the germination of embryos, physiological aspects, and medium-term in vitro conservation of the embryos. Results of these physiological studies in participating laboratories in France, India, Mexico, Philippines, Sri Lanka and Tanzania have provided a better initial understanding of the effects of culture media, light, carbon dioxide, temperature, growth promoters and inhibitors, and nutrients on the survival rates of in vitro embryo-derived seedlings.

All participating laboratories are now able to culture coconut embryos in vitro and to successfully acclimatize the plantlets. This will encourage germplasm exchange among...
Six countries in South America and Africa are participating in the CFC-funded project entitled, “Coconut Germplasm Utilization and Conservation to Promote Sustainable Coconut Production”. The countries involved are Benin, Brazil, Côte d’Ivoire, Jamaica, Mexico and Tanzania. The aim of the project is to assist the national programmes of the selected countries in conducting multilocation trials to identify hybrids or varieties with better yield and broader adaptation compared to local cultivars.

Côte d’Ivoire has successfully produced 5400 seednuts of six selected hybrids and shipped them to the designated trial sites of the other participating countries. At least 150 seednuts each of the four selected local varieties have been produced and sown in the nursery of the research facilities for the six participating countries.

In Mexico, assisted pollinations were made for the production of seednuts from four Dwarf x Tall hybrids. Nine hundred seednuts were also received from the Marc Delorme Station in Côte d’Ivoire. Ninety palms of MAYPAN hybrids have been planted in the nursery. They were watered and fumigated to control the Helminthosporium halodes fungus, and are now on quarantine and germination beds. Two trial sites have been identified.

In Benin, seven imported hybrids from Côte d’Ivoire, and three local ones have been sown and germinated. They are expected to be transplanted to the field in May 2000. Six hybrids imported from Côte d’Ivoire and four local varieties were sown and germinated in Brazil and Jamaica, respectively. The field trial sites have been identified. In Tanzania, production of seednuts from five local crosses (by hand pollination) was conducted at the Chambezi Research Station. The Idete prison farm, situated in the Morogoro region of the Kilombero district, has been selected as a suitable site for the hybrid trial. Soil survey of the area was conducted to assess the land suitability, which included physical analysis (soil texture and structure), moisture and drainage. The soil samples will also be subjected to chemical analysis.

### Common Names for Coconut in the Philippines

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<tr>
<th>Scientific Name</th>
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<tr>
<td>Cocos nucifera L.</td>
<td>Niyog</td>
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<td>Giragira</td>
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Source: Agroforestry Seeds Circular Supplement
Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)

Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) is a French agricultural research institution that specializes in agricultural research and development in tropical and subtropical countries. CIRAD’s research centres are located in Montpellier, Guadeloupe, French Guiana, Martinique, Mayotte, New Caledonia, Réunion, and the French Polynesia.

CIRAD’s mandate is to contribute to the rural development through research, experimentation, training operations, in over 90 countries in Africa, Asia, the Pacific, Latin America and Europe. It has a staff of 1800 including 900 senior staff.

CIRAD has seven scientific departments, namely: 1) agronomy, environmental and natural resources management (Ager); 2) plant biology and breeding (Micap); 3) crop protection (Midec); 4) animal production (Micap); 5) technology (Mitech); 6) social sciences (Mes); and 7) applied mathematics and biometrics (Biom). There are 28 research programmes in seven departments, which include annual crop; tree crops; fruit and horticultural crops; animal production and veterinary medicine; forestry; territories, environment and people; and advanced methods for innovation in science.

The CIRAD-CP (tree crops) component is divided into five programmes, namely, cocoa, coffee, coconut, rubber and oil palm. The objectives of those programmes are to:

- analyze the operating mechanisms within the commodity chains and assist stakeholders in decision-making for production, production organization, primary processing of raw materials and marketing;
- design environment-friendly production strategies; alternatives to deforestation, intercropping, IPM, and rational fertilization; and
- analyze quality chains and improve post-harvest operations, primary processing and end-products.

The Coconut Programme focuses its research on improving crop productivity and producer incomes, establishing an integrated control of lethal decay diseases, and diversifying the outlets for coconut. The objectives are to: 1) increase coconut productivity, particularly on smallholdings; 2) restore the competitiveness of copra, the main source of vegetable oil in producing countries and the principal source of lauric oil; 3) keep coconut in the traditional growing zones for its food, economic and cultural value, and to develop alternative outlets for smallholders; and 4) prevent the risk of coconut disappearing from regions affected by lethal decay diseases.

