COGENT Conducts Research With Coconut Farmers

Most farmers in the Asia and the Pacific region have an extensive knowledge on the management of coconut diversity. For one, they have maintained coconut cultivars that have several of the desired characteristics, and are adapted to the local climate and culture.

The value and usefulness of these varieties could be further improved, though, through a farmer participatory research project on coconut diversity conducted by COGENT in collaboration with IPGRI and funded by the International Fund for Agricultural Development (IFAD).

To keep many of these desirable traits, the three-year project averred, farmer participation is essential to ensure that the improved coconut varieties are adapted to the environmental conditions and meet their specific needs. “Genetic diversity is maintained through diversity of uses, so the entire process, from selecting and breeding multifunctionality in cultivars to encouraging market demand for alternative coconut products, becomes important to plant genetic resources conservation,” the project report stated.

COGENT, together with IPGRI, conducted the farmer participatory research project in keeping with its mission to promote sustainable coconut product and enhance the income of coconut farmers in the Asia and Pacific region. The project was participated in by 14 countries, namely: Bangladesh, China, Fiji, India, Indonesia, Malaysia, the Philippines, Samoa, Sri

COGENT Develops Strategies for Sustainable ICGs

Strategies for sustainable international coconut genebanks (ICGs) are being developed to ensure the sustainability and efficient maintenance of important coconut genetic resources. The strategies’ main objective is to enable the genebanks to become financially independent and thus can maintain the genetic diversity and product seednuts and embryos for export to COGENT member countries.

The development of strategies for sustainable ICGs was recommended at the International Coconut Genebank Workshop held on 17-18 July 2000 in Chennai, India. The strategies include the following:

1. Enable the host country to maintain conserved germplasm per memorandum of agreement and the host government to allow the income generated by the ICG to be plowed back for maintenance cost.
2. Generate income from the ICGs from intercropping practice and livestock/fodder production, and planting additional areas to high-yielding varieties (HYV) or other crops. Income can also be derived from producing high-value products from kernel, husk, shell, wood and coconut water. The incomes can be put in a trust fund for the maintenance of the ICG.
3. Superimpose research and training with the general activities.
4. Generate financial support from the host state government or province.

A feasibility study on the recommended sustainability strategies will be conducted before the strategies are implemented.

The establishment of a multi-site International Coconut Genebank was proposed at the first meeting of the COGENT
COGENT stressed. The farmer’s knowledge of coconut characteristics, adaptations and multiple uses is in itself a vital resource to conserve along with the genetic diversity,” COGENT reported.

Assessing and recording the indigenous knowledge and classification systems of coconut farmers is the first step in developing local varieties adapted to specific microenvironments, and in identifying new uses of coconut products. Partnerships with farmers will eventually help to define breeding objectives, conservation needs and the potential for genetic enhancement, all in the context of low-input systems.

In the project, participatory rural appraisal (PRA) was carried out in selected countries on the basis of their proximity to major coconut research stations, centers of valuable cultivars or ecotypes and/or areas where coconut diversity is under threat. PRA is a research technique used by small multidisciplinary teams to generate a large amount of information in a short time, with techniques such as community and historical mapping; transect walks; ranking, rating and sorting exercises; semi-structured interviews; folk taxonomies; and focus group interviews.

Researchers in the participating countries asked similar questions in their interviews, discussing the varieties of coconut grown and their descriptions by the farmers, their management practices and major obstacles, home and commercial uses of the crop, and suggestions by the farmers on ways to improve the varieties, conserve genetic diversity and enhance income.

Groups of interested local farmers listed the traits of the cultivars and ecotypes used, and ranked their importance on a scale of 1 to 10. Similar ranking exercises were performed for the problems associated with each variety, and uses of each part of the coconut crop.

Discussions were held separately with groups of men and women to make sure that both perspectives were included, since there was often wide divergence between groups. Some teams also included focus groups with youth and elders in their research methodology.

Interesting insights have emerged from the PRA workshops, COGENT reported.

In a participatory study done in Kerala, India, the farmers suggested that the departmental nursery programme be decentralized to the village level, with mother palm material being selected from the best 5-10 percent of palms available in local gardens. This system would help prevent the spread of diseases such as root wilt and leaf rot.

They requested that researchers focus on varieties with potential for high toddy yield and strong petioles to make tapping and toddy-based processing more productive than nut production. They also asked that support should be extended to women’s groups and cooperatives to develop coconut products and handicrafts such as hats, mats and spoons and networks of stands to sell sweet drinks from young, tender coconut. The India project produced a booklet of the Farmer’s Assessment of Coconut Varieties in Kerala, in both English and Malayalam, the regional language.

At the workshops in Samoa, farmers discussed problems on very old coconut stands, pests such as rhinoceros beetle, Batiki grass, late-bearing nuts, immature nut fall and yellowing leaves. More important, they identified alternative coconut high-value products such as buttons, hair accessories, earrings, rings and necklaces. They plan to try new marketing strategies for these products, which would make the continued growth of diverse coconut stands more profitable.

In Fiji, farmers have been hurt by the instability of international copra prices, and will henceforth focus on entering the market for tender coconuts, which sell at 10 times the price of a mature nut. They are experimenting with germplasm of dwarf varieties of coconut, which would ease the harvesting of the young nuts. Workshop participants in Vanuatu identified income instability as well as land shortages as barriers to coconut production. Thus, they are exploring diverse intercropping systems to address both problems.

In the Philippines, farmers identified Laguna Tall palms with superior characteristics in crown shape, number of leaves and inflorescences, number of nuts, copra content, and in the regularity of bearing. Such desirable germplasm could be used for further multiplication by research station, the farmers themselves or by both in groups. Problems for smallholder coconut growers are often the lack of finance for...
inputs, access to funding institutions, limited individual land rights and availability of quality germplasm. Workshops across countries identified limited access to germplasm of local cultivars as a barrier to coconut production. In this case, agricultural research institutions could be of help in providing access to germplasm of local cultivars, besides their standard hybrid offerings. They could also take an active role in establishing germplasm exchange systems within the region and beyond.

PRA was only the first step in the three-year participatory research project. Work is underway to provide a detailed characterization of the most valuable types identified. This information will be compiled in a database of smallholder coconut resources, which will be useful in the identification of types of new uses and cultivars under threat.

To ensure that these genetic resources remain in the hands of farmers and that they can continue to share in the benefits for future improvement, a COGENT task force is being formed to provide a framework on intellectual and material property rights, access and benefit sharing to farmers. Quantitative measures of genetic characters to assess the relationship among coconut types will also be performed, along with records of institutions and sociocultural practices, choices and values associated with coconut diversity.

The final stage of the project will provide strategies to add value to these local varieties identified and to maintain diversity within the coconut-based farming systems, linking plant genetic resource conservation with research and development (R&D) and income-generating projects. The country reports have been extremely encouraging in compiling rich and concrete information on coconut varieties and uses which had not been the focus of coconut R&D in the past, but which are valuable and appreciated by farmers and researchers alike. A special emphasis should be placed on returning these research results to the communities in which they were performed.

Summing up, the participatory research on coconut diversity promises to be an extremely beneficial partnership for the equitable sharing of knowledge and insights between farmers and coconut scientists.

Steering Committee in 1992, the year the network was formally established by the International Plant Genetic Resources Institute (IPGRI). Now with 37 member countries, COGENT serves as a coordinating mechanism to promote conservation and exchange of coconut genetic materials.

A regional genebank is being established in each of the five regions, namely: Southeast and East Asia, South Asia, South Pacific, Africa and the Indian Ocean, and Latin America and the Caribbean. It was agreed that germplasm to be conserved in each regional genebank will be contributed by country members of each region.

Subsequently, consultations, site suitability evaluations and past risk assessment were undertaken. Indonesia, India, Papua New Guinea, Côte d’Ivoire and Brazil were initially identified as suitable countries to host the ICG in their respective regions. Specifically, Indonesia was chosen to host the ICG for Southeast and East Asia, India for South Asia, Papua New Guinea for South Pacific, and Côte d’Ivoire for Africa and the Indian Ocean. Brazil is being considered to host the ICG for Latin America and the Caribbean.

As it is, important coconut diversity is being conserved in national genebanks to ensure that precious coconut genetic resources will not be lost through genetic erosion, natural calamities, pests and diseases, and other factors. These threats could seriously affect the global coconut production and, consequently, the livelihood of nearly 50 million people who depend on it, either directly or indirectly.

The capabilities of the national genebanks, however, are not fully assured owing to insufficient financial and technical resources. In addition, germplasm movement and use are limited owing to the tedious nature of germplasm export clearances and lack of disease indexing capability.

Nevertheless, there are strong national programmes that could serve as the catalyst to overcome these difficulties. The establishment of the regional genebanks to be hosted by these national programmes would solve these problems.

