



NEWSLETTER

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About the Newsletter

The International Plant Genetic Resources Institute (IPGRI) is one of the 16 Centres of the Consultative Group on International Agricultural Research (CGIAR) with its Headquarters at Rome, Italy. IPGRI's mission is to encourage, support and undertake activities to improve the management of genetic resources worldwide so as to help eradicate poverty, increase food security and protect the environment. IPGRI focuses on the conservation and use of genetic resources important to developing countries and has an explicit commitment to specific crops. IPGRI works in partnership with other organizations, undertakes research and training, and provides scientific and technical advice and information. IPGRI operates in five geographical areas: Sub-Saharan Africa (SSA), the Americas, Europe, Central and West Asia and North Africa (CWINA), and Asia, the Pacific and Oceania (APO). APO Regional Office is based in Serdang, Malaysia with sub-regional offices for East Asia and South Asia located in Beijing, China and New Delhi, India, respectively. There is also an outposted staff in Pokhara, Nepal.

The APO Newsletter is produced thrice a year and is mainly aimed at promoting the overall concern on plant genetic resources, with emphasis on their conservation and use. [Contd. on page 5]

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Editorial

Promoting Sustainable Conservation and Use of Coconut Genetic Resources

About 96% of coconut farmers are smallholders and resource-poor. In the past two decades, these farmers have been suffering from low coconut productivity, low price and unstable markets for their traditional copra and coconut oil products that provide them with an average annual income of US\$ 180-200/year. This income is marginal and to improve the situation, there is a need to provide coconut farmers with high-yielding and widely adapted varieties, some of which are highly potential, multipurpose and suitable for the production of high-value products.

Achieving the above objective requires the use of a wide range of genetic diversity that can be exploited in a breeding programme. Since national coconut programmes have limited diversity, there is a need to augment national collection through further importation of desirable accessions from other countries and their conservation. There is also a need to provide security to the world coconut diversity to ensure sustainable coconut production.

Networking approach

The Consultative Group on International Agricultural Research (CGIAR) recognized that coconut research is a long-term undertaking and funding by developing countries is often limited and

discontinuous. Thus, the CGIAR decided in 1991 to include coconut in its research portfolio by incorporating coconut genetic resources in the research programme of the International Plant Genetic Resources Institute (IPGRI). To implement this decision, networking was chosen as the mechanism for promoting collaboration among coconut producing countries and other interested partners as it appeared to be the most advantageous and sustainable mode of operation. This approach, initiated by committed coconut producing countries, would avoid unnecessary duplication of efforts; promote complementation and synergy and would result in sharing of germplasm, technology and information. Based on this analysis, the International Plant Genetic Resources Institute (IPGRI) established the International Coconut Genetic Resources Network (COGENT) as the mechanism to implement a global initiative on conservation and utilization of coconut genetic resources. In 1992, there were 15 coconut producing countries as members. To date, there are 38 member countries worldwide.

Database development and sharing

In the past, most countries had limited germplasm and inadequate access to information on germplasm conserved in

other countries, a condition that hampered coconut breeding. The development of the International Coconut Genetic Resources Database (CGRD) through the help of the French Government and CIRAD enabled COGENT to document important data on accessions in national coconut genebanks. To date, information on 1338 accessions has been documented, updated and shared with coconut researchers worldwide. The CGRD allows coconut breeders the opportunity to systematically choose suitable breeding materials which they could use to develop improved coconut varieties and hybrids.

Conservation efforts

Considering the perennial nature and many industrial uses of coconut, with multi-sectoral users and beneficiaries as stakeholders, a comprehensive conservation system appears to be desirable. This would accommodate the germplasm that is needed to make available cultivars that will meet the needs of resource-poor smallholder growers and consumers and processing industries which generate employment and foreign exchange for coconut producing countries.

COGENT has helped member countries to collect germplasm in several countries and conserve important coconut diversity in national genebanks. To date, 1338 accessions have been conserved in 25 sites in 20 countries. Through the help of the Asian Development Bank (ADB) and the Department for International Development (DFID) of the U.K., additional 160 populations have been collected in the Asia-Pacific region, which are being conserved. The establishment of the multi-site International Coconut Genebank (ICG) hosted by India, Indonesia, Papua New Guinea and Côte d'Ivoire for their respective regions, each of which will conserve and share a maximum of 200 important accessions from South Asia, Southeast Asia, the Pacific, and Africa and Indian Ocean Islands, respectively, provides double security to nationally conserved germplasm. In addition, the ICG will also

undertake field evaluation and share data and germplasm with member countries using safe exchange guidelines as prescribed by FAO and IPGRI.

To complement the field genebanks, there is a need to develop a mechanism for long-term storage. To address this need, COGENT countries, in collaboration with advanced European laboratories, are developing cryopreservation technologies for zygotic embryos and pollen. At the same time, techniques for efficient regeneration and determination of genetic fidelity of resulting materials are also being addressed.

