Coconut is the most important palm of the humid tropics with over 11 million hectares planted to the crop in 86 countries. About 96% of the crop is grown by resource-poor smallholders. In addition to the traditional products of copra, coconut oil and copra meal, coconut has the ability to produce a wide variety of food and environment friendly non-food products which are used domestically and exported. In some countries, coconut is the only source of foreign exchange earnings. Coconut has also been a stabilizing factor in the farming systems of marginal and environmentally fragile environments.

Despite the above potential of coconut, farmers are suffering due to declining yields and decreasing farm productivity. These are caused by ageing palms which need to be replanted with better varieties, natural calamities such as pests and diseases, drought, and typhoons. There is a need to develop improved varieties with high yields and adaptation, and varieties that provide high-value products in order to increase the income of coconut farmers and promote sustainable coconut production. An essential requirement to achieve this objective is the availability and use of a wide range of diversity from around the world as varietal or germplasm introductions in replanting or breeding programmes. Several constraints hinder the attainment of this objective. Firstly, genetic erosion or the loss of important coconut germplasm in coconut-producing countries is occurring at a rapid rate due to the inability of many coconut-producing countries to collect and conserve precious germplasm which are threatened by natural calamities, urbanization and shifts to other crops. Secondly, few countries have the capacity to effectively characterize and evaluate the field performance of conserved germplasm, and share this data with other countries to help them identify suitable germplasm for their breeding work. Lastly, many countries do not have the capacity to exchange disease-free accessions with other coconut-producing countries due to the tedious nature of germplasm export clearances and lack of disease indexing capability in many countries.

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In order to remedy the above constraints and safeguard the future of the coconut industry and its smallholder beneficiaries, COGENT is establishing an International Coconut Genebank (ICG). In its first meeting in 1992, the COGENT Steering Committee proposed the establishment of a multi-site International Coconut Genebank (ICG) consisting of a regional genebank in each of the five COGENT 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 countries members of each region.

Subsequently, consultations, site suitability evaluations and pest risk assessment were undertaken, and Indonesia, India, Papua New Guinea, Côte d'Ivoire, and Brazil were identified as suitable countries to host the ICG in their respective regions.

The Memorandum of Agreement (MOA) to host the genebank is signed by IPGRI on behalf of COGENT, the United Nation’s Food and Agriculture Organization (FAO) as trustee, and the governments of each of the host countries. Under the MOA, the ICG host country places the conserved (designated) germplasm in the ICG under the auspices of the FAO as part of the International Network of Ex Situ Collections provided for in Article 7 of the International Undertaking on Plant Genetic Resources; holds the designated germplasm in trust for the benefit of all countries; commits not to claim legal ownership over the designated germplasm, nor seek intellectual property rights over that germplasm or related information, and requires similar commitments from any further recipients; manages and administers the designated germplasm in accordance with internationally accepted standards, and remains responsible for financing the maintenance of the designated germplasm. COGENT will collaborate with the host countries to develop proposals and generate funding for the cost of germplasm establishment, research, training, complementary conservation, and germplasm exchange activities. Facilities for pollen and embryo processing, disease indexing and training of researchers in relation to the above. The ICG will conserve nationally, regionally and internationally identified diversity; further assess the diversity, evaluate the field performance of the conserved germplasm and disseminate related information to other coconut-producing countries; make available germplasm materials to interested countries in accordance with the existing protocols; and conduct research and training in relation to the above.

The site for the ICG-South-East and East Asia (SEA) is Sikijang, Pekanbaru, Riau, Indonesia. Several activities have been initiated. To strengthen the ICG-SEA, the ADB-funded project of IPGRI is assisting the Research Institute for Coconut and Palmae (RICP) in germplasm collecting in several islands. It is also assisting RICP through the DFID-funded research project to refine the embryo culture technology, which will be used for exchange of germplasm among countries.

In India, the ICG-South Asia is located at the Central Plantation Crops Research Institute (CPCRI) seed farm in Kidu, Karnataka. Regeneration of selected accessions from the World Coconut Germplasm Center in the Andamans and from CPCRI, Kasaragod is underway. Twenty-five hectares will be cleared for planting in 2000 – 2001.

The ICG for the South Pacific is located at the Stewart Research Station in Madang, Papua New Guinea. The ADB- and DFID-funded projects of IPGRI are assisting PNG to refine the embryo culture technology. The materials to be introduced from other countries of the South Pacific will be received through embryo culture once the facilities have been developed and the quarantine requirements are addressed.
Strengthening COGENT capability

One of the objectives of COGENT is to strengthen the capability of members to undertake network projects. We are pleased to inform our network members and readers that with the help of country members, partner institutions and donors, IPGRI and COGENT were able to support the following activities in the last six months. Fifty-three country research projects worldwide were conducted in the areas of germplasm collecting and evaluation, embryo culture technology refinement, and farmer participatory research to identify multipurpose uses of the coconut and farmers varieties. To enhance the capability of researchers to analyze and report their data, two training courses were conducted namely, one on data analysis which courses were participated by 37 researchers from 16 countries, and another on technical writing, seminar presentation and public awareness for coconut researchers. To help researchers link germplasm conservation with income generation, a consultant was engaged to conduct a survey of marketable high-value coconut products and suitable varieties for these products. To provide better guidance to researchers in their collecting activities, a consultant was engaged to evaluate COGENT’s germplasm collecting strategy. To ensure the disease safety of the International Coconut Genebank (ICG), two other consultants were engaged to conduct pest risk assessment of the ICG for Africa and LAC regions and for the Asia-Pacific. COGENT was also able to support two technical assistance missions to conduct site suitability evaluation of ICG-Africa and ICG-LAC.

Three major decisions of the COGENT Steering Committee will have tremendous impact for strengthening the network. First, the decision to place the International Coconut Genetic Resources Database in the public domain will provide access to the passport and characterization data of the existing 1223 accessions which are conserved in 18 countries so that coconut breeders could efficiently select appropriate germplasm for their breeding work. The second is the decision to endorse IPGRI’s plan to sign a Memorandum of Understanding with COGENT member countries to formalize their membership in COGENT and enhance sustainable support to the network. And lastly, the decision to formulate a COGENT Strategic Plan for 2000-2004 will enable COGENT to develop an action plan to effectively implement its mandate to conserve and utilize coconut genetic resources to benefit resource-poor coconut farmers.

The above activities are featured or mentioned in this issue of the COGENT Newsletter. We welcome comments and suggestions from readers of this publication.

(Continued From Page 2)

In Côte d’Ivoire, the collections of the Marc Delorme Station Cocotier of the National Agronomic Research Center (CNRA) in Port Bouet was designated by the Côte d’Ivoire government as the ICG-Africa and the Indian Ocean (AIO). Extension site at the Grand Drewin Experimental and Production Station of CNRA in Sassandra has also been proposed and found to be suitable. Plans are underway to assist the ICG-AIO to develop its embryo culture capability and to regenerate old palms of accessions to be replanted.

Brazil has offered to host the ICG – Latin America and the Caribbean (LAC). The proposed sites in Itaporanga, west of Aracaju and Neopolis Plateau, northeast of Aracaju, have been evaluated and found suitable. COGENT is currently assisting Brazil to develop its embryo culture capability.

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The ICG is envisioned as an effective mechanism for the conservation and evaluation of important regional varieties and for the safe exchange of germplasm. However, it is important that its sustainability is assured. The following steps form the strategy to ensure the sustainability of the ICG: 1) under the MOA, the host country will provide the germplasm maintenance costs whereas the costs of germplasm establishment, evaluation, use and exchange, and research and training are to be externally sourced; 2) negotiation with the host country is underway to plow back incomes from the ICG to support its operation; 3) proposal that countries which request germplasm from the ICG will be charged for the cost of producing the material and some prorated maintenance cost; 4) host countries to plant high-yielding varieties in additional areas to generate income, provided it does not prejudice the health of the conserved germplasm in the ICG; 5) the ICGs will produce and market high-value products; and 7) whenever feasible, the ICGs and COGENT will generate funds for research and training activities in the ICGs so that the projects can share the costs of common activities needed for general maintenance.

COGENT has 35 member countries which are committed to sustain coconut production to benefit their resource-poor coconut farmers. The ICG is a step in this direction. The project is a difficult but challenging undertaking that requires the support of the CGIAR, partner institutions and donors.
The Steering Committee (SC) of the International Coconut Genetic Resources Network (COGENT) determines programme priorities and oversees the various COGENT activities. The SC is composed of ten representatives from COGENT's 35 member countries, plus the representative of the Asian and Pacific Coconut Community and the COGENT Coordinator, serving as the two non-voting members. The current members are two each from the five COGENT sub-networks, namely, Southeast and East Asia (Dr. Pasril Wahid, Director General, Forestry and Estate Crops Research and Development Agency, Indonesia, and Mr. Carlos B. Carpio, Deputy Administrator, Philippine Coconut Authority, Philippines); South Asia (Dr. U.P. de S. Waidyanatha, Chairman, Coconut Research Institute, Sri Lanka, and Dr. S.P. Ghosh, Deputy Director General, Indian Council of Agricultural Research, India); South Pacific (Mr. Tom Osborn, Agriculture Adviser, Secretariat of the Pacific Community, Fiji, and Mr. Samisoni Uilitu, Deputy Permanent Secretary, Ministry of Agriculture, Fisheries and Forests, Fiji); Africa and the Indian Ocean (Dr. Pierre Yavo N'Cho, Director, Station de Recherche Marc Delorme, Centre National de Recherche Agronomique, Côte d'Ivoire, and Dr. Alois K. Kullaya, Director, Station de Recherche Agronomique pour le Développement, CIRAD). It was officiated by Professor Duong Tan Phuoc, Assistant Minister in the Ministry of Industry, Vietnam. In his welcoming speech, Prof. Duong expressed his hope that the meeting would be successful and that good decisions made will enhance the incomes and living standards of coconut smallholders in the region.

The meeting reviewed the progress of ongoing and proposed projects, and activities of COGENT, the progress of the five COGENT regional sub-networks and the support provided by IPGRI and collaborating partner institutions. It also discussed the draft COGENT Strategic Plan for 2000-2004 and formulated COGENT’s Work and Action Plan for 2000.