COGENT 3
The meeting of the IFAD-funded project entitled “Sustainable Use of Coconut Genetic Resources for Enhancing the Income and Nutrition of Smallholders in Asia and the Pacific” was attended by project leaders, donors, and representatives from IPGRI and partner institutions.

It reviewed the 1999/2000 accomplishments of the 14 countries involved and the overall performance of the project, which ends in August 2000. Reports on farmer participatory research to promote the multipurpose uses of the coconut and projects for increasing income from coconut-based farming systems were presented and discussed. Status of the feasibility studies on high-value coconut products were presented by Bangladesh, Indonesia, the Philippines, Thailand and Vietnam.

Several issues and comments were raised during the meetings. In his opening speech at the IFAD-funded project meeting for the South Pacific countries, the Hon. Mafasolia Papu Vaai, Minister of Agriculture, Forests, Fisheries and Meteorology of Samoa, emphasized that the involvement of entrepreneurs and the private sector would greatly benefit the coconut industry as it would enhance the utilization of coconut products.

Other matters raised during the meeting included the possibility of each country to develop and implement a strategy where farmers can increase their income through high-value products aside from supplying raw materials; the convergence of external and indigenous knowledge; the need for farmers to benefit from in situ conservation; and the need to clarify the understanding of deployment of diversity in comparison to dissemination.

The progress of work on the establishment of the International Coconut Genebank (ICG) in each of the host countries was reviewed at the ICG workshop held on 17-18 July 2000 in Chennai, India. The workshop was hosted by the Central Plantation Crops Research Institute (CPCRI) of India and funded by IPGRI and the ADB.

The host countries for the ICGs are Indonesia for Southeast and East Asia, India for South Asia, Papua New Guinea for South Pacific and Cote d’Ivoire for Africa and the Indian Ocean. Negotiations are underway for Brazil to host the ICG for Latin America and the Caribbean.

During the workshop, related ongoing research projects and work plans for the next seven years were also discussed. The meeting likewise addressed urgent constraints and opportunities, and updated and refined the ICG work plans and budgets for submission to an appropriate donor.
African Governments Urged to Prioritize Coconut R&D for Poor Communities

National governments in Africa should consider giving high priority to coconut research and development (R&D) focused on the needs of poor farming communities in the coastal areas of tropical countries in the continent. At the same time, these governments should consider forming a national coconut body mandated to produce action plans and proposals aimed at alleviating constraints and identifying opportunities for the benefit of these communities.

These are two of the major recommendations made at the “Second International Coconut Workshop: Helping the Coconut Farmer in Africa into the 21st Century” held on 8-12 May 2000 in Mombasa, Kenya. Hosted by the Coastal Development Authority of Kenya, the workshop was attended by 71 participants from 14 countries, as well as representatives of regional and international organizations such as IPGRI/COGENT, the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) of France, the French Centre de Co-operation Internationale en Recherche Agronomique pour le Developpement (CIRAD) and the Association of Oil Palm and Coconut Producers of Africa (AFORDAP).

The workshop reviewed the status of coconut research and identified research gaps and linkages to address the constraints and opportunities in the region. The participants discussed a good number of issues that are of national, regional and international significance, as follows:

- At the national level, they batted for replanting programmes and the rehabilitation and revitalization of coconut processing and marketing to benefit poor communities, particularly women. It was also advocated that countries should explore generation of additional incomes from other parts of the coconut such as husk, shell, water, wood and sap. Moreover, they should generate national resources for capacity building to be supplemented by external assistance, as needed.

- In R&D, coconut-based farming systems research should be developed and where common problems and opportunities exist, regional and international collaboration be pursued. Control methods of *Oryctes sp.*, particularly in large-scale planting programmes, should be evaluated and adapted. The biology and control of the coconut mite *Eriophyes guererronis* should also be investigated. Likewise, countries should collaborate to further investigate the epidemiology, etiology and control of lethal yellowing disease.

- At the regional level, countries in Africa and the Indian Ocean should collaborate to establish a regional programme to focus on promoting collecting, conservation and exchange of disease-free germplasm; coconut-based farming systems; screening for resistance against lethal yellowing diseases, drought tolerance and other constraints; and technology transfer capacity strengthening of national programmes.

- The workshop further enjoined coconut-growing countries to consider joining AFORDAP to enhance its effectiveness in promoting the development of coconut in member countries. Moreover, BUROTROP and AFORDAP should develop their capacities to respond to requests for information from national programmes. Another recommendation was to investigate physiological and biochemical mechanisms of drought tolerance and support a regional facility in Benin for drought tolerance research. A workshop in Africa on postharvest technologies applicable to coconut with South and Southeast Asian experts invited to share expertise was also suggested.

- At the international level, the workshop participants underscored the need to support the establishment of a global coconut research programme to promote all aspects of coconut research.

ICC Reviews Performance of Coconut Industry Sectors

The performances of the various sectors of the coconut industry were reviewed at the International Coconut Conference held on 24-28 July 2000 in Chennai, India. Held within the ambit of the APCC XXXVII COCOTECH Meeting, the conference was hosted by the Government of India through the Coconut Development Board and jointly sponsored by the Asian and Pacific Coconut Community (APCC), Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) and IPGRI-COGENT.

During the review, problems and opportunities to be addressed in the new millennium were identified. The recommendations of the conference will be used as a guide in developing project proposals to address priority activities.
Several recommendations were made during the 9th Steering Committee meeting held on 19 – 21 July 2000 in Chennai, India. The meeting was attended by the 12 Steering Committee members and representatives from partner institutions. The objectives of the meeting were to review the ongoing and proposed projects and activities of COGENT, assess the constraints and opportunities, review the status of COGENT and formulate future directions for enhancing its effectiveness.

An important recommendation was made to develop strategies to ensure COGENT’s sustainability as a network. Thus, strategies to maintain optimum research and development activities and a five year forward financial plan were recommended. Part of the strategy should be to integrate COGENT’s major activities to promote greater complementation, synergy and impact with partner institutions such as APCC, BUROTROP and the SPC. Linkages with all levels of the Coconut Support Group should be strengthened and greater collaboration in research information sharing/exchange among member countries established.

A recommendation was made for the regional subnetworks to assume the roles of IPGRI in COGENT as a way to strengthen and sustain them. This require commitment from all parties and further discussions on funding support, common problems and opportunities and how to take advantage of them are required. In regions where coconut has not been accorded a high research priority, subnetworks could try to incorporate research in thematic-focused organizations. It was recommended to develop a strategy of strengthening both the subnetworks in Latin America and the Caribbean (LAC) and in Africa and the Indian Ocean (AIO) to effect the needed balance with Asia Pacific.

The International Coconut Genebanks (ICGs) received due attention with the recommendation to endorse further negotiations for Brazil to host the ICG for LAC and for the COGENT Coordinator to liaise with EMBRAPA on issues regarding derivatives and current laws affecting intellectual property rights. The members also approved the recommendation that accessions with specific traits such as disease resistance, superior tender nut qualities, etc, be identified and conserved in the ICGs and the use of performance and molecular data be used to finalize the list of accessions. Germplasm conservation in the ICGs should include accessions from host country, countries in the region and from those outside the region as appropriate.

The Coconut Genetic Resources Database (CGRD) now has passport and characterization data registered for 1338 accessions conserved in 22 countries. The SC members are urged to encourage member countries in their respective regions to complete characterization of accessions in their national genebanks and submit data to the CGRD. Further recommendation was made regarding the need to survey and monitor the usability of CGRD and identify features that need improvement. The SC also needs to approve an appropriate format or procedure before releasing the CGRD to the public domain, and identify legal and other implications in advance. A catalogue of conserved germplasm was also recommended to be developed and disseminated.

The SC requested the Chair of the CGIAR Coconut Support Group to commission a second external review of COGENT to assess achievements and mandate coverage in relation to emerging problems and opportunities in the coconut industry and to assess possible role of COGENT in the proposed coconut global research initiative using the global commodity chain approach.

The SC members agreed that it was appropriate at the moment to defer signing of MOUs between IPGRI and national institutions as COGENT activities are receiving full collaboration from national partners. This option could be reviewed in the future as appropriate.

During the meeting, several proposals were recommended to be developed. A number of COGENT member countries are facing climatic change and drought problems. Thus, a proposal on breeding for drought tolerance will be developed for EU submission, involving India, Sri Lanka and two European research organizations. Another proposal is on a globally coordinated coconut breeding to achieve specific breeding objectives utilizing classical and innovative approaches. Accelerated implementation of a more effective in situ conservation programme in coconut in countries involved in the IFAD project was also recommended. The meeting agreed that COGENT and FAO/RAPA cooperate to seek donor and technical support to develop an integrated climatic surface, soils, topography GIS database for the Asia-Pacific that can be digitally-linked to crop models. COGENT will also develop, among others, proposals for additional project support from IFAD, ADB, and DFID.