There is a strategic value for *in situ* conservation as farmers have extensive knowledge of their coconut diversity, especially those with desired characteristics and are adapted to local climate and culture. Through the assistance of the International Fund for Agricultural Development (IFAD), farmer participatory research is being undertaken in 14 Asia-Pacific countries in which farmers are encouraged to identify and conserve their coconut diversity *in situ*. This initiative will complement the *ex situ* conservation, and will remain to be a very important conservation method in terms of the amount of genetic diversity maintained over time.

Promoting germplasm utilization

The benefit of conserved germplasm would only be maximized if these were utilized to benefit resource-poor coconut farmers. The characterization of 1338 accessions in national genebanks and the sharing of passport and characterization data with coconut breeders worldwide has promoted the use of wider genetic diversity in national breeding programmes. The recent decision of the COGENT Steering Committee to develop a globally coordinated breeding project is also a step in this direction. Using the characterization and evaluation data generated from the field genebanks and the farmers' varietal preferences generated in farmers participatory

research on *in situ* conservation, varieties and hybrids could be developed which would have the attributes of high yield and adaptation as well as acceptance by resource-poor coconut farmers.

To further maximize the use of conserved germplasm, COGENT is initiating the deployment of important genetic resources in coconut producing communities to increase yield and adaptation, enhance incomes through suitable germplasm for high-value products and increased income per unit area per unit time through intercropping. This poverty alleviation initiative which will benefit poor coconut farmers and socio-economically disadvantaged women, is planned to be introduced in 75 coconut growing communities in 15 countries.

Sustainability

The establishment of COGENT fulfils the urgent need for an internationally coordinated research programme on coconut genetic resources in support of the resource-poor coconut farmers and consumers. To date, COGENT has achieved some modest outputs in conservation and utilization of coconut genetic resources as well as national capacity building including human resource development. Support of donors and partner institutions are strong. To ensure its sustainability, member-countries are expected to abide by the basic COGENT networking principles of full access to germplasm and information; sharing of resources to implement agreed projects and activities; and commitment to collaborate in addressing common problems and opportunities. The public and private sectors have high expectations from COGENT to benefit the farmers in the shortest possible time. In the final analysis, however, the success of COGENT would depend not on the support of international donors and partners but on the commitment and political will of COGENT member countries. [Dr Pons Batugal, IPGRI Senior Scientist and COGENT Coordinator, IPGRI-APO, Serdang, Malaysia].

Headquarters

Serving the PGR Community: IPGRI's New Website

IPGRI's new Website was released in July 2000 with a new address (www.ipgri.cgiar.org), a new design that reinforces the institute's corporate image and a new thematic approach.

Goal

The goal of IPGRI's Website is to be the principal portal to information on plant genetic resources on the Internet. It serves to raise the profile of IPGRI and inform its target groups of the institute's vision, programme and achievements. Target groups include PGR scientists, donors, policy and decision-makers, educators and trainers, students, NGOs and private sector companies.

Organizing information by theme

Information on the site is organized by theme to help users find the information they need. The themes used are:

- Institutional information
- Genetic resources themes
- Regions
- Networks
- Information resources
- Crops/Species
- Events
- Training
- Countries

Institutional and technical information

The site provides both institutional and technical information, addressing the needs of different target audiences.

Institutional information includes:

- IPGRI's vision, strategy and structure
- Board of Trustees and Donors
- Office locations
- Vacancies, etc.

Technical information is organized by topic and region and includes:

- The *in situ* Conservation project (www.ipgri.cgiar.org/themes/in_situ_project/home/insituhome.htm)
- The Forest Genetic Resources area ([www.ipgri.cgiar.org/programmes/grst/FGR/ FGRhomepage.htm](http://www.ipgri.cgiar.org/programmes/grst/FGR/FGRhomepage.htm))
- Regional platforms for plant genetic resources in Europe, the Americas, Central and West Asia and North

Forthcoming Website

Work is underway on a COGENT Website and a platform for Plant Genetic Resources in Asia, the Pacific and Oceania. Prototypes for these have been developed and are being tested.



Africa, Sub-Saharan Africa and Asia, the Pacific and Oceania region.