The 8th Steering Committee meeting made the following decisions:

1. Noted the 8-year COGENT progress report of the Coordinator and expressed appreciation for the tremendous progress made by the network.
2. Noted the report of IPGRI and its Programme Planning and Review Committee (PPRC) which complimented COGENT on the excellent results achieved in the last three years; the recommendations of the PPRC for further enhancing the efficiency of project implementation; and thanked IPGRI for its continued technical, financial and administrative support to COGENT.
3. Noted with appreciation the reports of the Asian and Pacific Coconut Community (APCC) and the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP); and expressed its gratitude for the excellent collaboration in areas of mutual interest. It noted that this collaboration has resulted in desirable complementation and synergy of research activities among the three organizations, which is much appreciated by COGENT member countries and donors.
4. Noted the progress in the implementation of the COGENT regional sub-networks for Southeast and East Asia, South Asia, South Pacific, Africa and the Indian Ocean and Latin America and the Caribbean; and decided to accelerate further development of the last two sub-networks through the leadership of the Steering Committee members from these regions and the COGENT Coordinator.
5. Noted with satisfaction the successful implementation of the following ongoing projects:
   a. ADB-funded project involving 20 countries in the Asia Pacific entitled “Coconut Genetic Resources Network and Human Resources Strengthening in Asia and the Pacific (Phase II)”.
   b. IFAD-funded project involving 14 countries in Asia Pacific entitled “Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region”.
   c. DFID-funded embryo in vitro culture project involving 13 laboratories worldwide entitled “Improvement of In Vitro Techniques for Collecting and Exchange of Coconut (Cocos nucifera L.) Germplasm”.
   d. CFC-funded multilocation hybrid and varietal trials project involving three African countries (Benin, Côte d’Ivoire and Tanzania) and three LAC countries (Brazil, Jamaica and Mexico).
6. Noted the progress made by the International Coconut Genetic Resources Database (CGRD) project; and requested CIRAD to make provision in the CGRD to add data on molecular markers.

COGENT’s 8th Steering Committee Meeting was held on 20 – 22 September 1999 in Ho Chi Minh City, Vietnam. The meeting was attended by the SC members and representatives from partner institutions, namely, Mr. Francois Rognon, Director, Bureau for the Development of Research on Tropical Perennial Oils Crops (BUROTROP); and Mr. Andre Rouziere, Head of the Coconut Programme, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD). It was officiated by Professor Duong Tan Phuoc, Assistant Minister in the Ministry of Industry, Vietnam. In his welcoming speech, Prof. Duong expressed his hope that the meeting would be successful and that good decisions made will enhance the incomes and living standards of coconut smallholders in the region.

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6. Noted the progress made by the International Coconut Genetic Resources Database (CGRD) project; and requested CIRAD to make provision in the CGRD to add data on molecular markers.
7. Endorsed the recommendation to place the CGRD data into the public domain, created an advisory task force and requested IPGRI to further advise COGENT on any current and future policies that might affect the effective implementation of this decision.

8. Noted with gratitude the progress on the establishment of the multi-site International Coconut Genebank (ICG) and the signing of hosting agreements by the Governments of India, Indonesia, Papua New Guinea and Côte d’Ivoire. Likewise noted with gratitude the generous local funding contribution provided by the Government of Indonesia for the ICG-Southeast Asia.

9. Endorsed further negotiations for Brazil to host the International Coconut Genebank for Latin America and the Caribbean and requested Coordinator to liaise with EMBRAPA to further clarify issues on derivatives and current laws affecting intellectual property rights.

10. Agreed to support the decision of 15 countries in the Asia Pacific region to initially provide 178 coconut accessions to the three ICG host countries to be conserved and shared with COGENT member countries.

11. Noted the conduct of the site suitability evaluation of the additional genebank site for Côte d’Ivoire and the proposed ICG sites for Brazil. Also noted the conduct of a pest risk assessment of the ICG host countries and the planned development of a quarantine manual for the operation of the ICGs.

12. Tasked the Coordinator to coordinate with the Central Plantation Crops Research Institute (CPCRI) of India to check if the accessions previously obtained from Guam is safe from the Tinangaja disease; and to take remedial action if needed.

13. Agreed to finalize the consultancy reports on the collecting strategy, ICG site suitability evaluations and pest risk analysis after further comments by SC members; the coconut product marketing and processing survey after additional data input from member countries; and develop appropriate implementing activities and interventions on relevant recommendations.

14. Approved the holding of the second International Coconut Embryo Culture Workshop in Mexico in March 2000 to further upgrade the embryo culture technology, identify research gaps and formulate further research as required.

15. Approved the holding of the training course on embryo culture technology in the Philippines in October 2000 to train countries on the use of the upgraded technology in germplasm exchange.

16. Approved the holding of the second workshop of the CFC-funded multilocational trials project in Jamaica or in any alternative site in March 2000.

17. Requested designated task forces and partner institutions (BUROTROP, APCC and CIRAD) to finalize research project proposals on screening for drought tolerance, coconut breeding, molecular markers somatic embryogenesis, cryopreservation and ICGs within the first half of 2000 so that the said proposals can be submitted to appropriate donors.

18. Agreed to accelerate support for Africa and the Indian Ocean and Latin America and the Caribbean and to accelerate finalization and submission of project proposals and initiation of activities to implement this decision.

19.Created a task force to review the technical, economic and ecological aspects of coconut-based farming systems, to identify research and policy gaps and formulate recommendations for needed interventions for maximizing benefits to coconut farmers.

20. Requested the COGENT Coordinator to identify suitable venues and hosts and make suitable arrangements for the holding of the annual project meetings of the ADB- and IFAD-funded projects in 2000.

21. Accepted the invitation of the Government of India to hold the 9th Steering Committee annual meeting in July 2000 in Bangalore or Cochin, India, preceding the proposed International Coconut Conference to be held in the same locality.

22. Co-sponsor with APCC and BUROTROP the International Coconut Conference (ICC) in July 2000, in either Bangalore or Cochin, India with the aim to assess the status of R & D in the coconut industry and to identify appropriate interventions to promote benefits to resource-poor coconut farmers in the 21st century.


24. Endorsed the suggestion of IPGRI to sign a Memorandum of Understanding with COGENT member countries to formalize their membership in COGENT and further enhance sustainability of network support by COGENT member countries.

25. Decided to develop further strategies to make COGENT a sustainable network and to continue discussions on the development of specific activities to implement this decision.

26. Agreed to finalize the draft COGENT Strategy 2000-2004, after receiving comments from the SC members.

27. Elected Côte d’Ivoire as the Chair and the Philippines as the Vice-Chair of the COGENT Steering Committee for 2000-2001 and tasked the COGENT Coordinator to request elected countries to officially nominate designated representatives for these posts.

28. Developed a Work and Action Plan for 2000 to monitor the implementation of the above decisions of the COGENT Steering Committee.
COGENT Steering Committee

COGENT Steering Committee for 2000 – 2001

Below are five members of COGENT Steering Committee 2000 – 2001. The remaining members will be featured in the next issue.

Mr. Carlos Carpio is Deputy Administrator at the Philippine Coconut Authority (PCA), Philippines. He received his Bachelor of Science in Agriculture from the University of the Philippines, Los Baños, Philippines, and a MSc. in Plant Genetic Resources Conservation and Utilization from the University of Birmingham, England. Before assuming his current position, Mr. Carpio was Senior Science Research Associate and Department Manager with the PCA’s Davao and Albay Research Center, respectively. He is also active in various other activities including as project leader of PCA-Australian Centre for International Agricultural Research project on cadang-cadang; Coordinator of PCA-German Tissue Culture Project; Chairman of Bicol Consortium for Agricultural Research and Development (BICARRD); and project coordinator on PCA-IPRI Project on Survey and Pathogenicity Testing of CCCVId-related and Viroid-like RNA’s in Coconuts within the Philippines. He is also the designated Country Coordinator for COGENT activities.

Mr. Samisoni Uliitu received his early and tertiary education in Fiji and went to England for his post graduate studies. He joined Fiji’s government service in 1969 and is currently the Deputy Permanent Secretary in the Ministry of Agriculture, Fisheries and Forests. Mr. Uliitu has also attended various agriculture-related courses both locally and overseas. He is the National Liaison Officer for the APCC since 1993 and has actively participated in its activities.

Dr. U.P. de S. Waidyanatha obtained his Bachelor and Master degree in Botany from the University of Ceylon, in 1963 and 1967, respectively. He went on to receive his PhD in Plant Physiology in 1973 from the University of London. Dr. Waidyanatha worked as a researcher with the Tea Research Institute (TRI) and Rubber Research Institute (RRI) during the period of 1964 to 1979. He was an agronomist with the International Institute of Tropical Agriculture in Sri Lanka in 1981 before he joined the University of Hohenheim, Germany after securing a senior Post-doctoral Fellowship Award under the Alexander von Humboldt Foundation. Dr. Waidyanatha was Head of the International Winged Bean Institute in 1983 - 1986, a consultant to the World Bank - IICA project on the development of rubber, the FAO on rubber production in Bolivia, and for the ADB on crop production in Sri Lanka. From 1989 to 1998, he was Director of the ADB-funded Perennial Crop Development Project in Sri Lanka. He is currently the Chairman of the Coconut Research Board and also Adviser on Agricultural Planning to the Ministry of Finance and Planning. Dr. Waidyanatha’s research spans the field of plant physiology, soil microbiology and tropical crop production systems. He also has an extensive experience as an extensionist.

Dr. P.G. Punchihewa is the Executive Director of the Asian and Pacific Coconut Community (APCC). He received a Bachelor in Arts from the University of Ceylon in 1959 and a Diploma in Rural Social Development from the University of Reading, United Kingdom. He received his Doctor in Philosophy from the University of Sri Jayawardenapura, Sri Lanka in 1994. Before his current position with the Asian and Pacific Coconut Community (APCC), Dr. Punchihewa held various positions in the Government of Sri Lanka including a stint with the Ministry of Coconut Industries and the Coconut Development Authority, Sri Lanka, as Secretary and Chairman, respectively. He is a prolific writer with various publications to his credit, including children’s books, and a freelance writer for newspapers in both Indonesia and Sri Lanka.

Dr. Alois Kullaya received his BSc. and MSc. in Agriculture (Plant Breeding) from the Institute for Tropical Agriculture, Karl Marx University, and his PhD. in Plant Breeding from the Institute for Tropical Agriculture of the Technical University, Germany. Before his current position as Director of the Mikocheni Agricultural Research Institute, Dr. Kullaya was a plant breeder and national coconut research coordinator with the Ministry of Agriculture and National Coconut Development Programme (NCDP), Tanzania, respectively. He has also served as a contact person for the German Agency for Technical Cooperation (GTZ) at the NCDP. Dr. Kullaya is also a member for several committees including the Cashew Research Steering Committee (CRSC); Research and Development Advisory Committee on Agriculture and Livestock Development under the Tanzanian Commission for Science and Technology (COSTECH); Eastern Zone Technical Committee and as Board member and Vice-Chairman of the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP).