Documentation is an essential component of the COGENT network. It was recommended that technologies related to coconut-based farming systems, including costs and returns, and research bibliography to be documented in CD ROMs and disseminated to member countries. Consultancy reports on marketing high-value products, collecting strategy and PRA must be made available upon request. A recommendation was also made for COGENT to jointly develop a catalogue of coconut recipes in collaboration with APCC, and another on conserved germplasm and farmers’ coconut varieties.
Southeast and East Asia

The Southeast and East Asian region is home to more than half of the world’s coconut production, with the Philippines and Indonesia having the largest collection of coconut populations. Aside from these two countries, composing the Southeast and East Asia subnetwork are Malaysia, Thailand, Vietnam, China and Myanmar.

Coconut is an important oil crop in the region, grown mostly in smallholdings. The national programmes to develop and sustain the growth of the coconut industry are heavily evident in the Philippines and Indonesia, with Vietnam and Thailand showing similar commitment.

Meanwhile, Malaysia’s coconut industry is showing signs of strain with the loss of 3000 palms a year owing to urbanization and oil palm planting. About 75% of the palm population is senile and if replanting is not accelerated, Malaysia could face a constant shortage of coconut. In 1999, for example, Malaysia had to import coconuts from neighbouring countries such as Indonesia and Thailand.

Vietnam and Thailand are developing alternative high-value coconut products such as coir fibre and handicrafts from coconut shell that could enhance the income of poor coconut farmers. Coconut in these two countries is grown only in some provinces, but the multiple uses of coconut appear to have attracted the attention of coconut entrepreneurs that cater particularly to export markets.

Coconut in China mainly grows on the island of Hainan. There are many interesting cultivars that can thrive in cooler temperatures. The development of the coconut industry on the island could prove interesting with great prospects seen in marketing the coconut and coconut by-products in mainland China.

Both projects funded by the Asian Development Bank (ADB) and the International Fund for Agricultural Development (IFAD) in COGENT member countries in the Southeast and East Asia subnetwork show new prospects in many aspects such as the discovery of new and interesting accessions; the multipurpose uses of coconut; the documentation of farmers’ varieties and indigenous knowledge which have remained elusive for a long time; and the sharing of technology among the member countries, such as the processing technology of coconut fibre developed by Vietnam.

South Asia

Four countries compose the South Asia subnetwork, namely: Bangladesh, India, Pakistan and Sri Lanka.

In India, 30 accessions have been collected from the Andaman and Nicobar group of islands. Germplasm prospecting and collecting were conducted, generating eight accessions in the form of embryos from the Maldives. Germplasm collecting activity is also planned for Comoros and Reunion. A survey was also undertaken to identify elite palms in coconut gardens in Kasaragod, in the Kerala State. Preliminary results indicated 12 high-yielding palms.

In Sri Lanka, five new populations were collected in three districts. One hundred seednuts from each population were planted in the nursery to obtain seedlings for ex situ conservation. Sixteen accessions conserved in two ex situ field genebanks were characterized for stem, leaf and inflorescence morphology.

In Bangladesh, seednuts of 12 populations have been planted in the nursery for germination. Pre-prospection surveys were conducted in 30 sampling sites. Eight conserved germplasms were evaluated and documented with the characterization data of seven accessions submitted to the Coconut Genetic Resources Database (CGRD).

In Pakistan, 30 high-yielding populations were identified for conservation in the genebank. Ten populations harvested from the Garkho forest are being grown in PIC Gonthombli and hybrids received from Sri Lanka have been planted with 85% germination for all the entries. Pakistan has submitted characterization data for 32 coconut accessions to the CGRD.

Under the International Fund for Agricultural Development (IFAD)-funded project entitled “Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region”, India, Sri Lanka and Bangladesh conducted a farmer participatory survey to identify coconut varieties that have the potential for multipurpose uses in their respective country. The findings showed useful information and insight regarding the economics of traditional coconut farming and opportunities available to enhance the income of coconut farmers.

In India, 18 tender nuts marketing stalls were set up and managed by women and youth. The nuts sold were mainly of the Chowghat Orange Dwarf (COD) variety which the customers seemed to prefer. Three women’s groups were also organized to undertake the processing of coconut wood, shell, kernel and others into value-added products to enhance the income of the coconut farmers’ families.

In Sri Lanka, a postharvest technology was developed to extend the storage period of tender nuts to enable sea shipment to overseas markets.

In Bangladesh, specific adaptations of local ecotypes have been identified; a feasibility study on the use of a decorticating machine for each processing of husk into fibre has been initiated by a non-government organization (NGO), Banchte Shekha; two stalls selling tender nuts have been established; and data were collected on marketing of tender nut for cost and return analysis.

South Pacific

Mention South Pacific and what instantaenously comes to one’s mind are idyllic islands, vast seas, azure skies and coconut trees.

Coconut, indeed, is widely grown in the South Pacific, particularly in the eight countries that compose the South Pacific network, namely: Cook Island, Fiji, Kiribati,
Papua New Guinea, Solomon Islands, Samoa, Tonga and Vanuatu. Coconut products such as coconut milk, soap and copra are widely produced and used in the region. Coconuts provide substantial environmental benefits. They help reduce soil and beach erosion and soil temperature, are used in nutrient recycling, and act as windbreaks.

The coconut industry of the Pacific region, however, suffered a decline in recent years owing to low prices of copra, leading to lack of maintenance of coconut plantations and replanting of senile palms.

The national programmes of the member countries are being strengthened through the COGENT projects funded by ADB and IFAD, in collaboration with BUROTROP, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and APPC. Through these projects, funding, training and technical assistance have been provided to national researchers to undertake research and development activities based on local needs and opportunities. The outputs would form the basis for the implementation of a viable coconut industry development programme in the region.

Under both ADB- and IFAD-funded projects, coconut germplasms in the eight member countries were collected and passport data characterized; promising coconut varieties were identified and planted in the field; a farmer participatory survey was conducted and the indigenous knowledge documented; and alternative uses of the coconut were identified to enhance the income of the coconut farmers.

The South Pacific subnetwork is sustainable because there is a high level of interest and activities among the member countries, which include seednut production, local marketing and export of coconut products; strong support from regional organization, such as the Secretariat of the South Pacific Community (SPC), that are interested in and committed to strengthening coconut development activities; and assistance from international organizations such as IPGRI, BUROTROP and CIRAD that share the same sentiment.

The 2nd International Coconut Workshop for Africa: Helping the African Coconut Farmers into the 21st Century was held on May 8-12 in Mombasa, Kenya. Organized by BUROTROP in collaboration with the Coastal Development Authority of Kenya, the workshop brought together COGENT member countries from the region to meet and discuss the coconut situation in the subnetwork. The outputs of the workshop were several recommendations aimed at promoting coconut production and utilization through R&D programmes at the national, regional and global levels.

**Africa and the Indian Ocean**

Coconut is an important subsistence and cash crop in the eight countries that compose the Africa and the Indian Ocean subnetwork-Benin, Côte d’Ivoire, Ghana, Kenya, Mozambique, Nigeria, Seychelles and Tanzania.

This widely known “tree of life” is mainly cultivated by smallholders in the region. The average coconut yield, however, is quite low owing to unfavourable weather, lack of improved planting materials adapted to local conditions, and the presence of serious pests such as the oryctes beetle.

Several member countries of the subnetwork are active in research and development activities in coconut, namely: Benin, Côte d’Ivoire, Ghana, Nigeria and Tanzania. The oldest research stations in the region, some more than 50 years old, are located in Benin and Côte d’Ivoire. The main objective of these national programmes is to promote the production and utilization of coconuts by addressing the constraints faced by the coconut farmers in the region.

Ongoing activities in the subnetwork include germplasm conservation, characterization and utilization; breeding high-yielding materials; agronomy trials which include coconut-based farming systems; studies on diseases and ways to combat them; developing effective pest control strategies against major pests; and producing and distributing improved planting materials to coconut farmers.

**Latin America and the Caribbean**

The Latin America and Caribbean Subnetwork has eight member countries, namely: Brazil, Costa Rica, Cuba, Guyana, Haiti, Jamaica, Mexico, and Trinidad and Tobago.

Several activities were and are being conducted in the subnetwork. The Common Fund for Commodities (CFC)-funded project to promote sustainable coconut production through coconut germplasm utilization and conservation was implemented through the planting of the multi-location trials in Brazil, Jamaica and Mexico. In the trials, six introduced hybrids from Côte d’Ivoire, four local varieties and hybrids produced through artificial pollination were tested in each participating country.

Lethal yellowing (LY) is a serious problem in Mexico, Honduras and Belize. Several laboratories in Mexico, Honduras and Cuba are working on the diagnosis of LY by molecular methods. Cuba is also conducting a survey and sampling of all LY areas in major islands to characterize and identify the phytotlasma present in the country. Cuba is collaborating with Honduras in developing some aspects of the research.