Databases facilitate information delivery

Most of the information on the site is provided dynamically through databases. These include:

- A *Publications Catalogue* providing access to IPGRI publications, 145 of which are available as full text and can be downloaded free of charge (www.ipgri.cgiar.org/publications/indexpub.htm)
- *Public Awareness materials* such as Geneflow, Annual Reports and PGR bulletins
- *Training opportunities database* providing information on degree programmes, courses and workshops worldwide in genetic

resources and related disciplines (www.ipgri.cgiar.org/training/trop.htm)

- *Internet Links Directory* providing access to other relevant websites (www.ipgri.cgiar.org/links/select.asp)
- *Information desk* providing access to selected library and scientific references at IPGRI and worldwide (www.ipgri.cgiar.org/library/resources/library.htm)

Help in finding information

The site has a flexible search function that helps users find the information they are looking for. The search function provides for:

- a free-text search of the pages' content
- a simple search of the web pages catalogue

- a dynamic site map

This will soon be supplemented by a searchable staff database that will help users identify and contact IPGRI staff working in particular fields.

A popular site

A recent survey shows more than 12 000 'visits' a month to the IPGRI Website. The most frequently visited 'pages' are the publications catalogue and the training area, which offers many training materials on conservation and use of plant genetic resources that users can download. The publication that has been downloaded most often since the launching of the website is the 'Guidebook for Genetic Resources Documentation' by K.A. Painting, M.C. Perry, R.A. Denning and W.G. Ayad. [Mr Paul Neate, Senior Scientist and Head, Communications Services, DIT, IPGRI-HQ, Rome, Italy].

Regional

Update on IPGRI-APO Activities

IPGRI-APO is involved with the national programme in several research and PGR activities particularly focusing on conservation, use and management of genetic resources, thematic research in this context, capacity building and public awareness. Progress of such major collaborative activities undertaken/conducted at national/regional levels during the last four months is briefly reported.

Conservation and use of genetic diversity in tropical fruits

Several activities under ADB project are in progress such as in *Nephelium ramboutan-ake* and *Mangifera odorata* with MARDI, Malaysia; Mango, *Citrus* spp, *Garcinia* spp., in the Philippines with NPGRL, IPB, UPLB; mango and rambutan with DOA, Thailand; *Citrus*, mango and litchi with VASI, Vietnam and with CRI, CAAS in China and ICAR in India; rambutan and mangosteen in Indonesia with the National Committee on

PGR; mango and *Citrus* with NARC, Nepal; mango and jackfruit with DOA, Sri Lanka; Jackfruit, mango and citrus with BARI, Bangladesh.

Research on conservation of *Citrus* genetic resources

Much progress has been made in a collaborative effort with Universiti Kebangsaan Malaysia on the conservation of *Citrus* genetic resources. The study focused on seed tolerance to desiccation and freezing and was financially supported by the Republic of Korea. Four species of *Citrus* and citroids namely, *Citrus madurensis*, *Fortunella polyandra*, *Citrus* sp. and *Murraya koenigii* have been studied. The seeds of these species were exposed to different periods of desiccation in an air-conditioned laboratory (23.8+/-0.2°C; RH 77.5+/-0.8%) followed by exposing them to low temperatures (5–18°C and liquid nitrogen at -196°C). *Fortunella polyandra* and *Murraya koenigii* seeds were found to be sensitive to desiccation and freezing; *M. koenigii* seeds were more sensitive than those of *F. polyandra*. *C.*

madurensis and *Citrus* sp. seeds were found to be more tolerant to the two factors studied. Cryopreservation of embryonic axes of these two species using desiccation technique was recommended to conserve their germplasm. However, for *F. polyandra* and *M. koenigii*, alternative cryopreservation techniques using embryonic axes or shoot tips need to be developed. [Abstracted from: Normah Mohd. Noor. 2000. Conservation of *Citrus* Genetic Resources; Seed Tolerance to Desiccation and Freezing. IPGRI Project Report. IPGRI-APO, Serdang, Malaysia].

Another study undertaken in collaboration with Universiti Putra Malaysia (UPM), on the cryopreservation of selected *Citrus* species focused on seed tolerance to fast drying and survival of decorticated seeds in liquid nitrogen and effects of slow drying on survival of decorticated seeds in liquid nitrogen. The Republic of Korea funded this study on two *Citrus* species, namely, *C. madurensis* and *C. grandis*. The study

confirmed that for decorticated seeds of *C. madurensis* precultured in 0.6M sucrose, slow desiccation in the LAF cabinet was more effective than fast drying using air forced through silica gel. The ideal moisture is 13% where a survival of 43% could be achieved in liquid nitrogen. *Citrus grandis* seeds of UCKK variety were not recalcitrant as they could be desiccated to 6% with more than 90% germination. Decorticated seeds can desiccate faster than the whole seed and have higher survival in liquid nitrogen especially at lower moistures of 6–8%. [Abstracted from: Hor, Y.L. and E. Cho. 2000. Cryopreservation of Selected *Citrus* Species. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

Research on sweetpotato under the auspices of ANSWER

In collaboration with the Universiti Putra Malaysia, the study on the genetic diversity in sweetpotato as measured using molecular markers and its relation to gene expression as expressed in the form of heterosis within their progenies made further progress. It was noted that there was no correlation between heterosis and genetic distance and this could be due to the small level of dissimilarity between parents which were from the same region. Technique for measuring genetic diversity in sweetpotato accessions has been standardized and further work on diverse genotypes is in progress. [Abstracted from: S. Saad. 2000. Genetic Diversity in Sweet Potato as Measured Using Molecular Markers and its Relation to Gene Expression as Expressed in the Form of Heterosis Within Their Progenies. IPGRI Project Report. IPGRI-APO, Serdang, Malaysia].