Dr. Evandro Almeida Tupinamba received his Bachelor of Science degree and Master of Science in Agronomy in 1970 and 1976, respectively. He worked in the area of rural extension in 1971 - 1972, and in genetic resources (bean and cassava) from 1973 to 1988. Dr. Tupinamba began his involvement in the area of coconut development in 1989. His professional activities are linked to the Coconut Genetic Resources Network. He is also Head of the Coconut Germplasm Bank and project leader of the Brazilian Multilocation Trials funded by the CFC.
Several seminars and courses were conducted in the second half of 1999. A seminar on the "National consultation on research, development and extension priorities in agriculture, fisheries, forestry and natural resources (2000-2004)" was conducted on July 20-21, 1999 in Manila, Philippines. A paper on "Research and development agenda for 2000 – 2004" was presented to coconut farmers’ organizations, state universities and colleges, local government units, private/industry sectors and policy makers.

A training workshop on “Technical writing, seminar presentation and public awareness” was held on 30 August 1999 – 4 September 1999 at SEARCA, Los Baños, Laguna, Philippines. It was followed by the “Coconut data analysis” training course on 6-10 September 1999. Both training courses were organized by IPGRI/COGENT in collaboration with the Philippines Coconut Authority.

Under the ADB-funded project, activities on characterizing in situ and collecting germplasm of three accessions each from Lombok Island, West Nusa Tenggara and Bacan Island, Indonesia, were conducted from April 1998 to July 1999. From August 1999 to March 2000, exploration will be continued in Sula Island, Molucabs and North Sulawesi Province, followed by characterization of existing accessions (Mapanget, Bone-Bone and Pakuwon ex situ collections). Collecting of embryos from five coconut accessions, culturing the embryos, acclimatization in screenhouse, and preparation of chemicals and other consumables are being conducted from August 1999 to March 2000 under the project, “Strengthening the embryo culture capability of the ICG for Southeast and East Asia.”

For August 1999 to July 2000, transfer of technology for tapping sap and sugar-making, determining socio-economic benefit and the development of strategy for farmer associations in sugar production and marketing will be continued under the IFAD-funded project. Farmer participatory survey was conducted in North Molucabs and North Sulawesi in August 1999.

In Malaysia, more germplasms are being collected under the ADB Phase 2 project, especially from the state of Kelantan and Terengganu where earlier collections did not survived, and from drought areas in Sabah to conserve drought tolerant populations/ecotypes. Besides these collecting activities, characterization of the existing germplasm collections in MARDI Hilir Perak and in the Department of Agriculture, Sabah are being conducted. Under the IFAD project, farmer participatory researches (FPR) have been conducted in three selected coconut-growing areas.

Under the ADB-funded project, surveys to identify young tender coconut ecotypes for characterization and conservation have been conducted since January 1998 in 10 provinces around Bangkok and in the south. The dominant variety was mainly Nam-hom. The other varieties were planted in small farms throughout the provinces. Pre-prospection surveys have been conducted more intensively in Chumphon and Prachaubkirikhan. Characterization has also been done, and thirty nuts of each of the four ecotypes collected were germinated.

Farmer participatory surveys have been conducted in Chumphon, Pathalung, Pichit and Samutsakorn province. It was discovered that the farmers prefer Sawi –1 (hybrids distributed by Chumphon Horticulture Research Centre (CHRC)) than the others for its sugar because of low trunk, early bearing, high production and reliable supply of seedling from CHRC. Technologies for sap production have also been reviewed and refined, and have been transferred to farmers. Training courses have been conducted both at CHRC and at farmer sites.

**South Asia**

Sri Lanka became the first country under COGENT Germlasm Exchange Programme to initiate germplasm exchange within a sub-network by providing germplasm of three indigenous tall coconut cultivars to Pakistan. The Coconut Genetic Resources Database (CGRD) has been updated with the recently acquired computer facilities, under ADB-IPGRI funding. Passport and characterization data of 62 accessions were obtained. Sixteen and 18 populations collected during the ADB Phase I project were planted in the field genebank in December 1997 and March 1998, respectively. In Phase II of the ADB project, germplasm collecting activities from non-traditional coconut growing areas have resulted in the collection of ten accessions during the first half of 1999.

Sri Lanka has also prioritized and expanded its activities on the characterization of drought tolerance in coconut using randomly amplified polymorphic DNA (RAPD) molecular marker, in vitro glycol tolerance of embryo cultured plantlets, and other physiological techniques. The primary objective of this work is to develop a drought tolerance index.

Identification, collecting, multiplication, and in situ conservation of King coconut germplasm and development of techniques to improve the shelf life of King coconuts for the export market were undertaken under the IFAD-funded project. A technology package has now been developed to enhance shelf life up to 28 days enabling sea freight. A farmer participatory survey, involving 15 farmer organizations, was conducted to identify multipurpose uses of coconut, suitable varieties for different uses and production constraints. The survey covered the five main coconut-growing districts.

Under the ADB Phase 2 project, 49 collection sites have been identified in major coconut-growing areas of

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1. *Deputy Administrator, Philippine Coconut Authority (PCA), Philippines.*
One of the major issues affecting the progress of coconut activities in the South Pacific region is the lack of training for technical staff. In order to address this problem, several training workshops for the South Pacific were conducted in 1998 and 1999.

The Secretariat of the Pacific Community (SPC) in Suva, Fiji, hosted a training workshop on 3 - 7 August 1998, on “Computer use, documentation and data analysis for the South Pacific”. Participants included technical staff from Fiji, Papua New Guinea, Samoa, Tonga and Vanuatu. The workshop was funded by the Asian Development Bank (ADB), COGENT/IPGRI, the Pacific Regional Agriculture Programme of the European Union, Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) and SPC. Resource persons included Mr. Paul Queck of IPGRI, Mr. James Blatta of Agronomix Software, and Mr. Jean-Pierre Labouisse of CIRAD/VARTC. The training covered general software use of Microsoft Office, Word and Excel. In-depth training was also provided on accessing and using the Coconut Genetic Resources Database (CGRD), the use of Agrobase software, and statistical analysis of data from CGRD using Agrobase. This training has proven to be very useful to the participants in the implementation of the Coconut Genetic Resources Network for the Asia and the Pacific Region (CGRNAP) project.

The Vanuatu Agriculture Research and Training Centre (VARTC) hosted the STANTECH training course on the collecting and management of coconut genetic resources on 29 June – 10 July 1999. The participating countries included Cook Islands, Kiribati, Marshall Islands and Tuvalu. The training was part of the ADB-funded CGRNAP Phase 2. It was the first activity of the project, “Coconut germplasm collection, characterization and conservation” in Cook Islands, Kiribati, Marshall Islands and Tuvalu. The resource persons included Mr. Jean-Pierre Lambouisse of CIRAD/VARTC, Mr. Tiata Sileye, Mr. Godefroy Buletare, Mr. Pierre-Chanel Watas, and Mr. Jean-Pierre Tabinusu.

The training course focused on coconut genetic resources collecting strategy, the collecting process and the methods of characterizing coconut varieties. The participants were trained to gather characterization data with the STANTECH Manual as a guideline through practical exercises in the VARTC field genebank and in the nursery. Participatory Rural Appraisal Survey on coconut diversity and uses was conducted during a field trip to a village. The participants were also trained to use the International Coconut Resources Database (CGRD), Passport and characterization data collected in the VARTC genebank and during the field trip were analyzed using computer spreadsheets and results were entered into the CGRD.

*1 Agriculture Adviser, SPC, Fiji*

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**South Pacific**

*Tom Osborn*

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**Africa and the Indian Ocean**

*Alois Kullaya*

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The Mikocheni Agricultural Research Institute (MARI) of Tanzania is collaborating with institutions from other countries in the development of improved and standardized embryo culture and acclimatization techniques. The activities include validating the best available protocols in comparison to the currently used protocol at MARI; studying the physiological and histological integrity of roots and leaves of parallel grown embryos and seednuts in vitro and in situ, respectively; establishing the main in vitro conditions and practices that lead to physiological and histological malfunctioning of plantlets in vitro and ex vitro; correlating the research findings of the study to the survival rate in vitro and ex vitro; and improving plantlet recovery in vitro and ex vitro.

Three varieties, Malayan Yellow Dwarf (MYD), a local dwarf - Pemba Red Dwarf (PRD) and the local East African Tall (EAT) were used in the validation of five established protocols. Sixty embryos were cultured in vitro for each test variety and protocol. The protocols used were those of CPCRI (Central Plantation Crops Research Institute), UPLB (University of Philippines at Los Baños), PCA (Philippine Coconut Authority), IRD (International Coconut Research for Development) previously known as ORSTOM, and MARI (Mikocheni Agricultural Research Institute).

Seednut production of the six hybrids as multi-site controls in Côte d’Ivoire and of the local hybrids/varieties in three African (Tanzania, Côte d’Ivoire and Benin) and three Latin American (Jamaica, Brazil and Mexico) countries had started in 1997. To date, each participating country has already received and sown in the nursery 150 seednuts of each multi-site control. Field planting is expected to take place between end of 1999 and early 2000. However, some countries are likely to experience shortage of seedlings due to poor germination and relatively high mortality rate for some of the imported hybrids. For instance, about 20% of the seednuts received in Tanzania had either germinated, rot, or had no liquid endosperm.

Another activity is the application of DNA marker technology for germplasm characterization and breeding. The general objective of this research is the development and use of DNA marker technology for the evaluation of the
Brazil, Jamaica and Mexico have received about 900 seednuts each of four dwarf x tall and two tall x tall hybrids from Marc Delorme Station, Côte d’Ivoire in early 1999. Plantlets of national hybrids and/or varieties are being prepared for the CFC-funded project, entitled “Coconut germplasm utilization and conservation to promote sustainable coconut production”. Multilocation trials are also being established in Benin, Côte d’Ivoire and Tanzania.

At the 7th COGENT Steering Committee Meeting held in Papua New Guinea in November 1998, Brazil presented the proposal to host the International Coconut Genebank (ICG) for Latin America and Caribbean. In April 1999, COGENT’s site suitability evaluation task force went to Brazil to evaluate the potential ICG sites. A project funded by Brazilian government was recently approved as a counterpart for the ICG in the region. The Brazilian Agricultural Research Corporation (EMBRAPA) has also obtained clearance of the identified ICG site of 50 hectare irrigated area from the Government of Sergipe State.

Another project was also approved for coconut prospecting and collecting in Northeast region and activities were initiated in August 1999.

In April 1999, Costa Rica organized a coconut seminar, with the participation of COGENT Coordinator and representatives from Costa Rica, Cuba, Mexico and Honduras. In this meeting, the project proposal for coconut development in Latin America and the Caribbean was presented and discussed, with the participation of COGENT, IICA and BUROTROP. Some suggestions were made to enable ICA to revise the proposal. One of the conclusions of this event was the necessity to increase aggregate value of coconut through high value coconut products. A training programme on processing is scheduled for next year in Cuba.