Cuba and Mexico, in collaboration with the Max Planck Institute, initiated the analysis of biodiversity in coconut plantation by DNA markers. The Brazilian Agricultural Research Corporation (EMBRAPA) is conducting a similar activity.

Human resource strengthening was realized through several workshops. Researchers from Cuba, Brazil, Jamaica, Mexico and several other Latin American countries have benefited from the “Workshop on the Application of Biotechnology to Plant Breeding and Crop Protection”, organized by the Max Planck Institute in Meriden, Mexico. Similarly, the 2nd International Coconut Embryo Culture Workshop was held in March 2000 at the Centro de Investigacion Cientifica de Yucatan (CICY) in Mexico with participation from 17 countries.

In Brazil, the first coconut farmer association, known as SINDCOCO National Syndicate of Coconut Producers, was established. Its main objective is to look after the welfare of coconut farmers in the country.
Coconut Research and Development in Thailand

By Chulapan Petchpiroon

Coconut is an important subsistent crop in Thailand. Over 200,000 farm families are directly or partially dependent on the coconut industry for their livelihood. The total area under coconut is about 376,000 hectares, with an average farm size of 1–2 hectares. The predominant coconut varieties in Thailand are the local tall trees even though high-yielding coconut hybrid varieties have been released to farmers since 1982.

Coconut farmers in Thailand do not rely on coconut and its traditional products alone as they are also engaged in non-farm activities for additional income. Mixed or intercropping practice is also popular with the farmers as it has shown to provide higher incomes.

A large portion of the coconut production is for the domestic consumption with little used for industrial purposes. Production is often insufficient as coconuts are used for various uses and thus cannot meet the domestic demand.

In order to solve the shortage of coconut in Thailand and increase sustainable production, research and development activities have been carried out by the Department of Agriculture (DOA). Coconut research was first started in 1960 with the establishment of a research station called Sawi Horticultural Experiment Station in Amphoe Sawi, Chumphon province. It has since been renamed Chumphon Horticultural Research Centre (CHRC). CHRC research activities are mainly on coconut, robusta coffee and related intercrops, and is regarded as Thailand’s only main coconut research centre.

Over 50 coconut accessions were collected at CHRC, which include local and exotic varieties.

A project on coconut hybrid research was launched in 1974. The first hybrid experiment was set up in 1975 and a coconut hybrid seed garden was established simultaneously in order to keep pace with the planting material demand. Some hybrids performed very well under local conditions. The first hybrid, Sawi Hybrid No.1 (Malayan Yellow Dwarf x West African Tall), was released to farmers in 1982. Two more hybrids, Chumphon Hybrid No.60 and Chumphon Hybrid No.2, were recommended in 1987 and 1995, respectively. Among these three hybrids, copra yield per hectare was found to be similar. However, the copra weight per nut differs.

Chumphon 60, a cross between Thai Tall or Maphrao Yai and West African Tall, has medium to big size fruit. Copra per nut is about 260 – 300 g. Chumphon 2, a cross between Malayan Yellow Dwarf and Maphrao Yai, is more precocious than Chumphon 60 and has a medium size fruit with relative uniformity of fruit size. Copra per nut is relative, about 260 g. Most farmers who had planted hybrid varieties expressed satisfaction with Chumphon 2. CHRC is also responsible for producing the hybrid seedlings.

The advantages of coconut-based cropping systems have long been recognized and such are commonly adopted in the country. Increased coconut production due to intercropping is attributed to the cultivation and maintenance of intercrops. Experiments on intercropping were conducted and a wide range of suitable crops was found to be suitable. Some example of intercrops include annuals (sweet corn, cucumber, string bean, groundnut, taro, turmeric), biennials (pineapple, papaya, banana), and perennials (coffee, durian, mango, longkong, jackfruit, pummelo, salak).

Coconut products have benefited from post harvest and processing technology. At present, coconut cream and young tender nut have become important export products. The coconut cream products are packed in a variety of ways using UHT cardboards, tincans and polyethylene bags to ensure their freshness. Thailand is one of the largest exporters of coconut cream to the United States. According to the exporters, the export value of coconut cream reaches over 2000 million baht each year.

Young tender nut is another product which is gaining popularity. Studies on the preservation and transportation of young tender nut have helped expand the business to a larger scale. The quality and shelf life of fresh nuts have been enhanced, ensuring that the nuts remain in good quality up to 45 days after processing. Proximity or distance is, therefore, no longer a problem for exporters. The young tender nut is marketed in several variations including fresh nut with partial husk, frozen juice, pasteurized juice and canned sterilized juice. At present, the DOA is particularly focused on young tender nut research compared to other products. Nevertheless, research activities on varietal improvement, plant nutrition and post harvests are being conducted.

Another promising product is coconut sugar since the demand for this product is expected to increase significantly in the future. The coconut sugar is mainly used in cooking and desserts and cannot be replaced by other types of sugar due to its unique flavour. Inflorescence sap for bottled soft drink is another product that is gaining its market share. However, more studies on coconut sugar should be conducted, especially in terms of product quality so as to satisfy the consumers.

Handicraft from coconut shell is also another growing industry. They were originally produced by individual farmers in very limited scale but with support from government agencies, it looks set to become bigger. It now provides the main income to some farmers’ groups through their involvement in the Queen’s project which focuses on enhancing incomes of the women in Thailand.

In addition to the government’s support to the coconut industry, foreign assistance has been channelled through the DOA such as from the French and British government, and the FAO/UNDP programme.

In addition to productivity improvement, diversification of coconut products should be given further consideration in order to promote value-added coconut products. Although the coconut industry in Thailand has achieved considerable success, its prosperity still requires strong support from government so as to strengthen the capability of the coconut farmers in improving their livelihood.

1 Coconut Breeder, Chumphon Horticultural Research Centre (CHRC), Thailand.
Coconut is an important tree crop in Bangladesh. It contributes to the livelihood of farmers through its many uses. It has a high utilization potential for shelter, cosmetics, pharmaceuticals, energy and environmental protection. Coconut is also noted for its remarkable ability to stand against cyclones, sheltering hundreds of homes on the coastal belt.

In a country with limited land space, coconuts are rarely grown on large plantations except for a few on the coastal areas. They are mainly grown on homestead in almost all parts of the country. There is a wide variability in the country’s coconut population.

At present, the coconut yields about 21 fruits per tree per year, which is very low, compared to those of other coconut-growing countries. The poor production is due to the lack of high-yielding cultivar, inadequate nourishment and management practices. However, the yield of coconut would increase with the use of selected local germplasm and introduction of high-yielding varieties, and with application of appropriate inputs and management practices.

The coconut-growing areas in Bangladesh are often subject to genetic erosion due to cyclone and many man-made calamities. The Government is very much concerned about the loss of genetic materials, germplasm conservation and improvement of coconut production. In the early 1960’s, a Coconut Research Station (CRS) was established at Rahmatpur, Barisal - a coastal district. The CRS aimed to establish a systematic collecting, evaluation and conservation of coconut germplasms.

The station has a large collection of Malaysia and Sri Lanka Typica varieties, King Coconut and Nana coconut besides many local ecotypes.

In the early 90s, CRS’s position was strengthened under the name Regional Horticulture Research Station. Assistance was received from the Asian Development Bank (ADB) with the provision of 26 scientists in different disciplines and an increased scope of activities.

Nuts collected from different selected mother palms and promising ecotypes were planted in 11 research stations of the Bangladesh Agricultural Research Institute (BARI) and Horticulture Centres of the Department of Agriculture and Extension (DAE). In 1996, BARI has released and recommended two coconut varieties, the BARI Narikel-1 and BARI Narikel-2, for planting throughout the country. BARI also distributes about 4000 seedlings of BARI Narikel-1 and BARI Narikel-2 annually among the farmers at a subsidized rate. On the other hand, quality coconut saplings are also being distributed by the Bangladesh Horticulture Development Corporation (BADC) and DAE through their Horticulture Development Centres and Horticulture Centres, respectively.

In early 80s, a 100-ha isolated coconut garden was established at Ramu, Cox’s Bazar, a coastal district, to produce hybrid nuts and saplings for distribution to growers. It was established under the DAE. The garden has a large stand of CRI 60 and Malayan Dwarf coconut. There is a lack of progress, however, in achieving its goal due to the lack of fund and trained personnel.

In early 90s, the coconut project was established with 14 centres in different areas of the country. The purpose was to raise saplings from selected nuts collected from mother trees and distribute them to the farmers. These activities are ongoing, providing major contribution towards the development of coconut industries in Bangladesh. It also helped develop private entrepreneurs and nurseries on coconut. The government-funded nurseries, which are under DAE, have been renamed as Horticulture Centres. At present, many private nurseries are also working side by side with state-owned seed gardens.