Analysis of genetic diversity in the *Vigna angularis* complex and related species in East Asia

IPGRI is assisting the National Institute of Agrobiological Resources (NIAR), Japan; the Chinese Academy of Sciences (CAAS), China; the Pyongyang Crop Genetic Resources Institute, DPR

Korea and the National Seed Management, Rural Development Administration, Republic of Korea in carrying out collaborative research on *Vigna angularis* complex and related species in East Asia. The study is financed by Japan. A joint team from NIAR and Republic of Korea collected germplasm in Japan after determining genetic diversity using AFLP technique, which clearly identified the different species and also enabled collecting of specific ecogeographic races of both *V. riukiensis* and *V. nakashimae*. Database development has begun for *Vigna* germplasm in East Asia with inputs from China, Japan, DPR Korea and Republic of Korea. [Abstracted from: Shoji Miyazaki. 2000. Analysis of Genetic Diversity in the *Vigna angularis* Complex and Related Species in East Asia. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

IPGRI collaborates with Nepal and Japan on conserving buckwheat genetic diversity

IPGRI assisted National Institute of Agrobiological Resources (NIAR), Japan and Nepal Agricultural Research Council (NARC), Nepal in carrying out a collaborative research programme on *in situ* conservation of buckwheat genetic resources in Nepal. This study is financed by Japan. A joint team surveyed important bitter buckwheat (*Fagopyrum tataricum*) growing areas and seed samples were collected from several locations. The seed was brought to NIAR, Japan and only 8 samples germinated. Young leaves from the germinated samples were used to extract DNA using CTAB method. The genetic diversity of these was studied by RAPD analysis using 11 primers (which were identified to give polymorphic bands earlier of the 75 tested) and 39 polymorphic bands were observed. The genetic variability was estimated using DICE similarity coefficient index. Based on the level of genetic diversity and its distribution, two populations were suggested for *in situ* conservation. [Abstracted from: Bimb, H., S. Fukoku

and T. Nagamine 2000. *In situ* Conservation of Plant Genetic Resources. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

In situ conservation of buckwheat in China

IPGRI collaborated with the Chengdu Institute of Biology, Chinese Academy of Sciences in determining the feasibility of conserving buckwheat *in situ* in China. In this study, 20 counties in Sichuan and Yunnan Provinces were covered and agrobiological characters of tartary buckwheat and its wild relatives were studied. A total of 56 plant communities were investigated and 277 specimens belonging to 8 species and 1 variety were collected. Various agrobiological characters were recorded. The allozyme and agrobiology research report for 50 samples using the cluster and factor analysis were completed. Further analysis of data is in progress. [Abstracted from: Zuo Cheng Zhao. 2000. Feasibility Study of Buckwheat *In Situ* Conservation in China. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

IPGRI supports work on developing sesame core collection in Korea

IPGRI is working with the Division of Industrial Crops, National Crop Experiment Station, Republic of Korea on establishing a sesame core collection

About the Newsletter

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It provides information on plant genetic resources activities carried out by national programmes and other centres in the region. Information is also periodically abstracted from recent literature (books, periodicals, etc.), and brief research contributions published. With over 2500 addressees on its mailing list, the APO newsletter is widely distributed to focus on IPGRI's mandate to advance the conservation and use of plant genetic resources for the benefit of present and future generations.

of Korean landraces. A total of 2740 Korean landraces were planted and observations/information on several descriptors have been recorded. Further work is in progress. [Abstracted from: Kang, C.H. 2000. Establishment of Sesame Core Collection of Korean Landraces. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

Status of litchi genetic resources in India, Thailand and Myanmar

A status report on Genetic Resources of Litchi in India, Myanmar and Thailand has been completed. The major production problem is low and irregular yields due to poor flowering and fruit set. Inadequate flowering is due to lack of growth check whereas poor fruit set may be due to several factors such as water stress, nutrient deficiency, insufficient number of female flowers, poor overlap of flowering stages, excessive flowering, poor pollination, disease and pest damage. In India, sun burning and skin cracking of the fruit is a major problem in West Bengal, Bihar, Punjab, Tripura and Assam, whereas in Thailand and Myanmar, its management is amongst the most difficult both in the field and market. The future prospects of litchi in India appear to be good as the demand in domestic and export market is much more than the present level of production, whereas the scope of expansion in Thailand and Myanmar is rather limited. Further research is required in the area of crop improvement, plant production and management, and handling and storage. [Abstracted from: Ghosh, S.P. and S.K. Mitra. 2000. Status Report On Genetic Resources of Litchi in India, Thailand and Myanmar. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