Selected embryo culture laboratories in Cuba, Brazil and Mexico are participating in the project “Improvement of in vitro techniques for collecting and exchange of coconut germplasm”, funded by the Department of International Development (DFID) through COGENT.

Bangladesh. Passport data as well as characterization data of ten populations have also been completed. It is reported that Bangladesh now produces about 100 million nuts annually of which 40% is consumed as tender nuts. In view of this trend, the IFAD project would promote tender nut consumption, characterize the most suitable varieties to be used as tender nuts, and establish mechanism for their in situ conservation.

In Pakistan, under the ADB Phase 2 project, a survey of germplasm in 30 farms in Karachi, Thatta and Balochistan was completed. Breeding activities at Garkho Forest has been initiated to produce Tall x Tall crosses. A survey of coconut diseases and pests revealed the presence of root wilt, bole rot, bud rot, and leaf blights. In the areas of Karachi, Thatta and Sakran, symptoms resembling that of the lethal yellowing disease have been observed.

In India, forty-nine accessions were collected from Lakshadweep, Andaman and Nicobar, West Bengal and Orissa, under the ADB Phase 2 project. Passport data of accessions made in ADB Phase 1 have been submitted to CGRD. Under the IFAD project, a farmer participatory survey covering 198 households in the Kerala State to identify ecotypes with multiple uses and promote income-generating opportunities using special ecotypes was completed. Eight coconut nurseries have been established and 5200 seedlings have been distributed to farmers.

Cuba and Max Plant Institute have submitted a proposal for a project to evaluate coconut biodiversity using molecular markers and develop molecular diagnosis methods for lethal yellowing studies in Cuba due to begin in January 2000. The Portuguese version of the STANTECH Manual is being finalized and will be published by COGENT. A partnership of EMBRAPA/CENARGEN has started the characterization of coconut accessions using molecular markers.

Centro de Investigacion Cientifica de Yucatan (CICY) has established in its home page (http://www.cicy.mx/dir_acad/cicy/CICLY01.html), the Centre for Information on Coconut Lethal Yellowing (CICLY), a virtual discussion list about the lethal yellowing disease of coconut caused by phytoplasma.

1 Head of Coconut Germplasm Bank, EMBRAPA, Brazil
2 Deputy Director, Instituto Investigaciones de Citricos y Otros Frutales (IICF), Cuba

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The importance of the coconut industry to the economy of the Philippines cannot be overemphasized. It represents 25% of the total agricultural land with over 20 million Filipinos directly or indirectly dependent on the industry. It is the only agricultural product included in the country's top ten exports and contributes an average of US$800 million in export earnings annually.

The coconut industry is, however, beset with many problems, particularly the declining coconut production and productivity; low income from coconut farming; scarce resources for agro-industrial research and development, and market development and expansion; and limited regulatory powers vested on the Philippine Coconut Authority (PCA) for the aggressive and effective implementation of legislative measures affecting the industry.

The Coconut Research, Development & Extension (R, D & E) Network is composed of government agencies and research institutions, state colleges and universities, local government units, and the private sector currently involved in the research, development and extension aspects of the coconut industry, with the Philippine Coconut Authority as the lead agency. The present state of the R, D & E for coconut may be characterized as wanting in appropriate direction in line with the actual needs of the coconut industry. The situation is largely influenced by the lack of sufficient funds to pursue definite R & D activities. A majority of R, D & E activities is directed towards the dictates of funding institutions. More so, allocations are concentrated on the R & D aspects and less on the extension aspect. This situation leaves most research results confined in research institutions and laboratories, depriving the flow of benefits to prospective clients.

The Agriculture and Fisheries Modernization Act enables the creation of a national integrated R, D & E programme for coconut, which is imperative in order to have a sustainable coconut industry. This will pave the way for the Philippine Coconut Authority and other public, and private R, D & E institutions to accord appropriate direction to coconut R, D & E programmes. While pursuing the present production and productivity focus on R, D & E programmes and projects, the programme will also focus on various other relevant areas. Another major concern of the programme is the transfer of research results to the prospective clientele through viable entrepreneurial activities and other extension programmes showcasing model integrated coconut-based farming systems.

The national R, D & E programme for coconut aims to sustain the viability of the coconut industry and raise the living conditions of the industry stakeholders, particularly the farmers. This would be through increased production and productivity, development and promotion of the marketing and processing of coconut products and by-products, protection of the environment, saving coconut biodiversity, policy research and advocacy, and institutional and capability building.

The Philippines' coconut programmes, projects and activities include the mass production of selected planting materials for the coconut planting and replanting programme; development and technology transfer of selected production technologies; development, promotion and commercialization of selected processing and marketing technologies; and technology generation on the improvement of coconut and its by-products through biotechnology.

An in-depth study of the coconut industry including responsiveness of the PCA as lead agency, policy reviews and advocacy and socioeconomic impact assessment of coconut RDE programmes and projects was also conducted, as well as institutional strengthening and capacity building of the coconut research, development and extension workforce and its client.

1 Deputy Administrator, Philippine Coconut Authority, Philippines

Since 1997, Fiji’s Ministry of Agriculture, Fisheries and Forests has embarked on the Commodity Development Framework, which has prioritized coconut as one of the major crops in Fiji. Some 40 000 households are dependent on this crop for their livelihood and as a source of cash income. The annual production of coconut oil for export has declined steadily, however, from 25 000 tonnes in the 1960s to just 9000 tonnes this year. The decline in production was due to low market prices, senile or old palms and the increase in cost of production. The copra prices have skyrocketed in 1998, however, from US$170 per metric tonne to more than US$300, with the inception of another copra buying company. As a result, copra production has also increased from 11 551 metric tonnes to 17 041 metric tonnes.

A policy guideline for the coconut sector has been established under the coconut rehabilitation programmes (C.D.F). One key element is to rehabilitate 40 000 hectares of the total coconut area of 65 000 hectare and utilize the balance of the area for general agricultural diversification. The initial development will concentrate in the Cakaudrove province at an annual planting rate of 1050 hectare. The other elements include to increase the potential of coconut production by developing and testing hybrid cultivars, and improving the quality.
of planting material; increase the traditional product base of the coconut industry, such as coconut oil, through value-added ‘down stream’ processing for niche market outlets; encourage private sector’s investment in the development of the coconut industry; promote long-term sustainable development of the coconut sub-sector by introducing ‘new’ integrated crop enterprise development concept that should increase the profitability of coconut-based farming systems; and to improve and strengthen the indigenous research capacity and scientific capability of local researchers working in the coconut sub-sector.

The Taveuni Coconut Centre (TCC) plays a major role in the implementation of the above objectives in terms of hybrid seednut and seedling production. Approximately 150,000 seedlings will be produced annually to rehabilitate 40,000 ha of senile palms and it would take 13 years to replant with the current capacity of the TCC. The execution of the above programme will enhance the coconut industry and enable it to regain its status as a major foreign exchange earner in Fiji.

Two coconut projects are being implemented in collaboration with the International Coconut Genetic Resources Network (COGENT). The projects are the ADB-funded Phase II project entitled “Coconut Genetic Resources Network and Human Resources Strengthening in Asia and the Pacific”, and the IFAD-funded project entitled “Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region”.

The two projects are currently in their second year. Three cultivars have been identified and collected, and the scheduled works of the ADB-funded project have been completed. The progress work of the IFAD-funded project was slightly delayed as a new staff was appointed to take over the work of the previous national coordinator for coconut research.

The coconut industry in Tanzania
Alois K. Kullaya

The coconut is an important perennial cash and subsistence oil crop that is mainly cultivated along the coastal belt of mainland Tanzania and the islands of Zanzibar and Mafia by about 300,000 small-scale farmers. The crop is also found in the inland regions of Morogoro and on the shores of Lake Nyasa, Tanganyika and Victoria. The area under coconuts in Tanzania is estimated to be about 252,000 ha with a population of about 25 million palms. About 95% of the coconuts are grown by small-scale farmers, while the rest are under medium and large-scale plantations.

In 1979/80, the Government of Tanzania initiated the National Coconut Development Programme (NCDP) with the objective of reversing a state of low and declining production that became more apparent during the 1960s and early 1970s. The NCDP is now being implemented by the Mikocheni Agricultural Research Institute (MARI) which was established in March 1996 as a move to institutionalize coconut R&D under the Directorate of Research and Development of the Ministry of Agriculture and Cooperatives.

The main activities of MARI include breeding improved and adapted planting materials that are disease resistant and drought tolerant. The activities include germplasm collecting, maintenance and evaluation, improvement of the local East African Tall (EAT) through national selection and cross breeding, and evaluation of different genetic materials under local conditions.

MARI is also developing and introducing, to farmers, the integrated plant protection measures against economically important pests, in particular the rhinoceros beetle, coreid bug (Pseudotheraptus wayi) and termites. Emphasis has been on the biological control of P. wayi using red weaver ants, Oecophylla longinoda.

Investigation into the etiology and control of important coconut diseases is another of MARI’s activity. Emphasis is on lethal disease caused by phytoplasmas. The main activities include screening different genetic materials for lethal disease resistance under field conditions, conducting epidemiology studies and developing DNA-based techniques for the detection of phytoplasmas in coconut and insect vector.

MARI is also developing improved coconut-based farming systems and providing appropriate recommendations to coconut growers. Main activities include on-station and on-farm trials on intercropping, crop rotation as well as on the improvement and maintenance of soil fertility.

Another main activity is developing improved small-scale coconut oil processing technologies and making these available to the end users. The oil processing technologies being promoted include the use of rotary graters, ram press and bridge press.

The institute is also collaborating with some international institutions in building capacity in biotechnology and related aspects of biosafety and biopolicy. Current activities include coconut embryo culture techniques and the application of DNA marker technology for diversity studies, germplasm characterization, breeding and crop protection.

According to an impact study conducted in 1996, the NCDP has had a significant effect on production promotion as well as on the income and welfare of the coconut farmers. Specifically, the area under coconuts has been increasing at 2% per year; the average yield increased from 23-25 nuts (in 1980s) to 30-40 nuts per palm per year (in 1996); and the income from coconut products and by-products increased by 13% between 1993 and 1996. The increase in yield is largely attributed to the fact that more farmers are applying improved cultural practices like weeding, proper intercropping and crop rotation.

1 Director of Research, Ministry of Agriculture, Fisheries and Forests, Fiji.
Asia and the Pacific are the major producers of coconut. More than 11 million families or 50 million people are directly involved in the cultivation of coconut, while a further 3 million people in Asia are directly dependent on small-scale processing of coconut for their livelihood. About 96 percent of coconut farmers are smallholders cultivating about 0.2 to 0.4 ha compared to only four percent grown in large estates.