The Government has also initiated a project for afforestation in the coastal belt, which is prone to the annual cyclones.

Bangladesh joined COGENT as a member country in 1998. Several activities have been initiated since early 1999, which include collecting and in situ and ex situ evaluation of the available germplasm of the country. The ultimate aim is to be able to share the coconut genetic resources with other member countries of the network. Researches have been undertaken on the production and processing of the coconut and its bio-products for both food and non-food items at household levels involving women to increase the income of smallholders.

There is no doubt coconut has a great potential in enhancing the income of the rural people through increased production and processing of coconut. The step that should be taken would be to strengthen the national programme for the development of the coconut industry in the country. Among the activities planned under this programme include breeding to develop drought, salinity and swamp tolerant hybrids, establishment of laboratory for embryo culture for quick multiplication of the selected hybrids and exotic germplasm from abroad, and standardization of coconut-based farming systems.

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Coconut has occupied an important place in the livelihood and culture of the people of Mozambique for a long time. It contributes directly and indirectly to the subsistence of a great number of smallholders. Coconut has also been a notable cash crop for some plantations.

The coconuts grow along the coastal areas but the main area dedicated to this crop is between the rivers Zambeze and Ligonha where the climate and soils are more favourable. In the last 20 years, however, coconut plantations and productions have been decreasing and are sometimes abandoned due to internal problems. Despite the decrease in production of its coconut groves, Mozambique remains the largest producer of copra in Africa. Coconut palms cover an estimated total surface of 100 000 hectares which produce an average of 60 to 70 tonnes of copra per year.

In the past, the structures of the plantations were based on four plantations which occupied about 50 000 ha. Now there is only one big plantation, the Sociedade Agrícola da Madal, which has about 23 000 ha. In the smallholders’ plots, the coconuts are harvested as mature nuts and sometimes processed as copra in kilns.

Almost all the material comes from the Mozambique Tall and in the last 20 years, grown mainly on plantations such as Madal. With the support of IRHO, hybrids of Mozambique Tall x Malayan Dwarf have been planted, representing 4 to 6 % of the total area of coconut plantations.

At the time when the private companies and the National Agriculture System, based on the National Programme for Agrarian Development (PROAGRI), wanted to promote coconut plantations, lethal yellowing disease was detected in the Zambezia Province. In 1958, Carvalho Mendes reported for the first time the occurrence of an unknown disease of coconut in northern Mozambique. In 1999, the disease was confined to the Cabo Delgado province. With the easy spread of this disease, the production of coconut will be seriously limited in the near future.

With financial support from Portugal, COGENT/IPGRI, Instituto Superior de Agronomia (ISA) (Portugal), CIRAD, Madal and Instituto Nacional de Investigação Agrária (INIA), Mozambique will conduct a multilocation trial of promising hybrids and varieties, which is important for the future of the country’s coconut plantation. This trial is already being conducted in six countries; Tanzania, Benin, Côte d’Ivoire, Brazil, Mexico and Jamaica.

Four dwarf x tall (DXT) and two tall x tall (TxT) hybrids, which have been proven to have a good yield potential in major coconut-producing countries, would be used as common multisite controls in all participating countries. Four local varieties or improved local hybrids that are likely to contribute towards the increase of tolerance or resistance to biotic and abiotic stresses would also be included in the trials. These local hybrids will be produced by crossing locally selected parents.

However, pollen of the male parents SGD (Mozambique Tall) and VTT (Vanuatu Tall) will be supplied by CNRA Station de Recherche Marc Delorme (a lethal yellowing disease–free location) based in Côte d’Ivoire together with the six introduced hybrids for multisite controls. In order to ensure uniformity of treatments and comparability of results, the trial would follow COGENT’s STANTECH manual, which will be translated and published in Portuguese.

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**South Pacific Agriculture Directors Present Frameworks of their Coconut Programmes in Apia Meeting**

**By Tom Osborn**

The Directors of Agriculture in South Pacific subnetwork countries presented the framework for national coconut programmes in their respective countries at the ADB- and IFAD-funded meetings in Apia, Samoa, on 26-30 June 2000.

The meeting was held under the auspices of the project funded by the Asian Development Bank (ADB) and the International Fund for Agricultural Development (IFAD). It provided the opportunity for Agriculture officials to gain a better understanding of the international, regional and national activities conducted by COGENT.

The framework presented by the agriculture officials focuses on a number of components which include the importance of price stability or support and that national committees should be established together with the participation of the public and private sector to facilitate the development of the coconut industry in the South Pacific.

**Fiji**

Coconuts are grown in 65 000 hectares with 60% of the area owned by smallholders. Sixty percent of the palms are senile. The national development framework for Fiji calls for reducing the area under coconuts...
but increasing yields through the provision of hybrids and selected Fiji Tall. The Taveuni Coconut Center is spearheading seednut production, whereas the Coconut Industry Development Authority was established in 1998 for the regulation, development and funding of the coconut industry. The coconut research and extension activities are being strengthened. Greater value-adding and increased utilization of coconut products and by-products including coconut cream, cocotimber, activated carbon, virgin oil, coconut shell products, desiccated coconut and coir products are essential to the development of the coconut industry. Whole nut processing is also being explored.

**Samoa**

Solid stand of coconuts, coconuts mixed with livestock and coconut farm with intercrops occupy 36% of the arable land of Samoa (80 000 hectares). The harvested nuts are processed and exported as oil and coconut cream. There was a massive replanting scheme in the early 1990s after several devastating cyclones. The national framework includes continued replanting with selected Samoan local talls and hybrids; research and promotion of coconut-based farming systems and coconut fibre utilization such as for doormats. Research activities also need to continue to identify, characterize and utilize local germplasm as well as adapted hybrids.

**Tonga**

In the early 1990s, low prices and introduction of squash and other short-term crops led to the clearing of coconut land for mechanical cultivation and milling of coconut timber. However, coconuts are still used as mature and green nuts, and as handicrafts. A coconut replanting scheme has been formulated in recognition of the high priority of coconuts. The strategy will include coconut-based farming systems with root crops as well as kava and vanilla. Research and development activities will be strengthened based on the results of the ADB- and IFAD-funded projects conducted by COGENT. The feasibility of various value-added products from coconut for development in Tonga will also be determined. The establishment of a coconut marketing authority is expected to carry out market research and marketing of coconut products.

**Papua New Guinea**

Coconuts are planted in 250 000 hectares, mostly by smallholders, and rank fourth in export earnings. The proposed national development plan aims to achieve increased yields and income for farmers through intercropping, improved planting material, diversification of coconut products and improved transportation and infrastructure. Coconut intercropped with cocoa is practiced by 41 000 farmers and research is underway to increase intercropping with other food crops and promotion of pasture and livestock. There is a need to increase production of hybrid seed nuts through the establishment of seed gardens throughout the country. Research and feasibility studies need to be undertaken to determine what new value-added coconut products are suitable. A food technologist has been hired for this area. Like in Vanuatu, the high cost of transportation is a problem that is being studied. Improved extension services by the Coconut and Cocoa Extension Agency in cooperation with the Coconut and Cocoa Research Institute will be an important component for the development of the coconut industry.

**Vanuatu**

Coconuts are planted in 91 000 hectares, mostly by smallholders, with an average area of 3.4 ha. Copra remains the mainstay of the economy, providing 30-50% of the export earnings. The suggested national strategy is to make improved planting materials available at an affordable price, which is currently hindered by the high cost of transportation between the islands of Vanuatu. Increased production of staple crops for the urban markets is important and coconut intercropping is one of the options. There is a need to determine the feasibility of a variety of value-added products and promote the promising ones. These efforts will be coupled with a strong research component from the Vanuatu Agriculture Research and Training Centre (VARTC), which is managed and assisted by Centre de Cooperation Internationale en Recherche Agronomique pour le Developpment (CIRAD). Intercropping research is being conducted by VARTC to provide advice to farmers on coconut-based farming systems adapted to local conditions.

The atolls of Cook Islands, Kiribati, Marshall Islands and Tuvalu provide a challenge for the development of a coconut industry. Coconut replanting schemes are being initiated in Kiribati and Tuvalu with selected local talls and hybrids. Traditional coconut-based farming systems will be examined so that innovations can be considered and production boosted. The analysis will include local varieties and potential exotic varieties, soils and plant nutrition, drought resistance, other crops adapted for the system and matching the varieties to the use of the coconut. Because of the low overall production and distances between the islands and the market, value-adding for household use, import substitution and exports such as soap, oil and handicrafts, need to be studied and promoted.

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1 Agriculture Adviser, SPC and COGENT Steering Committee member
The West African Tall (WAT) has gone a long way to becoming a part of the West African landscape since it was introduced by Portuguese travellers from Mozambique at the beginning of the 16th century. At the end of the 19th century, it was introduced from Benin to Côte d’Ivoire. From 1951 to 1954, three main accessions of the WAT were surveyed from two plantations in Côte d’Ivoire and one in Benin. The best parent palms for copra yield were selected by the surveyors.