Participatory approaches to PGR conservation and use in Yunnan Province of China

IPGRI collaborated with Crop Germplasm Resources Institute, Yunnan Academy of Agricultural Sciences to establish a participatory assessment group to test and generate participatory methods suitable to Yunnan province in

the field of plant genetic resources management. Yunnan province is praised as the Kingdom of Plants where very rich biodiversity of PGR has been managed and used. A village biodiversity fair was held wherein 140 people participated from 59 households and 62 accessions of crop resources were exhibited. [Abstracted from: Dai Luyuan. 2000. Participatory Approaches to PGR Conservation and Use in Yunnan Province of China. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

IPGRI helps Thailand in organizing basic documentation course

IPGRI collaborated with Department of Agriculture in organizing the basic documentation course. More than 11 Thai researchers participated in the course and discussions were held on genebank objectives, information and organization including descriptor list, descriptor states and documentation system. Trainees were able to practice PGR documentation and improve their skills. [Abstracted from: Jaray Sadakorn. 2000. Training Course on Basic Documentation. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

Fifth SANPGR meeting

The fifth meeting of South Asia Network on Plant Genetic Resources (SANPGR) was organized at the National Bureau of

Plant Genetic Resources (NBPGR), New Delhi from 9-11 October 2000. Seventeen participants from national programmes (Bangladesh, Bhutan, India and Nepal) and international organizations (FAO, ICRISAT, IPGRI) participated in the meeting.

Dr R.S. Paroda, Director General, Indian Council of Agricultural Research and Secretary, Department of Agricultural Research and Education, Government of India was the Chief Guest who inaugurated the meeting. Dr Paroda emphasized on the need for greater collaboration in the South Asia region and appreciated IPGRI's role and support in this direction. He also mentioned that different crop networks in the region could function under the umbrella of APAARI, which is collaborating with IPGRI for priority activities. He further informed that Global Forum for Agricultural Research (GFAR) also provides support for network activities.

Dr Percy E. Sajise, Regional Director, IPGRI-APO, Malaysia who chaired the Inaugural Session, appreciated the efforts being made by the national programmes in implementing GPA priority activities. He mentioned about the need for focussed attention for joint collaborative activities between the partners. He also highlighted the importance of SANPGR in effective implementation of PGR programmes and



Fifth Meeting of South Asia Network on Plant Genetic Resources (SANPGR)

activities and on the need for sustainability of this network based on concrete action plan.

There were five technical sessions: i) Current status of national PGR programmes, ii) IPGRI's activities in the region iii) Germplasm utilization and PGR policies, iv) Strengthening PGR collaboration, and v) Finalization of recommendations and action plan. The first three sessions dealt with presentations on country reports, IPGRI's supportive role and specific topics relating to PGR utilization and policy issues, while the remaining two sessions were devoted to in-depth discussions on specific issues and developing concrete action plans. Several important recommendations emerged which were of both general and specific nature.

The general recommendations included: (i) integration of PGR activities into SANPGR, (ii) initiating networks on minor millets, minor legumes, amaranth and cucumber, (iii) providing more resources to SANPGR, (iv) developing/ enhancing institutional capacity for dealing with policy and legal issues, (v) sharing of NBPGR genebank facilities by SANPGR countries, (vi) developing list of research topics for M.Sc./ Ph.D. students, and (vii) identifying focal persons for horticulture and forestry. The specific recommendations were: (i) joint exploration for germplasm collecting; (ii) joint evaluation of released varieties and elite lines of *Lathyrus*, blackgram and amaranth; (iii) joint testing of varieties of okra, sesame and eggplant; (iv) establishing PGR information network and developing web pages; (v) promoting the use of DIPVIEW and Education Kit for school children; (vi) developing germplasm directory and PGR workers' directory; (vii) establishing regional plant quarantine network; (viii) promoting germplasm exchange through Material Transfer Agreement (MTA); (ix) focusing on germplasm use activities; (x) assessing genetic diversity and genetic erosion in conserved germplasm; (xi) enhancing human resource development through training courses, exchange visits

and postgraduate studies; and (xii) strengthening laboratory facilities particularly for biotechnology and *in vitro* conservation and cryopreservation. The proceedings of the workshop will be published. [Dr Bhag Mal, Coordinator, IPGRI Office for South Asia, New Delhi].