Coconut is grown not only for the production of edible oil but also for a variety of uses ranging from industrial oil, charcoal, activated carbon, construction material, handicraft production, animal feed, and fruit juice production. The variety of products and uses demonstrate the importance of coconut in increasing the income of farmers, generating employment opportunities, and improving the quality of life in the rural areas, particularly given that most of the coconut is produced by smallholders.

Coconut production in Asia and the Pacific region is facing several constraints that could have an adverse effect on its future. The main constraint is the widespread cultivation of traditional, tall and low yielding varieties. They produce low yield and low incomes to coconut farmers, particularly under poor management where there is no use of fertilizer, pest, weed and diseases control. Although high yielding dwarf varieties have been developed, few farmers who have adopted them since their dissemination are constrained by poor extension services and the absence of a strong seed industry.

Few research activities to improve productivity and profitability of coconut are being conducted since the coconut is considered difficult to breed and financially unattractive. The governments in the region are also not paying enough attention in solving the coconut problems through the formulation of policies, programmes and projects that can increase the productivity and incomes of the coconut farmers.

Another constraint is the farmers’ tendency to grow coconut on a part time basis, thus, neglecting proper management of the crop that would enable them to obtain high yields and incomes from a given land. This attitude, however, may be attributed to the low yields and incomes from coconut, which force the farmers to obtain supplementary income from other sources. Meanwhile, the private sector in the Asia and Pacific has not been willing to invest more money in the marketing and processing of coconut, and its by-products, and also in the development and dissemination of improved varieties and technologies, thus, discouraging the farmers from producing more coconut.

The coconut farmers are also crippled by the lack of confidence of the commercial banks in providing credit since the coconut industry is considered not to be financially favourable. Another constraint is the inactive involvement of the non-government organizations in promoting improved varieties and technologies, delivering micro-credit to farmers, and organizing coconut farmers into a strong and cohesive group to represent the coconut industry. Without a strong representation, the coconut farmers cannot influence the policies of the governments.

Several measures can be taken, however, to increase the productivity and profitability of coconut. Coconut production can be increased up to 50 percent if farmers replace the traditional and low yielding varieties with high yielding varieties, together with an efficient crop management. Intercrop is a feasible measure in increasing farmers’ incomes, reducing the risk of crop failure and ensuring an efficient use of cultivated land. Farmers would also greatly benefit from research to further develop alternative high-value coconut products, in addition to incomes from the more traditional uses of coconut. A good crop management would significantly increase the yield of coconut by ensuring that it will not be adversely affected by drought or poor drainage, by applying adequate fertilizers, and controlling weeds and pests.

Coconut improvement can only be achieved through the involvement of all the stakeholders from research scientists, extension workers, the commercial banks, the processors, private sector entrepreneurs, NGOs and the farmers themselves. Research and extension on coconut to make the crop more competitive over other crops must also be strengthened. The importance of coconut must be highlighted not just because of its role in the economy of Asia and the Pacific, but also in the livelihood of millions of poor coconut farmers.

1 Lead Agronomist, Asian Development Bank, Manila, Philippines

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Improved small-scale coconut oil processing techniques have been developed and adopted by some women groups in rural areas. Furthermore, coconut growers, nursery operators, as well as the extension staff, are more aware and knowledgeable about coconut production aspects as compared to when the project started.

MARI’s challenge in the future is to sustain these achievements by disseminating the different technologies that have been developed to the target groups, and to continue and consolidate those research activities that have yet to give conclusive results.

1 Director, Mikocheni Agricultural Research Institute (MARI), Tanzania
Coconut Varieties: Malayan Dwarf

Roland Bourdeix

The Malayan Dwarf is a base variety in many germplasm collections and genetic improvement programmes of coconut in pantropics of Africa and the Indian Ocean, Latin America and the Caribbean, Asia and the Pacific. It consists of three races – the Yellow, Red and Green Dwarfs. The dwarf type known as Nyior Gading or Klapa Gading in Malaysia is said to have been brought in from Kryon (or Krion), Java, (the Dutch Indies) (Handover 1919, cited by Gangolly et al. 1957). The localization and actual name of Kryon or Krion has yet to be verified. The Malayan Dwarf has been found to confer precocity in its many hybrids especially with tall palms. Thus, it has been used in hybridization with the local tall of West Africa, Polynesia, Equatorial Guinea, Vanuatu, Tonga, Kiribati, Solomon Islands and other ecotypes. It is interesting to note that the first coconut hybrid produced was between the Malayan Dwarf and Niu Leka Green Dwarf in Fiji in 1928.

Malayan Yellow Dwarf (MYD)

According to the 1999 Coconut Genetic Resources Database (CGRD), the Malayan Yellow Dwarf (MYD) is now represented in germplasm banks by 28 accessions, totaling 16,453 individual palms. MYD is conserved in the following 15 countries: Benin, Brazil, Côte d’Ivoire, Fiji, India, Indonesia, Jamaica, Mexico, Papua New Guinea, Philippines, Tanzania, Thailand, Vanuatu, Vietnam and Malaysia. The oldest accessions registered in germplasm banks are found in India (1959) and in Côte d’Ivoire (1960). Côte d’Ivoire was the most active centre for exporting MYD to other countries, such as Benin, Brazil, Indonesia, Madagascar, Mexico, Mozambique, Nicaragua, Philippines, Tanzania, Thailand, Vanuatu, and Vietnam.

MYD is now the most widely diffused dwarf cultivar in the world. There are other yellow dwarf cultivars that are similar to the MYD: Sri Lanka Yellow Dwarf (YD), Nias YD in Indonesia, Chowgat YD in India, and Pemba YD in Tanzania. However, all the accessions called ‘Malayan Yellow Dwarf’ may not be completely identical. The use of molecular biology techniques will be useful in solving these questions. Using RFLP technique, Lebrun et al. (1998) confirmed that the Malayan Yellow Dwarf and the Ghana Yellow Dwarf are identical, thus, the cultivar “Ghana Yellow Dwarf” would have to disappear from the international cultivar list.

In good field conditions, MYD could start to flower 2 years after field planting (about 2.5 to 3 years after germination of seednut) and it may produce 80 to 100 fruits/year/palm (at a planting density of 205 palms per hectare and without irrigation). MYD is sensitive to dry and less favourable environmental condition, and is subject to alternate bearing. Pale yellow is the colour of the seedling sprouts, the leaf stalks, the inflorescence, and the immature fruits. When the fruits are young (6 to 9 months), their colour is often a pale yellow-green.

The youngest leaves at the top of the palm are characterized by the soft petiole terminal portion and soft leaflets. The upper canopy appears like an undressed hair, which can be observed more clearly for MYD than for Malayan Red or Green Dwarf. Because of its short peduncle, the bunch is well supported by the leaf petioles. As the spikelets are also short, fruits sometimes abort due to the lack of space on heavy bunches. The reproduction system has been described as direct autogamy whereby the period of receptivity of female flowers is fully overlapped by the period of dehiscence of male flowers, from the same inflorescence.

MYD produces medium sized, oblong fruits. Inside the fruits, the nuts are almost spherical. Water from young nuts is sweet, but not as sweet and
M raided by some other green dwarf cultivars. The albumen is thin and gives a rubbery copra, which is difficult to dehydrate but have a good final oil content of about 69%.

MYD characterization data for nine countries can be found in the CGRD version 1999: Brazil, Côte d’Ivoire, Fiji, India, Philippines, Tanzania, Thailand, Vanuatu, and Vietnam. Although they are not always complete, these data describe the following characteristics: speed of germination, stem morphology, leaf, inflorescence and flower morphology, fruit component analysis, and yield.

The MYD is tolerant to the Lethal Yellowing Disease (LYD) of Jamaica (Been, 1979; Romney, 1980) but sensitive to the LYD found in Tanzania and Ghana (Schuiling et al. 1992; Sangare et al. 1992). It is classified as sensitive to the mite Eriophyes guerreronis K., which attacks coconut fruits (Julia and Mariau 1979); and the lethal foliar decay of Vanuatu (Calvez et al. 1985).

In the field of coconut genetic resources and breeding, MYD is the most utilized cultivar worldwide. COGENT recommends to systematically use it as genetic control for field experimentation when comparing dwarf cultivars or dwarf x dwarf hybrids (STANTECH Manual, 1994). MYD is also quite often chosen for developing new technologies such as vitro-culture of zygotic embryos.

During the 1960s, the Malayan Dwarfs cultivars were planted in a large scale in Jamaica because of their tolerance to LYD in the country. Afterwards, the hybrid MAYPAN (Malayan Yellow or Red Dwarf x Panama Tall population Jamaica) was found to be more productive, less sensitive to environmental conditions and displayed a good tolerance level to the disease.

The cross Malayan Yellow Dwarf x West African Tall (WAT), known as PB121 or MAWA, was created in Ivory Coast by CIRAD in the 1960s. It is the most widely utilized coconut hybrid worldwide and is recommended as a genetic control for Dwarf x Tall hybrid tests. The hybrid MYD x Tahitian Tall was also used in Côte d’Ivoire to a lesser degree. Individual palm progeny testing at the Centre National de Recherche Agronomique (CNRA) Marc Delorme Research Station, Côte d’Ivoire has improved these two hybrids.

Due to its extensive utilization, it is almost impossible to list all the hybrids where MYD was involved as parental material. In Côte d’Ivoire, MYD has been crossed with 11 dwarfs and 9 tall cultivars; in Jamaica, with at least 15 cultivars; and the Philippines and Indonesia have at least 6 hybrids with MYD as parent.

Malayan Green Dwarf (MGD)

Within the Malayan Dwarfs, the green form is less common compared to the Yellow and Red forms. According to the CGRD (1999), MGD is only represented in the germplasm banks by 10 accessions, totaling 622 individual palms. MGD is conserved in the following countries: Côte d’Ivoire, Fiji, India, Solomon Islands, and Tanzania. The oldest accessions registered in germplasm banks are found in India and in Côte d’Ivoire (1959).

Open pollinated seednuts were imported to Côte d’Ivoire from Teluk Anson (now Teluk Intan), Malaysia. The population was quite heterogeneous with a mix of pure dwarf, natural Dwarf x Tall hybrids, and their later progeny. Within the 52 palms initially planted, only 25, selected as putative true to type MGD, were used to reproduce the accession using the controlled pollination method.