The contents of this publication include the presentations, discussions and field protocols produced at the Workshop on Farmer Participatory Research on Coconut Diversity held in Davao, Philippines on 16 - 28 March 1998 and Taveuni, Fiji on 24 - 28 March 1998. The results of the follow-up workshops held in the Solomons and Bangladesh are also included. This publication provides documentation of a work in progress. It is intended for use in the field by coconut scientists and development specialists in carrying out participatory field research with farmers. It is also hoped that this publication will stimulate similar efforts to tap local knowledge of coconut diversity to solve the problems of small-scale farmers.

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The small-scale coconut farmers manage and use coconut genetic resources in a wide range of environments for diverse purposes. Farmers are particularly familiar with a range of locally adapted cultivars that provide multiple products and innumerable benefits to low income farm households. Documentation of these varieties in a farmer participatory research process is imperative to identify valuable genetic resources. This publication is one of the results of this farmer participatory research, which was conducted in Kerala, India. This publication will be made available to the coconut farmers of Kerala and to the coconut research institutions in India. It is hoped that the institutions will use the knowledge found in the book to improve coconut farm productivity and enhance the incomes of the Indian coconut farmers.

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Copies of the ‘Farmer’s Assessment of Coconut Varieties in Kerala’ (English and Malayalam) are also available at the COCENT Secretariat.
Coconut Literature Infobase (CLI)

The Coconut Literature Infobase (CLI) project identifies, sources, documents and disseminates publications and information on completed and ongoing researches on coconut in national, regional and global programmes.

At present, the printed materials available are grouped into: 1) reprints; 2) published books; 3) reports; and 4) COGENT publications. The reprints are divided into five specific subjects: genetic resources and breeding; pests and diseases; research, production and product diversification; coconut-based farming system and biotechnology.

CLI is available in the Endnote programme, a software for electronic library system (information on this software is available at www.niles.com). With Endnote, one can browse and search for the available materials using keywords, authors and titles. The location of a copy of the material is also available in the reference since some of the materials may only be available in the library of other organizations or institutions.

COGENT’s request for materials on coconut is sent regularly to country coordinators, project leaders, partner organizations and institutions. Among the items frequently requested are annual reports, articles about coconut in journals, list of articles written by coconut researchers with complete literature citations, and newsletters that publish articles on coconut.

Presently, there are 348 reprints, 40 published books, 95 journals and seven COGENT publications available. The reprints are divided into five specific subjects: genetic resources and breeding; pests and diseases; research, production and product diversification; coconut-based farming system and biotechnology.

Farmers’ Varieties and Multipurpose Uses of the Coconut Database

Farmers’ Varieties and Multipurpose Uses of the Coconut Database is an important documentation approach towards public awareness and information sharing in the conservation of coconut genetic resources. The database documents farmers’ knowledge through farmer participatory research surveys conducted under the IFAD-funded project, ‘Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region’. Fourteen countries in the Southeast and East Asia, South Asia and the South Pacific regions are involved in this project.

At present, data submitted through the semi-annual and annual reports by the countries are being documented into an Excel sheet according to the frames identified by a task force. Among the frames are: 1) the local names of farmers’ varieties; 2) origin of variety; 3) location of variety; 4) common uses of the palm parts; and 5) farmers’ overall ranking of the importance of the variety. Further inputs will be required directly from the project collaborators for any missing data.

The IFAD-funded project database will be made available to coconut researchers and other interested parties through the COGENT website.

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COGENT Bulletin Board

**ADB - and IFAD - funded Project Annual Meetings**

The annual meetings for the ADB- and IFAD-funded projects, specifically for the 10 participating South Pacific countries, will be held back-to-back on 26 - 30 June 2000 in Apia, Samoa, while the meetings for the 10 Asian countries will be held back-to-back on 10 - 15 July 2000 in Manila, Philippines.

The third annual meeting of the ADB - funded project entitled “Coconut Genetic Resources Strengthening in Asia and the Pacific (Phase 2)” will review the 1999/2000 accomplishments and 2000/2001 proposed work plans of the 20 participating countries involved in coconut projects. Progress reports on the human resource development component will also be presented, together with reports on the biotechnology and embryo culture components. Three host countries will also report on the activities of the International Coconut Genebank (ICG).

The third annual meeting for the IFAD-funded project entitled, “Sustainable Use of Coconut Genetic Resources for Enhancing the Income and Nutrition of Smallholders in Asia and the Pacific” will review the 3-year accomplishments of the 14 countries involved in the project which will end in August 2000. Reports will be presented on farmer participatory research to promote multipurpose uses of the coconut, identify suitable varieties for these uses, and to apply these findings in strategies for coconut germplasm conservation. Reports will also be presented on projects for increasing income from coconut-based farming.