Regional training course on *in vitro* conservation and cryopreservation

A Regional Training Course on 'In Vitro Conservation and Cryopreservation' funded by ADB and FAO was organized under the auspices of IPGRI, FAO and ICAR at NBPGR, New Delhi, from 12-25 October 2000. The objective was to promote the use of biotechnological methods for sustainable conservation and use of vegetatively propagated and recalcitrant seed germplasm. The course was attended by 8 participants from six countries of the Asia-Pacific region, namely, Sri Lanka, Philippines, Papua New Guinea, Republic of Korea, India and Indonesia. The trainees were research workers engaged in the field of *in vitro* conservation and cryopreservation, especially in conservation of coconut genetic resources. The course was designed to give the trainees an overview of the theoretical and practical aspects of *in vitro* conservation and cryopreservation techniques, with special emphasis on coconut. The topics broadly covered included: Principles and

concepts in plant genetic resources conservation and use; Complementary conservation strategies; *In vitro* methods for medium-term storage; *In vitro* collecting of germplasm; Virus indexing; elimination and germplasm exchange; Germplasm characterization and evaluation; Management of *in vitro* and cryopreserved collections; Cryopreservation techniques; Coconut biotechnology; Genetic stability; Economic aspects of *in vitro* genebanks.

The faculty to conduct the course comprised experts from FAO, IPGRI, NBPGR and the Central Plantation Crops Research Institute (CPCRI), Kasaragod. During the training course, 27 lectures, 9 practicals and 2 demonstrations were organized covering various aspects of PGR conservation and use including the role of IPGRI and FAO.

An important outcome of the training course was the training manual, which could serve as a model-training module for all the laboratories engaged in similar research work in different countries. Various aspects relevant to countries of the region were incorporated to develop and enhance PGR activities. The trainees as well as the resource persons benefited richly through their interaction during the course. [Dr B.S. Dhillon, Director, National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi 110012, India].



Participants of Regional Training Course on 'In vitro Conservation and Cryopreservation'

IPGRI helps Sri Lanka in organizing national PGR workshop

A National Workshop on Plant Genetic Resources jointly organized by the Plant Genetic Resources Centre (PGRC), Gannoruwa, Peradeniya, Sri Lanka and IPGRI-APO was held at PGRC from 8-10 November 2000. At this workshop, the PGR workers in the country met on a common platform and discussed, interacted and updated information on various aspects relating to collection, multiplication, evaluation, documentation, *in situ* and *ex situ* conservation and utilization of plant genetic resources which included agricultural crops, plantation crops, forest genetic resources, forage crops, export crops and medicinal plants. Over 70 participants from various crops research institutes, universities and state departments involved in PGR activities participated. IPGRI was represented by two participants. The programme comprised of five technical sessions, viz., Global and Regional Perspectives; National Perspectives; Conservation Approaches; National Policies and Legislation and Capacity Building. Group discussions were held on four themes, viz., PGR conservation and utilization; National needs and capacity building; Plant quarantine and germplasm exchange; and National legislation and policy issues.

The workshop deliberations led to several recommendations, viz., i) PGRC will be the nodal agency for all PGR activities in Sri Lanka (including PGR exchange), ii) Establish a National PGR Coordination Committee, iii) Establish Crop Germplasm Advisory Committee, iv) All plant genetic resources conserved in Sri Lanka need to be documented, v) Conserve a duplicate set of the germplasm held in PGRC in another genebank for security reasons, vi) Extend PGRC conservation facilities for long-term storage, vii) Convert the present cooling system to a CFC-free system, viii) International expedition needs to be organized to study and

collect tea genetic resources in their centres of diversity, ix) Establish link programme with Universities for research and education on PGR activities, x) Establish a National Coordination Committee on PGR to look into policy related issues in the light of current global developments and make necessary recommendations. [Dr A.H.M. Jayasuriya, Senior Deputy Director, Plant Genetic Resources Centre, Gannoruwa, Peradeniya, Sri Lanka].

Expert consultation meeting on soybean genetic resources and base broadening in the farming system

The Expert Consultation was jointly organized by IPGRI and the National Research Centre (NRC) for Soybean and held at NRC, Indore from 13-15 December 2000. Presentations were made on: base broadening history and review of case studies; status of soybean production and research in India, China and USA; genetic base of soybean breeding in India, China and USA. This was followed by a brainstorming session to discuss major constraints to base broadening in soybean. The major recommendations included: i) promoting exchange of germplasm; (ii) supply of material possessing drought resistance as well as vegetable types of soybean to partners; (iii) studying the germplasm base using procedures adopted in

America and China for coefficient of parentage (CoP) and complementing it with molecular studies; (iv) identifying and exchanging sets of cultivars and accessions for collaborative trials; (v) exchanging information on germplasm holdings; (vi) involving Japanese and Brazilian soybean researchers, and (vii) preparing a concept note for developing and maintaining soybean populations.