The progeny obtained is again rather heterogeneous. Most of the palms have a thin stem (girth of 65 to 70 cm) without basal bole, and began to flower 25 to 35 months after planting. However, some of the palms have thick stem (girth about 80 cm) with a large bole (girth up to 130 cm) and only flower 60 to 70 months after planting. These last ones do not show dwarf characteristics. The exact pedigree of each palm was studied and it appears that three of the 25 putative dwarf parents do not transmit dwarf characteristics to their progeny. These palms will have to be discarded.

Compared to MYD and Malayan Red Dwarf (MRD), the MGD conserved in Côte d’Ivoire is much more heterogeneous. The fruits are bigger, rounder and with a higher albumen ratio. From a personal observation, it seems that the cultivar known as ‘Malayan Green Dwarf’ in Jamaica produces oblong fruits and looks more like the ‘Brazil Green’ in Africa. The use of molecular biology techniques will be useful to resolve these questions. There may also be more than one Green Dwarf cultivar in Malaysia. For example, more than 10 distinct green dwarfs are already registered in the Philippines.
The MGD is tolerant to the Lethal Yellowing Disease (LYD) of Jamaica (Been 1979; Romney 1980) but sensitive to the LYD found in Tanzania (Schuiling et al. 1992).

Ten years ago, in Jamaica, farmers planted more yellow or red MD forms than the Green one, but this practice is changing. According to Basil Been, Director of Research, Coconut Industry Board, there is a great demand for green dwarf seednuts in Florida, mainly for landscaping purposes as gardeners in Florida do not like Yellow or Red Malayan Dwarfs cultivars. They argued that these coconut palms look like diseased palms (Lethal Yellowing) because of their colour.

The Malayan Green Dwarf has been discarded from most of the coconut breeding programmes in the world. In Côte d’Ivoire, Vanuatu and the Philippines, Brazil Green Dwarf (BGD) or the numerous Philippines green dwarfs are preferred. In India, Chowghat Green is preferred while it is Nias Green Dwarf in Indonesia. MGD was only very recently crossed with improved West African Tall (WAT) and Rennell Island Tall (RIT) in Côte d’Ivoire.

Malayan Red Dwarf

Some other red dwarf cultivars seem rather similar to the Malayan Red Dwarf (MRD): Sri Lanka Red Dwarf (RD), Nias RD in Indonesia, Chowghat Red Dwarf (CRD) in India, Sri Lanka Red Dwarf, and Pemba RD in Tanzania. The leaves are longer than other dwarf cultivars such as the MYD, BGD or CRD. The youngest leaves at the top of the palm are characterized by a soft petiole terminal portion and soft leaflets. The upper canopy looks like unkempt hair, which is generally less pronounced than that of MYD.

The oblong fruits of MRD are bigger than those of MYD and contain more albumen. The seednut germination is slower for MRD than for MYD (Nuce de Lamothe and Rognon 1997). In places with good conditions, such as Santo in Vanuatu or Zamboanga in the Philippines, the weight of fruit is more than 1 kg for MRD, whereas MYD always remain under 1 kg.

The MRD is tolerant to the Lethal Yellowing Disease (LYD) of Jamaica (Been 1979; Romney 1980) but sensitive to the LYD found in Tanzania and Ghana (Schuiling et al. 1992; Sangare et al. 1992). The MRD is classified as sensitive to the mite *Eriophyes guereronis* K., which attacks coconut fruits (Julia and et Mariau 1979); and the lethal foliar decay of Vanuatu (Calvez et al. 1985).

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MRD has been frequently included in coconut breeding programmes worldwide. In Côte d’Ivoire, it was crossed with seven tall and 10 dwarf cultivars. The hybrids MRD x TAT (PB132) and MRD x RIT (PB133) have been released to farmers and are currently being improved. In the Philippines, MRD was crossed with at least six talls and two dwarf cultivars. The hybrids MRD x Taganan Tall (and its reciprocal) are being released to farmers. The hybrid MRD x RIT is used in many countries of the Pacific Region.

During the 1960s, Jamaica planted the Malayan Dwarf cultivars in a large scale because of their good tolerance to LY disease in that country. However, the hybrid MAYPAN (Malayan Yellow or Red Dwarf x Panama Tall population Jamaica) was found to be more productive, less sensitive to environmental conditions and also indicated a good tolerance level to the disease.

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In Côte d’Ivoire, the crosses using MRD as parents are generally comparable to similar crosses using MYD. Sometimes, with MRD, the yield is slightly lower, with less fruit of bigger size, but most of the time, this difference is not statistically significant. Thus, it is not useful to cross a new tall cultivar with both MYD and MRD. Making only one of these two crosses will give sufficient evaluation of the hybrid value.

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Coconut-based farming systems: a strategy to increase incomes of coconut smallholders

Severino Magat1, Tom Osborn2, P.K. Thampan3, and Shalizahanim Shukor4

Coconut palm is one of the most important food and cash crops grown in the world. It is a major contributor to the economies of many Asian and Pacific, and other coconut-producing countries. It plays a significant role in the global edible oils market. Although coconut as a monocrop is profitable, there is a need to demonstrate ways of increasing the income of coconut farmers in order to make coconut production more competitive and sustainable. One way to achieve this is to promote coconut-based farming systems (CBFS).

Coconut-based farming systems can have several components such as intercropping or multistorey/mixed cropping; livestock raising; underplanting of young coconut palms for edible pith (harvestable after three years from field-planting); nursery farm to produce planting materials; and aquatic farming. This is possible because the morphology and architecture of the coconut palm allow adequate sunlight to penetrate the palms for other plants to grow. Cultivation practices associated with the production of these understory components also favor the coconut.

In the Southeast and East Asia region, coconut-based farming systems are viable options for smallholders because they enable them to fully utilize large areas under coconut; diversify their enterprise with a minimum risk strategy; minimize resource demand; and encourage the adoption of improved husbandry practices. Sustainable farming systems also encourage the replanting of senile palms and diseased plantations as they minimize loss in incomes during the pre-bearing period.

In the Philippines, a hectare of coconut with 100 – 150 palms, producing 60 – 90 nuts per tree per year only generates P21 000 (US$525) gross income through copra production compared to a maximum income of as high as P100 000 (US$2500) per hectare per year with intercropping. For example, coconut intercropped with durian is estimated to generate P819 800 (US$20 400) per hectare per year; with banana, P85 000 (US$2125); with capsicum or sweet pepper, P150 000 (US$3750); and with root crop gab (taro), P75 000 (US$1875).

In South Asia, the benefits of coconut-based farming systems include efficient resource conservation; lower production cost as a result of sharing of labour and fertilizer inputs; higher coconut yields; and enhanced farmers’ incomes. In a study conducted at the Regional Coconut Research Station, Ratnagiri in Maharashtra State, India, six perennial spice crops were planted in separate blocks of 0.2 ha each under coconut. The nutmeg block generated the highest net profit of Rs. 53 951 (US$1245) per ha, followed by the cinnamon block with Rs. 37 128 (US$857) per ha. The profit from the coconut block alone was only Rs. 12 346 (US$285).

In the South Pacific, the threat to the livelihoods of smallholders caused by the decline in copra prices has encouraged them to adopt coconut-based farming systems. These have enabled the farmers to intensify land use; enhance incomes; increase yields; achieve product diversity; and ensure economic stability. In Fiji, for example, the total area under coconut is approximately 65 000 hectares with 28 000 hectares (44.5%) in pure stand, and 27 000 hectares (42.2%) under pasture and 8600 hectares intercropped.

In the South Pacific region, the practice of intercropping with coconuts is increasing because of higher economic...
returns achieved from CBFS. Kava, for example, is intercropped with coconut in Vanuatu, Fiji, Tonga, and Samoa. At a planting density of only 500 – 1000 plants per hectare, the crop can yield about 1500 – 3000 kg of dried roots, which have a value of US$7500 – US$15 000.

There are other benefits of practising coconut-based farming systems. These include increased organic matter build-up in the soil and consequent improvement in the increased water holding capacity; control of soil erosion in sloping lands; and effective weed control by replacing it with economically useful crops and better coconut root aeration through soil cultivation for the intercrops.

Livestock raising under coconut is also a viable option because it helps regulate grasses through grazing; increases soil fertility through animal manure and urine; provides fodder from crop residue, and forage crops; and increases the farmers’ incomes through product diversification.

In the South Asia region, single stand coconut holdings utilize only 25 percent of the soil mass. The remaining 75 percent, when utilized efficiently can support higher on-farm income for the farmers. The large amount of light, which reaches the ground due to interspaces between the palms, can be fully utilized by the intercrops. Coconut-based farming systems also improve soil fertility. In India, microbiological studies conducted in coconut gardens devoted to mixed cropping, showed enhanced activities of soil fauna and microflora. Higher rates of nutrient transformation were recorded. In Sri Lanka, there was a significant increase in earthworm population and improvement in physical and chemical properties of soil consequent in gardens with mixed cropping of cocoa, coffee, clove and banana.

In the South Pacific region, coconut-based farming systems thrive because the intercrops receive adequate shade from the coconut palms, and protection from the wind, sand and salt spray; erosion and flood control; and encourage the activities of coastal reclamation. Fertilizer used by the intercrops improves soil fertility as residual nutrients can be taken up by the coconut. Pasture under coconut is a major coconut-based farming system in the Pacific, especially in Vanuatu, Fiji, and Samoa. The cattle provides manure to the coconut and keep the undergrowth to a minimum.

The coconut-based farming systems in the Asian and Pacific countries face certain limitations, namely, paucity of adequate resources; lack of clear policy or strategy to deal with intercrops; lack of adequate fund for research and development purposes; limited production resources (land, labour and capitol) which are not judiciously used; lack of guidance to farmers in selecting appropriate crop combinations; inadequate credit facilities for the farmers; and lack of overall support to integrated farming as a strategy to help coconut farmers.

Steps which can be taken to encourage farmers to adopt coconut-based farming systems include, strengthening extension education and services at the farm-household levels; assisting farmers in selecting suitable crop combinations that are appropriate for the local edaphic and climatic conditions; and providing access to recommended planting materials and dependable market. Other suggestions include replanting the unproductive coconut gardens and introduction of appropriate intercropping system at the same time; and ensuring that the selected intercrops match the existing needs of the local market.

During a Farmer Participatory study conducted in India, the farmers expressed their views that even a small coconut holding of 0.4 ha can sustain the livelihood of four to five family members when it is devoted to intensive integrated farming. Hence, coconut-based farming systems have to be promoted in all coconut-growing countries to ensure resource conservation, sustainable levels of coconut production and, most importantly, enhance on-farm income and employment.

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Recent activities of the Asian and Pacific Coconut Community (APCC)

P.G. Punchihewa

The Asian and Pacific Coconut Community is 30 years old this year. The 30th anniversary celebration was held in the Federated States of Micronesia on 27 September 1999. Representatives from its member countries and observers participated, including BUROTROP and COGENT.