Selected WAT palms are conserved in the Marc Delorme Coconut Research Centre in Côte d’Ivoire. Since 1960, WAT seednuts have been exported to many countries, which include Brazil, India, Indonesia, Papua New Guinea, Tanzania and Vanuatu, and to at least 10 germplasm banks worldwide. Twenty-two WAT accessions totaling more than 3000 palms have been integrated into the Coconut Genetic Resources Database (CGRD).

The stem of WAT is rather thin for a tall cultivar, and has a thin but sometimes curved bole. The stem height varies from 4.5 to 6.5 m at 10 years old. The leaves are quite short but have a high number of broad leaflets.

Inflorescences are medium-size, with a short female phase beginning after all the male flowers have already dropped. The mode of reproduction is predominantly allogamous. Fruits are usually green to yellow-green, with the occasional green- to brown. Their shape is long, angulated and medium-pointed to oblong. The husk epidermis often bears the typical folds or puckers, creating a kind of equatorial belt around the fruit. The coconut inside is oblong, with a solid shell and thick albumen.

Fruit production generally begins six to seven years after planting. The number of bunches on average ranges from 11 to 14 per palm per year with the number of fruits ranging from 40 to 90 per palm per year, depending on the environmental factors and cultural practices.

Fruits of the WAT in Benin are heavier than those found in Côte d’Ivoire (1169 g as compared to 1040 g in the Côte d’Ivoire’s Germplasm Bank). They also have a higher husk weight ratio (43% as compared to 38%). The weight of copra per fruit is rather similar in both countries and ranges from 190 g to 245 g. The meat is thick and has a high dry matter content (55 to 59 %).

WAT is widely used as parent material in coconut breeding programmes. Its hybrids with the Malayan Yellow Dwarf (known as PB121 or Mawa) and the Cameroon Red Dwarf (CAMWA) have been diffused worldwide by Côte d’Ivoire. The new tall cultivars have been systematically crossed with WAT and the Rennell Island Tall. The hybrids from WAT crossed with Malayan Red Dwarf and Maphrao Thailand Tall have been diffused in Thailand. Meanwhile, the Philippines has included WAT as a parental material for its coconut synthetic variety project.

Data from Côte d’Ivoire’s Palmindustrie allowed the comparison of the yield of 4000 hectares of WAT with 12 500 hectares of hybrids (mainly PB121). From 1985 to 1990, the hybrids have produced 2.4 t of copra per hectare per year whereas the WAT yielded only 1.5 t.

WAT is more sensitive to drought than the hybrid PB121. WAT is also sensitive to the lethal yellowing diseases (LYD) in Jamaica, Tanzania and Ghana. This cultivar was also classified as sensitive to the coconut foliar decay in Vanuatu. It is susceptible to Eriophyes guererronis K., a mite pest on fruits, and the phytophthora diseases in Côte d’Ivoire and Indonesia. WAT is also sensitive to the leaf blight foliar disease in Brazil.

The WAT fruits are preferred by the coconut exporters for the European markets. The slow germination of the fruits, and the thick and solid shell reduce the losses caused by packaging and shipment.

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3 Director, Mikocheni Agricultural Research Institute, Tanzania
4 Researcher in Plant Breeding, Marc Delorme Research Station, Côte d’Ivoire
5 COGENT Coordinator, IPGRI-APO
‘Unique’ Coconuts of Indonesia
By Hengky Novariant and Miftahurrahman

Ever heard of Indonesia’s “unique coconuts”? These are varieties that have unusual morphological characters. They are found among the local coconuts in small number or individually and are known to the farmers.

The “unique” coconuts are among 40 accessions identified during an exploration activity in the Moluccas Islands, East Nusa Tenggara, West Nusa Tenggara and North Sulawesi, which have a large coconut diversity. Indonesia initiated the systematic exploration, collecting and conservation of coconut germplasm in these areas under the projects funded by the Asian Development Bank (ADB) and International Fund for Agricultural Development (IFAD), in collaboration with COGENT. It was one of the activities under Indonesia’s coconut breeding programme, whose main goal is the acquisition and development of potential cultivars that can adapt to different growth conditions and suitable for the production of various products.

Thus, a farmer participatory survey is needed to explore and collect Indonesia’s unique coconuts, and data would be gathered through interviews with the coconut garden owners, farmers and workers.

Takome Tall

This cultivar, which originated from Takome Village, Ternate, North Maluku, was first identified by the Research Institute for Coconut and Palmae (RICP) in 1977. Its unique characteristic is the remarkable number of fruits per bunch that reaches up to 100 nuts. The locals called it ‘Igoratu’, ‘Igo’ for coconut and ‘Ratu’ for hundreds. The fruit is small and round, and is suitable as a raw material for coconut handicraft. In Takome Village, only few palms can be found as most of them have been cut and replaced by other crops.

Santongbolang Tall

The Santongbolang Tall was discovered in Santongbolang Village, Bolaang Mongondow Regency, North Sulawesi in 1997. The cultivar has more than 60 fruits per bunch with long inflorescence. In optimum condition, it can have as many as 100 nuts per bunch. The fruit is medium size with a fresh albumen weight of 400g.

Igoduku Tall

This cultivar originally grew in Kulaba and Sulamandaha Villages (Ternate), Awer Village (Halmahera) and Amahai Village (Seram Island) in the Moluccas. The fruit has an oblong shape and medium size. The length of the fruit is 22.9 cm. Igoduku Tall is a favourite among the farmers because of its nuts high copra content.

Palapi Tall

This cultivar was found in Palapi Village, Moutong District, Central Sulawesi Province. It has a big size fruit and nut, with more than eight fruits per bunch. The fruit is green and the nut is round. A unique feature of the Palapi Tall is the large space inside the nut which allows a higher than normal volume of water. It is suitable as raw material for the production of nata de coco.

Dobo Tall

The Dobo Tall was found in Ngilngof Village, Kei Kecil Island, South East Maluku Regency, Maluku Province, in January 1997. This cultivar was also found on Pick Island and, according to the locals, it originated from Australia and New Zealand. The unique characteristic of Dobo Tall is its big fruit size with 3.5 kg fruit weight, 1.2 kg husk weight, 417 g shell weight, 999 g water weight, 900 g kernel weight and 14.70 mm kernel thickness.
Mamuaya Tall

Mamuaya Tall was discovered in Wasian Village, Dimembe District, Minahasa Regency, North Sulawesi Province. ‘Mamuaya’ is the family name of the owner. This cultivar is high-yielding and has unique fruit component qualities. The fruit is round, with very thin husk and red. The number of nuts can reach up to 10 per bunch, with a kernel weight of 600 g and copra weight of 300 g per nut. Mamuaya Tall has the potential to produce 5-8 t copra/ha per year which is higher than the Mapanget Tall with only 3-5 t copra/ha per year.

Shinta Red Dwarf

Shinta Red Dwarf was found in Lirung and Melongoane Village, Sangir Taulad Regency, North Sulawesi Province, in May 2000. Its uniqueness is in the large size of the bole which is unusual compared to other dwarfs. Data collected showed that the girth at 20 cm above soil level is 168 cm, bigger than that of the local tall (139 cm). According to the owner, the palms begin flowering three years after planting. The fruit is small, round and red. Shinta Red Dwarf has potential as an ornamental crop.

Pink Husk Coconut

This cultivar got its name from the unique pink colour of the husk at the basal region of the fruits. It can be detected when the calix is removed or the husk at the basal region is sliced. This pink husk can be found in tall and dwarf types. In Molopatodu Village, Gorontalo Regency, it can be found on the brown dwarf (local name is Kelapa Kapal); the green tall (local name Si Bibir Merah) in Melongoane Village, Sangir Taulad; and the green dwarf in Timor Island, East Nusa Tenggara. Oil and water of the pink husk coconut are mainly used as traditional medicine such as for fever.

Canarium Coconut

Canarium coconut can be found in almost all the provinces but with very few populations. The unique characteristic of this type is the abnormal structure of the endosperm and the taste. This type is good for tender nut consumption and fruit cocktail. Most farmers are not keen on this type though because the structure of the endosperm makes it difficult to be processed to copra.

Kopyor Coconut

This type was found in Babo Village, Santong-bolang District, Bolaang Mongondow Regency, North Sulawesi Province and Palapi Village, Moutong District, Central Sulawesi in 1999. Its unique characteristic is the suckers which grow up from the surface near the base of the trunk of the main or mother plant. The first sucker appeared one year after planting the mother plant. The palm in Babo Village has eight suckers and three of them are producing fruits. The palm in Palapi Village has four suckers and each of them has produced fruits after reaching five years old. The suckering coconut has the potential to increase coconut production in the future either by normal plantation or tissue culture propagation to produce homogenous plants on the field.