National training for germplasm database management in Papua New Guinea

A national training course for germplasm database management was organized from 4 - 7 December 2000, for staff of National Agricultural Research Institute (NARI) at NARI's Laloki Research Station with technical assistance from IPGRI. Ten professionals from different centres participated in this course and Dr P.N. Mathur was a resource person from IPGRI New Delhi Office. The purpose of this training was to: i) exposure for preferred software for germplasm databases; ii) understanding for building a database/database structure; iii) learning efficient data entering; iv) manipulating data in the database; and v) using the database to generate reports. The participants were exposed more elaborately to the use of MS Excel for PGR database and data analysis; concept of Data Interchange Protocol (DIP) and the use of DIP Viewer



Consultation Meeting on Soybean Genetic Resources and Base Broadening being Inaugurated

software; and use of Geographical Information System (GIS) for mapping and monitoring genetic diversity using GIS based software such as FloraMap and DIVA.

TaroGen Update

The ongoing activities of the project on germplasm collecting, conservation and improvement were continued. Collecting of taro germplasm has been completed and over 2200 accessions are held in various Pacific Island collections. In Papua New Guinea (PNG), a database using a set of IPGRI descriptors for morphological characterization of germplasm has been forwarded to IPGRI. Taro germplasm characterization databases of Vanuatu and New Caledonia, using TANSO descriptors, have been sent to IPGRI. Dr P.N. Mathur in IPGRI APO is currently using this information for rationalization of taro collections. The selected accessions will be sent to the University of Queensland for DNA fingerprinting and selection of the core sample. The Polynesian collections have been prepared and is ready to be sent to the University of Queensland for DNA fingerprinting. Project activities in the Solomon Islands are being monitored. Progress using cryopreservation has been limited because of bacterial contamination of samples. Ten cultivars from the regional taro collection have now been identified as clean (free from bacterial contamination). An additional seven accessions from the Fijian collection have been initiated into tissue culture. In PNG, work is progressing and seedlings from breeding cycle-4 will be transferred to the field for evaluation. Characterization of selected cycle-3 lines has been completed for above ground plant parts as well as the corm. Screening of elite cycle-3 lines for taro leaf blight resistance, yield and eating quality is in progress and is due to be completed. All genotype x environment interaction trials of cycle-2 elite-lines have been harvested and the data collected is currently being analyzed.

In Samoa, the Taro Improvement Project (TIP) held monthly meetings regularly and organized a Taro Diversity Fair on 22 November 2000, at USP in Samoa. Nurseries have been established for the multiplication of clones from breeding cycle-2 in Samoa. These clones will be evaluated by TIP farmers early next year.

Taro Genetic Resources Committee (TGRC) Meeting: The TaroGen TGRC meeting was held at SPC, Suva, Fiji from 27-29 November 2000, and was attended by 30 participants from NARI and DAL, PNG; MAFF, Fiji; MAFFM, Samoa, USP; Queensland University of Technology (QUT); University of Queensland (UQ); HortResearch; IPGRI; AusAID; SPC and the TaroGen project. Technical progress reports were presented by the Team Leader, TaroGen and representatives from IPGRI, HortResearch, QUT and UQ. [Contributed by: Danny Hunter, Team Leader, TaroGen, SPC, Suva, Fiji, Suva, Email: dannyh@spc.int].

ANSWER Meeting

Taking advantage of the presence of number of ANSWER members, Dr Gerry Mariscal (ViSCA, Philippines), Network Coordinator organized a meeting of ANSWER (Asian Network for Sweet Potato Genetic Resources) on 14 September 2000, during the ISRTC Congress 2000 in Tsukuba, Japan. The meeting was chaired by Dr Mariscal. Dr V. Ramanatha Rao represented IPGRI. The Coordinator informed that the ANSWER website was developed (www.eseap.cipotato/ANSWER). A decision was made to place the sweet potato characterization data on the web, and some discussion on traits that could be placed on the web took place. The Coordinator will finalize the list of traits. Later, the members updated on activities that have been going on in each country since the last meeting in Bogor. It was agreed that the members would jointly work on mapping of germplasm collected on a regional scale. [Dr V. Ramanatha Rao, Senior Scientist (Genetic Diversity/

Conservation), IPGRI-APO, Serdang, Malaysia].

Bamboo and Rattan and Forest Genetic Resources Update

Conservation of FGR in Vietnam

IPGRI's partners at the Research Centre for Forest Tree Improvement of the Forest Science Institute of Vietnam have been carrying out research on several important timber species in the country and recently a new study focusing on one of these species, *Pterocarpus macrocarpus*, was initiated. The study will assess genetic diversity of the species in the Central Highlands region, where most of the remaining populations of the species exist, and in northern Vietnam. The study is expected to locate genetic diversity for further conservation efforts as well as to provide information on the effect of human disturbance on genetic diversity of the species.