Dr. Mary Enig, the internationally known nutritionist, formerly of Maryland University, United States of America, who defended coconut oil against the soya lobby, was honoured at the celebration with a special award of recognition from APCC for her contribution to the advancement of research on the medical and nutritional benefit of coconut. Awards of recognition were also given out to those who had contributed to the development of the coconut industry in the member countries. In conjunction with the anniversary celebration, APCC has produced a souvenir publication for the occasion and published a special issue of its technical journal CORD which has completed 15 years of publication.

APCC Secretariat designated September 2 as the Coconut Day, the day the Coconut Community met for the first time in 1969. It was designated to be an annual event that would help focus world attention on this crop in order to enhance its potential in alleviating poverty, and promote total development of the industry. Among the activities carried out in the member countries were the introduction of new varieties of coconut and new products, publicity campaigns, various contests, seminars, workshops, etc. Two posters released by the Secretariat were widely distributed to member and non-member countries as a publicity material.

APCC’s 36th COCOTECH Meeting was held on 21-25 June 1999 in Phuket, Thailand, under the theme “Promoting coconut products in a competitive global market”. Eighteen resource speakers from coconut-producing and consuming countries presented papers with 120 participants representing the different segments of the industry. A number of recommendations were made which included the proposal that an International Coconut Conference within the framework of COCOTECH be held next year in collaboration with BUROTROP and COGENT.

A project proposal on Coconut Integrated Pest Management which was submitted to the Common Fund for Commodities was approved by its Board in October 1999. The project with a budget of US$1 300 000 of which US$800 000 will come from the CFC will be executed by the APCC. The three-year project is scheduled to come into operation in early 2000. The project will develop cost-effective, environmentally friendly integrated pest management strategies in respect of two economically important coconut pests, namely, *Oryctes rhinoceros*, *Aceria guerreronis*.

The Coconut Information Networking through Electronic Media project, in collaboration with the IDRC, was completed in June 1999. The objective of the project, which came into operation in January 1997, was to build on the information service programme of APCC. It also aimed to further develop and sustain the coconut information network among APCC member countries by providing them with the necessary resources and skills to utilize and operate modern information and communications technologies based on the Internet as a means of improving networking activities and the efficiency of the network. Under the project, assistance was provided to APCC member countries and one non-member country in setting up their e-mail connection. They were provided with computer equipment and training, together with the initial cost of installation and maintenance. Selected countries were also given assistance in establishing their own homepages.

The following publications were recently released by the APCC:
1. CORD Vol. 15 No. 2 (special issue)
2. Advance in Plant Physiology and Biochemistry of Coconut Palm
3. 36th COCOTECH Proceedings - “Promoting Coconut Products in a Competitive Global Market”
4. Proceedings of the Workshop on Lethal Diseases of Coconut Caused by Phytoplasma and their Importance in Southeast Asia

Participants of the 36th COCOTECH Meeting held on 21 - 25 June 1999 in Phuket, Thailand.

1 Executive Director, Asian and Pacific Coconut Community, Indonesia
The Secretariat of the Pacific Community, formerly the South Pacific Commission, was established in 1947 as a regional technical, advisory, training, and research organization. Its current membership includes all 22 countries and territories in the Pacific as well as France, Australia, New Zealand, United States and the United Kingdom. The headquarters of the SPC is in Noumea, New Caledonia but there is also a sub-regional office in Suva and field offices in many countries. The SPC has programmes in fisheries, health and agriculture.

Under the SPC’s Land Resources Division is the Agriculture Programme, being implemented under the direction of its member countries. It provides regional projects for the benefit of its member countries, technical assistance, training and information. It also responds to emergencies related to its activities.

There are four services within the agriculture programme. The Animal Health & Production Service which consists of veterinary services for domestic animal; legislative services of drafting quarantine and, animal and public health-related legislation. Other services include advice and training for quarantine procedures related to animal diseases; the Regional Paraveterinary Training Veterinary Public Health assistance through training and improving facilities; disease surveillance and control in collaboration with national programmes; animal production improvement through nutrition, management, and genetics; and the Animal Health Information Systems coordinated for the region and to assist national animal health systems.

The Crop Improvement Service maintains and supervises seed and planting materials, and maintains external linkages with other institutions for crops such as coconuts (regional link to COGENT and BUROTROP); bananas (regional link to INIBAP for distribution of planting materials); taro (AusAID, ACIAR, IPGRI Taro Genetic Resources Conservation and Utilization Project); yams (collaborator in the EU funded South Pacific Yam Network); vegetable seed (EU funded regional project and link to the Asia Pacific Seed Association); and kava (technical, trade and IPR aspects of this important regional crop).

The Regional Germplasm Centre of SPC is an essential service for the collecting, multiplication and distribution of disease-free planting material. SPC is also involved in projects with the EU, for example, the Farming Systems Research project in the lowlands and atolls for testing and extension of new technologies. Its objective is to improve quality and processing of agricultural products.

The Plant Protection Service is involved in several projects such as the EU Pacific Plant Protection Service which aims to improve national plant protection and quarantine services in Polynesia and Melanesia; the AusAID Plant Protection in Micronesia to improve plant protection and quarantine services in Micronesia; the NZODA Plant Protection in non-ACP states to improve plant protection and quarantine services in Cook Islands, Niue and Tokelau; the Taro Beetle Control project for research and extension on ways to control the pest; the GTZ Biological Control project to provide training and technical assistance to control agricultural pests and minimize pesticide usage; and the AusAID/UNDP Regional Fruit Fly Project for research into management of fruit flies, training and technical assistance. It also serves as the Secretariat to Pacific Plant Protection Organization and organizes the regional technical meetings for plant protection.

The components in the Resource Economics and Agricultural Information Services include resource economics; household food security; gender issues; disaster impact assessment; library services and searches; publications’ editing and productions; and national agriculture information strategy development and implementation.

The regional approach is an important strategy in the Pacific where there are many small island countries. The four services of the SPC agriculture programme work together in consultation with its member countries for the development and implementation of regional projects to facilitate the development of agriculture. Coconut is one of the many areas in which SPC is involved with since coconuts and coconut-based farming systems are an essential element of agriculture in the region. SPC is the link for COGENT in the region and also works with BUROTROP, CIRAD and the donors, along with the member countries to develop the coconut industry.

1 Agriculture Adviser, Secretariat of the Pacific Community (SPC), Fiji.

Coconut oil and confectionery

In the confectionery preparations, coconut oil finds extensive use as an ingredient in ice-cream, imitation cream and whipped cream and similar other products. Because of the very sharp melting behaviour (23°C to 26°C), coconut oil makes the preparations pleasant to eat. When used as a coating of ice cream bars, it remains very hard during storage but melts quickly and completely in the mouth when eaten. Similarly, when used as surface spray for bakery items like crackers, it gives a glossy appearance and provides a moisture barrier to the product.

Ongoing Projects

Coconut Genetic Resources Network and Human Resources Strengthening in Asia and the Pacific (Phase II)

The second annual meeting of the ADB-funded project entitled “Coconut genetic resources strengthening in Asia and the Pacific” was held on 16 – 18 September 1999 in Ho Chi Minh City, Vietnam. The meeting was attended by the project leaders, donors, and representatives from IPGRI and partner institutions. It was hosted by the Oil Plant Institute and funded by ADB and IPGRI. The keynote speech and official opening was delivered by Mr. Le Quoc Khanh, Deputy Minister, the Ministry of Industry. In his speech, Mr. Le Quoc Khanh highlighted several achievements accomplished by the ADB-funded project in coconut genetic resources. Among them is the establishment of a permanent forum and network on germplasm collection and exchange, training courses and workshops for the transfer of technologies.

The meeting reviewed the 1998/1999 accomplishments and 1999/2000 proposed work plans of the 20 countries involved in the projects. Progress reports on human resource development component were presented, together with reports on the biotechnology and embryo culture research. Three host countries (Indonesia, India, and Papua New Guinea) presented reports on the activities of the International Coconut Genebanks (ICGs).

Based on the issues presented and discussions made during the meeting, it was recommended that:

- fifteen countries to provide 178 accessions for exchange through the three ICGs in the Asia Pacific region;
- CIRAD to prioritize traits for characterization in order to fast track characterization of accessions;
- prioritize request for germplasm accessions from other countries in accordance with the needs for relatively similar environments;
- plan human resource strategy to retain and strengthen the present research capability of some South Asia and South Pacific countries;
- review collecting and conservation strategies for the South Pacific due to their various limitations and potentials;
- collect seednuts of identified ecotypes conducted in isolated islands or locations for initial conservation and subsequent regeneration, and to produce materials for future field evaluation;
- conduct a survey on genetic erosion as soon as possible to identify urgent threats or collecting gaps for appropriate interventions;
- develop a strategy for each country to address the lack of planting materials (hybrids and talls), currently the most critical issue affecting the sustainability of coconut hectarage and production;
- prepare a bulletin on coconut germplasm, containing some passport information and evaluation data about each germplasm, and coloured pictures of the whole plant, inflorescence, fruit bunch and fruit components to document the national collections of COGENT member countries;
- develop a research proposal to verify whether diseases of unknown etiology, apart from viroid and mycoplasma, could be transmitted through embryos;
- recommend that the Coconut Genetic Resources Database (CGRD) be placed into the public domain, both in the Internet and in hard copy to disseminate this useful information to coconut breeders and to create public awareness; and form a task force to advise COGENT on the IPR requirements to implement this recommendation; and
- standardize technical terminologies relating to germplasm nomenclature and use to be adopted COGENT-wide.

Field trip

A field trip to the coconut-growing Ben Tre Province was organized on 19 September 1999, in conjunction with the annual COGENT project meetings in Vietnam. COGENT country coordinators, project leaders and members of the COGENT Steering Committee participated. Places visited included the Ben Tre Provincial Office to meet the Chairman of the People’s Committee of the Province, the Dong Go Experimental Center and coconut seed garden, a coconut decorticating factory, coconut geotextile making and fibre-mat making co-operatives. It was a good opportunity for the participants to see the development of the coconut industry in Vietnam.
The second annual 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 held on 13 – 15 September 1999 in Ho Chi Minh City, Vietnam. The meeting was attended by the project leaders, representatives of donors, IPGRI and partner institutions. It was hosted by the Oil Plant Institute (OPI) and funded by IFAD and IPGRI. The keynote speech and official opening was delivered by Mr. Le Quoc Khanh, Deputy Minister, Ministry of Industry. In his speech, Mr. Le Quoc Khanh said that Vietnam appreciated its involvement in the IFAD-funded project because it is useful and practical in uplifting the income of coconut farmers.