The project leaders of both the ADB- and IFAD-funded projects, donors and representatives from IPGRI and partner institutions will attend the two meetings.

**International Coconut Genebank Workshop**

The International Coconut Genebank Workshop will be held on 17-18 July 2000 in Kasaragod, India. COGENT is establishing a multi-site International Coconut Genebank (ICG) in each of the five geographical regions. The host countries include Indonesia for the Southeast and East Asia, India for South Asia, Papua New Guinea for the South Pacific and Côte d’Ivoire for Africa and the Indian Ocean. Negotiations are underway for Brazil to host the ICG for Latin America and the Caribbean. The meeting will review the progress of work on the establishment of each ICG in the host countries, and related ongoing research projects and work plans, and budgets for the next seven years. The workshop will be hosted by the Central Plantation Crops Research Institute (CPCRI) with funding from ADB, IFAD and IPGRI/COGENT.

**9th Steering Committee Meeting**

The COGENT Steering Committee (SC) determines programme priorities and oversees the various COGENT activities. The SC comprises of ten representatives from COGENT’s 35 member countries, i.e. two each from the five subnetworks, namely; Southeast Asia, South Asia, South Pacific, Africa and the Indian Ocean, and Latin America and the Caribbean. The COGENT Coordinator acts as an ex-officio member. The APCC, represented by the Executive Director, is a non-voting member.

The 9th SC Meeting will be held on 20 – 22 July 2000 in Kasaragod, India. The SC members and representatives from partner institutions will attend the meeting. Specifically, the meeting will review progress of the five COGENT regional networks, projects and activities in COGENT, IPGRI and collaborating partner institutions. It will also discuss the COGENT Work and Action Plan for the Year 2000 and draft plan for Year 2001. The meeting will be funded by IPGRI/COGENT.

**International Coconut Conference (ICC)**

The International Coconut Conference (ICC) will be held from 24 - 28 July 2000 in Chennai, India, within the ambit of the APCC XXXVII COCOTECH Meeting. The conference will be hosted by the Government of India through the Coconut Development Board.

The conference will review the performance of the various sectors of the coconut industry to identify problems and opportunities to be addressed in the new millennium. The conference’s recommendations will be used as a guide in developing project proposals to address priority activities. The conference will be jointly sponsored by the APCC, BUROTROP and IPGRI/COGENT.

**Coconut Embryo Culture Training Course**

A Hands-on Coconut Embryo Culture Training Course will be held on 2 - 6 October 2000 in Albay, Philippines. The course will teach project leaders from COGENT member countries the upgraded and standardized embryo culture technology to enable them to exchange germplasm in the form of embryo-derived *in vitro* seedlings. The training course will be hosted by the Albay Research Centre of the Philippine Coconut Authority and funded by ADB, DFID and IPGRI/COGENT.
An international workshop on coconut mite was held at the Coconut Research Institute (CRI), Sri Lanka from 6 - 8 January 2000. The objectives of the workshop were to: 1) review the current knowledge on mites; 2) formulate a research programme and; 3) alert the other Asian and Pacific countries on the possible threat of mites in their countries.

Six participants from India, three foreign experts and several local scientists attended the workshop. The programme consisted of five in-house sessions and a field tour to the infested area. The Secretary of the Ministry of Plantation Industries in Sri Lanka graced the inaugural session. It was followed by the presentation of country reports by Sri Lanka and India.

Paper presenters included Dr. Dave Moore, CABI Bio Science, UK; Prof. Thomas Perring, University of California, USA; Prof. G. de Moraes, University of Sao Paulo, Brazil and Dr. R.I. Cabrera, Cuba. Their papers reviewed the current knowledge on non-chemical control methods and use of the fungus H. thompsonii for the control of mites, use of predatory mites in the control of eriophyid mites, and considerations in applied ecological research of eriophyid mites. The final session saw the discussion on identifying research priorities and recommendations, which included, the biology and ecology of A. guerreronis, crop loss assessments chemical control, and use of pathogens and predators in the control of the pest were identified.

The participants recommended that the research priorities are addressed urgently and a collaborative research programme especially between India and Sri Lanka with assistance from the foreign experts should be undertaken. It was also decided that international funding should be sought for such a programme. The final activity of the workshop was the field tour to the infested area. This provided the participants an opportunity to be enlightened on the nature of the outbreak in Sri Lanka. The workshop was funded by the CRI and the United Nations Development Programme (UNDP).

Priyanthie Fernando, Workshop Coordinator, Coconut Research Institute, Sri Lanka.