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Ongoing Projects

20 Countries Conserve Coconut Germplasm to Ensure Diversity

ADB-funded Project: Coconut Genetic Resources Network and Human Resources Strengthening in Asia and the Pacific (Phase II)

Twenty countries are currently involved in several activities aimed at developing a sound environmental management of coconut genetic resources through sustainable conservation and utilization of the coconut.

The countries are China, Vietnam, Thailand, Malaysia, Indonesia, Philippines, Bangladesh, India, Pakistan, Sri Lanka, Fiji, Samoa, Papua New Guinea, Solomon Islands, Tonga, Vanuatu, Cook Islands, Kiribati, Tuvalu and the Marshall Islands. They are involved in the Asian Development Bank (ADB)-funded project to strengthen coconut genetic resources network and human resources in Asia and the Pacific region.

The rationale behind the project is that the disappearance of coconut genetic diversity would lead to the untimely loss of an important cash crop that has been the source of income for millions of poor coconut farmers worldwide. Its ability to produce a variety of products and its resilient and hardy nature set it apart from other crops, making it worthy of an international rehabilitation effort.

The 20 participating countries have collected and conserved coconut germplasm, and have submitted 1338 passport and characterization data to the Coconut Genetic Resources Database (CGRD). Five countries have conducted hybrid/varietal trials and two have established molecular markers to characterize their germplasm collections. Fourteen countries have conducted farmer participatory surveys to identify farmer’s varieties and multipurpose uses of the coconut.

Human resources strengthening was achieved through several workshops and training courses. Among them are the technical writing and public awareness, and data analysis course for 13 countries; in-country farmer participatory research course held in Bangladesh and Solomon Island; a standardized research techniques in data analysis course for the four Pacific island member countries, Cook Island, Kiribati, Marshall Island and Tuvalu; and embryo culture training for participants from Indonesia and Papua New Guinea.

During the third annual meetings of the ADB-funded project in Apia, Samoa and Manila, Philippines, the project leaders came up with several recommendations to further enhance the results of the project’s activities. They recommended the establishment of country networks for low temperature tolerant varieties involving China, Bangladesh, Pakistan, India and Sri Lanka; identification of the exact location of the varieties to be conserved, and number of plants to be considered for in situ conservation. They also proposed that forthcoming funds to support the national programmes should be tied with available permanent staff to ensure the project’s sustainability even after the external funding is terminated.

Increase in Yields and High-Value Products to Enhance Farmer’s Incomes

IFAD-funded Project: Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region

Fourteen countries are participating in the International Fund for Agricultural Development (IFAD)-funded project that aims to promote genetic resources conservation and use through increase in yields and enhance smallholders’ income through high-value products. The countries are China, Vietnam, Thailand, Malaysia, Indonesia, Philippines, Bangladesh, India, Sri Lanka, Fiji, Samoa, Solomon Islands, Tonga and Vanuatu.

Farmer participatory surveys have been conducted in each participating country to document farmer’s varieties and multipurpose uses of the coconut. A major finding of the survey is that the lack of knowledge of local farmers, especially the young ones, could lead to genetic erosion as they abandon the crop for more profitable ventures.

The Asian and Pacific Coconut Commission (APCC), the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) and COGENT have collaborated to evaluate the performance of 10-30year-old previously introduced hybrids and varieties at the farm level in 18 coconut-producing countries under different agro-climatic conditions. Their aim is to help national programmes identify high-yielding and adapted varieties.
Eight countries have undertaken research on the production of high-value products and identification of suitable varieties and hybrids. They include research on coconut palm sugar production, young tender coconut water and its by-products, and others which include rope/geotextiles, coconut shell handicraft and nata de coco. In India, for example, a coconut farmer could earn about US$1978 per hectare per year from the sale of tender nut, eight times the income from traditional copra product. In Thailand, an upgraded sugar production technology was packaged and introduced in three pilot sugar-making demonstration units in coconut farming communities.

The IFAD-funded project also looks at coconut-based farming systems as a way to increase farmers' incomes. Intercropping and animal grazing activities are being conducted by the Philippine Coconut Authority (PCA) to determine their financial and technical viability as a strategy to support the maintenance of a coconut genebank. Malaysia, China, Samoa and Tonga are also conducting similar activities.

Several recommendations were made during the third annual meeting for the IFAD-funded project held in Apia (Samoa) and in Manila (Philippines). The project leaders recommended that the technology generated from the IFAD-funded project should be disseminated not only to the farmers and growers but also to the traders or exporters, and to establish linkages with them; and that the variety to be distributed must be the improved ones to solve the seasonal low production of the existing coconut.

The representative from India specifically recommended that the coconut nursery programme in the country should be continued with focus on varieties such as Jappanan, Komadan, King Coconut and the Elite Tall, which are regarded by the local farmers as superior in nut yield, toddy yield and in tender nut production. He further reported that one production cum training unit in coconut-based food processing and one design cum training unit for handicrafts are to be organized to benefit the women in the coconut sector. Further, the project on tender nut marketing, which was proven to be effective in providing regular employment to the youth and women, will expand its target to 12 stalls per year.

So far, the technologies derived and the success achieved by the IFAD-funded project have been providing a viable and sustainable means of helping the coconut farmers to enhance their income and the quality of life of their family.

### Multilocation Trials to Identify Better Yield Hybrids in Latin America and African Countries

CFC-funded Project: Coconut Germplasm Utilization and Conservation to Promote Sustainable Coconut Production in Selected South American and African Countries

The five-year project funded by the Common Fund for Commodities involves three countries in Africa (Benin, Côte d’Ivoire, and Tanzania) and three in Latin America and the Caribbean (Brazil, Jamaica, Mexico). It aims to assist the six countries in identifying hybrids or varieties with better yields through multilocation trials.

The project consists of three components: 1) multilocation trials to identify suitable hybrids and varieties for Africa, Latin America and the Caribbean; 2) technology transfer to upgrade the capability of national coconut genetic research programmes; and 3) project coordination, management, supervision and evaluation.

The multilocation trial activities see the transfer of seednuts of six selected hybrids produced by the Marc Delorme Station in Côte d’Ivoire to the six participating countries. The selected Tall x Dwarf hybrids are Malayan Yellow Dwarf (MYD) x West African Tall (WAT), Malayan Red Dwarf (MRD) x Vanuatu Tall (VTT), Cameroon Red Dwarf (CRD) x Rennell Island Tall (RIT), and MRD x Taganan Tall (MRD x TAGT). The Tall x Tall hybrids are VTT x TAGT and Sri Lanka Tall (SLT) x TAGT. The countries have been urged to repeat the production and planting of seednuts in their respective fields to obtain an adequate number of better quality seedlings and ensure more reliable results of the trials.

The technology transfer component was initiated through training courses on standard research techniques on coconut breeding (“STANTECH”) in which 15 researchers from 15 countries participated; on collecting and conservation, involving 11 participants from seven countries; and on embryo culture, involving 14 participants from eight countries. The first project workshop was also conducted involving nine participants from nine countries.

The third component oversees, among other things, the signing of the Project Agreement between CFC and IPGRI, and the Memorandum of Understanding between IPGRI and the six participating countries.
The two-year project funded by the Department for International Development (DFID) of the United Kingdom involves 13 laboratories in 11 countries. It aims to refine the coconut embryo culture and acclimatization technology. The participating countries are Brazil, China, Cuba, France, India, Indonesia, Mexico, Papua New Guinea, Philippines, Sri Lanka and Tanzania. All, except for France, Brazil and Mexico, are funded by DFID.

Coconut production is decreasing worldwide owing to declining farm productivity which is caused by ageing of palms; natural calamities instigated by pests, diseases, typhoons and drought; lack of high-yielding and adapted varieties; and genetic erosion. The sustainability of coconut production depends on the availability of and access to coconut genetic diversity by coconut breeders and farmers to overcome some of the above major problems and to meet the various needs of the resource-poor coconut farmers. Sustainable development is being promoted through several R & D activities which use the results of the current DFID-funded project.

One of these activities is the collecting and conservation of coconut germplasm being conducted in 20 countries in the Asia-Pacific region through the financial support of the Asian Development Bank (ADB) and the coordinating efforts of IPGRI and COGENT. Similar initiatives are being planned for the Africa and Latin America regions. The constraints in this ADB-funded activity are the difficulty in collecting germplasm from distant and isolated islands, the bulky nature of the coconut and the high transportation expenses. Embryo culture offers a solution as it would allow the cheap transport of non-bulk embryos which could be grown into seedlings for transplanting on the field. The Philippines and Indonesia, for example, are already using this improved method to collect germplasm from their isolated islands.