The meeting reviewed the 1998/1999 accomplishments and 1999/2000 work plans of the 17 projects in 14 countries. Reports were presented on farmer participatory research; projects on increasing incomes through coconut-based farming systems palm sugar production, tender nuts, and other uses.

During the meeting, it was recommended that:

- member countries further identify appropriate technologies that have potential for income generation so that feasibility studies can be conducted, and bilateral projects can be formulated;
- marketers, exporters and the government be given appropriate roles as stakeholders in the development of the coconut industry as a whole, as they determine policies and activities in support of the industry;
- the project provides funds in order to return information and results of the farmer participatory research to farmers and the general public of the participating countries in the IFAD project;
- adopt a number of strategies to generate funding and help maintain the International Coconut Genebanks (ICGs), which include, where feasible, production of high-value products, appropriate coconut-based farming systems (CBFS) and superimposing funded research and training activities on the germplasm block and materials;
- create a task force on palm sugar production to streamline and share information on improved processing and packaging technologies, suitable varieties, economics of production, and developing and promoting niche markets;
- create a task force to provide advice on intellectual and material property rights, access and benefit sharing to farmers whose varieties are being collected and utilized as germplasm materials;
- link IFAD projects with concerns and activities related to nutritional benefits, and food systems, directly or indirectly within ongoing or future projects; and
- identify and promote, in project activities, options and opportunities for enhanced role for women in the coconut industry.

Ongoing Projects

### Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region

The project is funded by the Common Fund for Commodities (CFC). Six countries are participating in the project, namely: Benin, Côte d’Ivoire, Tanzania, Brazil, Jamaica, and Mexico. The 5-year project will undertake multilocation trials involving 5 common hybrids (four Dwarf x Tall hybrids - MYD x WAT; CRD x RLT; MRD x VTT; MRD x TAGT, and two Tall x Tall hybrids - VTT x TAGT and SLT x TAGT) and 4 national hybrid/variety per participating country. The project will also evaluate germplasm x environment interactions to widen the possible application of results from the project. In addition to the multilocation trials, the project also supports training courses, workshops and meetings worldwide.

### Improvement of In Vitro Techniques for Collecting and Exchange of Coconut (Cocos nucifera L.) Germplasm

Thirteen laboratories in 11 countries are conducting a 2-year research to refine the coconut embryo culture and acclimatization technology. Participating countries include Brazil, China, Cuba, France, India, Indonesia, the Philippines, Papua New Guinea, Mexico, Sri Lanka, and Tanzania. On 20 – 23 March 2000, the participating laboratories will present their results at the 2nd International Coconut Embryo Culture Workshop to be held at Centro de Investigacion Cientifica de Yucatan (CICY), in Mexico. The results of this project will be used to further upgrade and standardize the technology which will be used to train coconut researchers worldwide. The DFID-funded project has also organized a Coconut Embryo Culture Project Network. The second issue of the project newsletter has just been released.
Research Capability Enhancement

Training workshop on technical writing, seminar presentation and public awareness

A training workshop on “Technical Writing, Seminar Presentation and Public Awareness” was held on 30 August to 4 September 1999 at SEARCA, Los Baños, Philippines. The workshop was a collaborative activity of IPGRI, COGENT and the Southeast Asian Ministers of Education Organization Regional Center for Graduate Study and Research in Agriculture (SEAMO SEARCA), and funded by ADB and IFAD. Eighteen coconut researchers from 13 countries attended the workshop. The objectives of the workshop were to enhance the participants’ ability in writing quality technical reports and project proposals, presenting seminars, and developing and implementing public awareness campaigns to generate support for coconut research.

In his opening speech, Dr. Soekartawi, SEAMEO SEARCA Deputy Director for Academic Affairs, emphasized the need for skills in technical writing not only for the researchers to attain greater success in their work but also to effectively disseminate and popularize research outcomes and undertaking. A researcher must be attentive to details and logic in presenting ideas and fact.

The importance of effective communication was further emphasized by Dr. Dimyati Nangju, ADB, who stressed that there is a need to make the public aware that coconut has many uses and plays a key role in the economies of many Asia and Pacific countries. Dr. Paul Stapleton, IPGRI, also stressed that a researcher must have skills in writing, communication, presenting oneself in public, creating public awareness and in public relations.

The main topics of the course were effective report writing and seminar presentation; project proposal formulation; and public awareness strategy. The participants also received valuable information from two resource persons from the International Rice Research Institute (IRRI), Dr. Duncan McIntosh and Ms. Sylvia Inciong.

The participants were also taken on field visits to the International Rice Research Institute (IRRI), the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), and the Institute of Biotechnology and Microbiology, University of the Philippines at Los Baños.

The “Coconut Data Analysis Course” was conducted on 6 – 10 September 1999 at the Southeast Asian Center for Graduate Study and Research in Agriculture (SEARCA), Los Baños, Philippines. The course is a collaborative activity of IPGRI, COGENT and SEARCA, and funded by ADB and IFAD. Nineteen participants from 14 countries attended the course, which consisted of project leaders of the ADB- and IFAD-funded projects. The objectives of the course were to train coconut researchers on methods of data analysis and to familiarize them with new developments in softwares for data analysis and databases interchange.

In his welcoming speech, Dr. Percy Sajise, SEARCA Director, emphasized the prime importance of coconut as a commodity. He added that data analysis and interpretation, depending on the analysis tool used, could influence the result of the study, rendering it useful or misleading. With the acquired knowledge, coconut researchers can have a reliable analysis that will help expand the frontier of knowledge in coconut.

The topics covered were on basic statistical concepts; frequency distribution and graphic representation; sampling methods; analysis of experimental designs; genetic diversity analysis; other statistical analysis; and demonstration of softwares. Resource persons were Dr. Prem Mathur (IPGRI, APO-New Delhi), Dr. Connie Reaño (UPLB Institute of Plant Breeding) and Ms. Susan Rivera of the Zamboanga Research Centre, Philippine Coconut Authority.

In his summary of the course activities, Dr. Pons Batugal, COGENT Coordinator, stated that the participants have been exposed to various topics, namely, how to estimate variance and co-variance in order to know the variability of the populations collected; measure population differences between two germplasm populations collected; cluster coconut populations based on the various clustering techniques; measure the genetic distance between two cluster means using Mahalanobis D2; and how to estimate direct and indirect effect of yield components on the total yields by applying several selection process of characters and ranking them on the basis of priority characteristics. The participants were also exposed to different softwares for developing databases and statistical analysis such as SAS, SYSTAT, Agrobase, CGRD, DIP and DIPVIEW. In order to enhance the multiplier effect of the course, the participants are expected to share this knowledge with their colleagues in their respective institutions.
Hopes placed on high yielding varieties and hybrids for the advancement of production and productivity of coconut, at the end of nearly a half a century does not seem to have met the aspirations of policy makers and farmers. There have been many shortcomings which have been now identified.

One factor responsible for this state of affairs was the limited availability of genetic material for the breeders. In certain countries there was a reluctance to import outside material for fear of introducing diseases not prevalent in the country. This is understandable. At the same time there was the reluctance of certain countries to part with their genetic material. This was difficult to understand. The only reason could be the fear of competition.

It is gratifying to note that things are changing for better. The initiatives taken by COGENT are making matters easy. One of the objectives of the APCC/COGENT/IPGRI project on the establishment of a multi-site international coconut genebank in the Asia Pacific region to promote sustainable coconut production is to make germplasm material available to interested coconut producing countries. As transpired at the recently concluded COGENT steering committee meeting, the protocol has been signed by the three host countries of gene banks in the region, India, Indonesia and Papua New Guinea. The host country has no claim of ownership over the designated germplasm or any intellectual property rights.

This should open a new chapter in exchange of germplasm. Even before signing the protocol some exchange of germplasm bilaterally has taken place between countries. With the technological advances made there is no need now to import whole nuts. Safe movement of germplasm is assured through embryo culture. The fears and suspicions that the countries harboured should not inhibit the exchange of germplasm henceforth. The availability of diversity of germplasm should provide enough resources for the breeders to meet the varying needs of their countries.

This is an area where South-South interaction can take place. All are developing countries and they all stand to benefit. There is not much high technology and capital involved and the countries could easily collaborate and benefit. In the past biggest threat to the coconut industry has been the stagnation of production and productivity. If it continues, the industry as a whole stands to lose. Apart from signing the protocol it is now necessary to proceed with setting up of gene banks in the countries that have agreed to do so. Even here some progress has been made. It should be good news to all those who are interested in the coconut industry.

From The Desk of the Executive Director
COCOMUNITY, VOL XXIX NO. 19, 15 October 1999

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**Centre for Information on Coconut Lethal Yellowing**

The Centre for Information on Coconut Lethal Yellowing has been established on the Internet and can be accessed at [http://www.cicy.mx/dir_acad/cicy/main.html](http://www.cicy.mx/dir_acad/cicy/main.html). Among the topics featured include host/pathogen/vector transmission; resistant and susceptible planting material; country information; sources of information about phytoplasma diseases of coconut and other palms; and a bibliography.
International Coconut Conference

The International Coconut Conference is scheduled to be held in July 2000 with the theme “Promoting a sustainable and equitable coconut industry in the 21st century”. The conference aims to review the state of coconut research and development at the end of the 20th century and to formulate a renewed programme to address the challenges and opportunities of the 21st century. The Bureau for Research on the Development of Tropical Perennial Oil Crops (BUROTROP), Asian and Pacific Coconut Community (APCC) and COGENT have agreed to co-sponsor the conference, in the ambit of APCC’s XXXVII COCOTECH Meeting.

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2nd International Coconut Embryo Culture Workshop

The 2nd International Coconut Embryo Culture Workshop will be held in Centro de Investigacion Cientifica de Yucatan (CICY), Merida, Mexico, on 20 – 23 March 2000. The objectives of the workshop are to report on the results of the COGENT-coordinated research activities of 13 embryo culture laboratories worldwide and the work of other partner institutions; further upgrade the coconut embryo culture technology to be used in training coconut researchers worldwide; and to formulate further research to refine and apply the technology in development-type project interventions.

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International Workshop on the Biology and Control of Coconut Mite (Aceria guerreronis)

The Coconut Research Institute (CRI) of Sri Lanka will hold a workshop on the biology and control of coconut mite, Aceria guerreronis, which has become a serious threat to the coconut plantations in the Indian sub-continent. The workshop is scheduled for 6 – 8 January 2000 and will be held at the Coconut Research Institute. The objectives of the workshop are to identify the gaps in knowledge of A. guerreronis with the assistance from experts involved in the control of the pest; formulate regional research programmes to effectively control the pest; and to alert the other Asian and Pacific countries of the possible threat of the pest invading their countries.

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