Results of the DFID-funded project are also being used in the conservation and safe exchange of germplasm activity which is being realized through the establishment of the multi-site International Coconut Genebank (ICG). The ICGs’ host countries will conserve duplicates of important coconut germplasm for each region and share them with member countries for their breeding and/or replanting programmes. However, safe movement of germplasm to the ICGs and national programmes worldwide is constrained by quarantine restrictions on the transport of coconut seednuts or seedlings which are essential to curb the spread of new diseases. Embryo culture, as a method of propagation and exchange, could prevent the introduction of new diseases as disease transmission through embryo has not been reported or proven. Thus, serious diseases such as the Lethal Yellowing disease caused by phytoplasma found in many countries in Africa and the Latin America regions could be prevented from spreading through germplasm movement using the embryo.

Poverty alleviation is one of COGENT’s main thrusts as most of the coconut farmers are smallholders with very low income. A good example of how improved embryo culture technology can help alleviate poverty is through the Makapuno industry in the Philippines. Makapuno is a special type of coconut characterized by a soft, jelly-like endosperm rather than the normal solid endosperm (kernel) of other coconut varieties, and command three to five times the price of a normal coconut. Makapuno coconuts, nevertheless, are quite rare owing to the lack of true-to-type planting materials. It does not germinate in situ because of the abnormal composition of the endosperm. However, the Makapuno embryo could germinate and grow normally in vitro before transplanting to the nursery to produce the seedlings. An interesting advantage is that these embryo-derived Makapuno plants produce 100% Makapuno fruits compared to 14% from traditional palms. The Makapuno embryo culture protocol is being disseminated to 12 COGENT member countries.

Improved coconut embryo culture technology also benefits the IFAD-funded project in identifying and promoting suitable varieties for high value products. Products such as palm sugar, young tender coconuts and coir geotextile could increase the incomes of coconut farmers by three to four times. The embryo culture technology could help promote the exchange of promising germplasm among coconut-producing countries.
Institute for Research through Development (IRD)

The Institute for Research through Development (IRD), formerly known as ORSTOM, is a public-owned scientific and technology research establishment based in Montpellier, France. It undertakes research activities in the Africa and Indian Ocean, Latin America and Pacific regions. It has 35 offices or establishments in 26 countries located primarily in the tropical zone. The IRD conducts research activities in collaboration with higher learning, other French and international research institutions, and in projects supported by the European Union and other international scientific programmes.

Coconut Tissue Culture Programme – An IRD and CIRAD Collaboration

The IRD and the Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement (CIRAD) are two science and technology research agencies with three basic missions: research, consultancy and training. These are fulfilled by conducting scientific programmes focused on the relationship between humankind and the environment. The aim of all these programmes is to contribute to the country’s sustainable development. In this context, since 1982, the two institutes have been supporting a programme on coconut biotechnology.

Embryo rescue

The coconut in vitro culture programme is led by an IRD-CIRAD team under the joined authority of both institutes. Researches are orientated towards two main objectives: mastering coconut micropropagation through somatic embryogenesis; and the use of embryo rescue for solving problems encountered by the exchange and conservation of coconut germplasm. They are conducted in collaboration with some genetic improvement programmes developed by CIRAD and CNRA (ex-IDEFOR) at the Marc Delorme Station in Côte d’Ivoire.

Coconut clone

In vitro vegetative multiplication of high performing individual palms remains the only short- and medium-term hope for the production of homogenous planting material and for a substantial improvement in the productivity of plantations. Cloning also allows rapid multiplication of selected individuals that exhibit resistance or tolerance to important diseases and adverse growing conditions. Unfortunately, coconut is a highly recalcitrant species as far as tissue culture is concerned.

In 1982, IRD and CIRAD began their research activities, which was orientated towards somatic embryogenesis, which appeared to be the more promising technique for clonal propagation of the coconut. Different approaches are currently being developed to overcome the recalcitrant character of the palm involving phytohormones analyses in media culture and in tissue, use of histology, search for early protein markers, and study of the nutrition status of the seed during germination.

One of IRD’s missions is to develop research programmes under international collaboration. Related to this, IRD established facilities to train collaborating researchers on techniques developed by the IRD-CIRAD effort. In the past four years, 10 persons from PCA-Philippines, CICY-Mexico, CRI-Sri Lanka, and CNRA-Côte d’Ivoire have received training from IRD-CIRAD.

Coconut Embryo Culture Network Newsletter

The Coconut Embryo Culture Newsletter is a bi-annual publication of the Coconut Embryo Culture Network, which was established in October 1997 through funding from CGIAR-IPGRI, and COGENT. The Newsletter desk is headed by Ms. Erlinda Rillo and is based at the Philippine Coconut Authority-Albay Research Centre, Banao, Guinobatan, Albay, Philippines.

The third issue of the newsletter was published in June 2000. The issue highlights the reports of network members during the 2nd International Coconut Embryo Culture Workshop held at the Centro de Investigacion Cientifica de Yucatan (CICY), in Merida City, Mexico on 14-18 March 2000. A ‘how to’ technoguide on coconut embryo culture will be published based on the results of the workshop for use by COGENT member countries in collecting, conservation and exchange of coconut germplasm.

For copies of the newsletter, please contact:

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Coconut Food Recipes

Coconut is used in food preparations worldwide. In the South Asian countries, coconut is used daily in making curries and other delicacies. In Malaysia, a meal would not be complete without sweets or desserts using coconut.

COGENT is currently documenting coconut recipes from its 37 member countries that are used daily in the lives of the local communities. These recipes will be published as a Catalogue of Coconut Food Recipes.

You are welcome to submit your contribution of coconut food recipes to COGENT. The food items should be easy to make and the ingredients readily available. When sending your contribution, please include a good 3R photo of the finished product. Please submit them together with your full name, address, institute/organization, designation, telephone and fax number, and email address.

High - Value Coconut Products

To enhance the income of poor coconut farmers, alternative high-value products are needed to complement the traditional products such as copra that are losing their niche in the international market.

COGENT engaged a consultant to conduct a market survey to identify marketable alternative high-value products and to help identify suitable varieties based on assessment of their suitability for efficient processing of promising products. The technologies to produce the products are being documented and will be shared with member countries. Feasibility studies are now being conducted in Bangladesh, Indonesia, Papua New Guinea and the Philippines to introduce and test the viability of producing high-value products from the coconut husk (ropes, geotextiles, doormats, cocopeat, etc.) with the assistance of Vietnam, which has the experience in the fabrication of equipment and in the production and marketing of these products. These products will be documented as a Catalogue of High-Value Products.

You are welcome to submit your ideas concerning this activity and suggestions on high-value coconut products. If possible, please submit a good 3R picture together with the suggestions. Please submit them together with your full name, address, institute/organization, designation, telephone and fax number, and email address.

Contributions for the Feature Articles Column

The Feature Article column in the COGENT Newsletter highlights issues concerning the various sectors of the coconut industry. The articles include a comprehensive coverage of important coconut varieties, high-value coconut products and technologies to enhance the income of poor coconut farmers.

You are invited to contribute articles for the Feature Column of the COGENT Newsletter. The articles should touch on issues concerning the coconut industry, either at the national, regional or international levels. COGENT reserves the right to edit the articles for content and length. The articles should be 1500 – 2000 words, and, if possible, together with a good 3R picture related to the topic of the article. Please submit them together with your full name, address, institute/organization, designation, telephone and fax number, and email address.

This newsletter is published twice a year by the International Coconut Genetic Resources Network (COGENT).

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IPGRI Web News

Plant Genetic Resources in Europe

An information platform about Plant Genetic Resources in EUROPE has been launched on IPGRI web site. This platform covers various areas: information on National Programmes, Contacts, crops & species databases, Policy and Research, networks, publications, and external links... and is located @ http://www.ipgri.cgiar.org/regions/europe/home.htm

Geneflow 1999 in Spanish

Electronic versions of Geneflow 1999, a publication about the earth’s plant genetic resources are now available in 3 languages on IPGRI web site. Articles may be consulted individually in English, French or Spanish, and searched by keyword. Access electronic versions of Geneflow 1999 @: http://www.ipgri.cgiar.org/system/page.asp?frame=geneflow/geneflow.asp

Pgr Bulletin 3 - December 2000

IPGRI pgr bulletin, a quarterly news sheet providing up-to-date information on IPGRI activities to donors and policy makers is provided online. For the last issue in electronic format visit IPGRI Web site @: www.ipgri.cgiar.org/system/page.asp?frame=pgr/pgr.asp?nb=3

Bibliographic References

EUFORGEN Bibliographic Database is now online. This database contains bibliographic references provided by Network members and that relate to the species covered by the Networks themselves. It currently offers almost 1000 references on gray literature related to the conservation and use of Forest Genetic Resources. To search a reference visit: www.ipgri.cgiar.org/networks/euforgen/Biblio/select.asp

What’s New @

www.ipgri.cgiar.org/system/page.asp?frame=institute/whatsnew.htm

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