A FGR networking initiative for the Asia-Pacific region

IPGRI and the Asia Pacific Association of Forestry Research Institutions (APAFRI) have tentatively discussed a joint networking initiative on FGR to enhance dissemination of information and to increase communication among various stakeholders. A concept note on this issue was prepared for the 7th APAFRI Executive Committee meeting held in Kuala Lumpur on 13 November 2000. The opinions and more detailed needs of the APAFRI member institutions are now being screened for possible further development of the networking initiative. Relevant international and regional forestry organizations have also been notified of this initiative and asked to provide their views.

IPGRI supports use of biotechnological methods in rattan research

IPGRI is supporting the National University of Singapore to work on the identification of genetic markers for gender determination in dioecious

rattans. This work is expected to help in managing the male:female ratio in natural populations of rattans. Leaf samples were collected from 2 locations in Singapore. DNA was isolated from one set of the samples collected using the CTAB method and good result was obtained from 4 samples. Repeat extractions are in progress to obtain high quality DNA suitable for the RAPD amplification. In the next phase of the project, plans have been made to optimize the amplification DNA for all the samples collected. [Abstracted from: Kumar, P. 2000. Identification of Genetic Markers for Gender Determination in Dioecious Rattan. IPGRI Report, IPGRI-APO, Serdang, Malaysia].

Research on socioeconomic causes and consequences of loss of bamboo and rattan resources in Karnataka, India

In collaboration with Ashoka Trust for Research in Ecology and the Environment (ATREE), a socioeconomic study is in progress on the causes and consequences of loss of bamboo and rattan resources. This study has shown that there is a large demand for bamboo products from the sericulture sector. Karnataka being one of the major producers of silk and silk products in India, it is necessary to protect bamboo as it forms the most important raw material in producing equipment for the sericulture industry with no substitute till date. [Abstracted from: Uma Shaanker, R., K.N. Ganeshiah and K.S. Bawa. 2000. Socioeconomic Causes and Consequences of Loss of Bamboo and Rattan Resources in Karnataka, India. IPGRI Project Report. IPGRI-APO, Serdang, Malaysia].

Mapping genetic diversity of bamboo and rattans in the Western Ghats of India

IPGRI collaborated with University of Agricultural Sciences, Bangalore in mapping of genetic diversity in bamboo and rattan in the Western Ghats and Central Western Ghats of India. Based on surveys, the geographical distribution

Ms Ramamani Y.S. has joined as Scientific Officer (Tropical Fruits) at IPGRI South Asia Office at New Delhi on 28 December 2000. Ramamani is an Indian National and her academic background includes a Master of Science degree in Botany and a Bachelor of Science degree from Bangalore University and a Diploma in Computer Studies. She has an interesting and varied work experience and had been involved in design and development of an electronic computerized plant taxonomic database for the vascular flora of India. Her professional experience includes research, design and development of database structures, along with analysis and editing of data.



of bamboo has been mapped for the Western Ghats. The phylogenetic association among species of bamboo is in progress along with a study of population and genetic variability of *Dendrocalamus strictus* in the Western Ghats and of *Calamus thwaitesii* in Central Western Ghats. [Abstracted from: Uma Shaanker, R., K.N. Ganeshiah. 2000. Mapping Genetic Diversity of Bamboo and Rattans in the Western Ghats of India. IPGRI Project Report, IPGRI-APO, Serdang, Malaysia].

Community conservation of bamboo in China

Seventeen species and 3 cultivars of bamboo consisting of about 3000 individual clusters have been planted in a 2 ha area of a community gene pool in Hongqiang, Central Yunnan, China. In addition, a training workshop was held to disseminate information on management techniques for bamboo for about 30 persons from the community in the area. Field collection trips have indicated that more than 15 species are present in central Yunnan representing the species diversity of bamboo in the area. [Extracted from report "Collection of Native Bamboo as a Community Gene Pool in Central Yunnan, China" by Long Chun-lin].

New initiatives

Two bamboo studies, one on genetic diversity and sustainable development of bamboo resources in Xishuangbanna, Yunnan, China and another on *ex situ* collection of bamboo for national

conservation and research in Malaysia have been initiated in the two countries, respectively. Two rattan projects one on population status and genetic variation of a commercially valuable rattan, *Calamus manan* in Sumatra, Indonesia and another on the distribution and status of rattan in Bardiya district of Nepal were finalised for implementation.

FAO expert consultation on rattan development

IPGRI participated in the FAO Expert Consultation on Rattan Development held in FAO, Rome in December 2000. The consultation brought together 24 rattan experts to review the state of knowledge on rattan resources and utilization. The low priority accorded to certain aspects of rattan resource management in many countries where the resource was available and the lack of information in specific fields were recognised. As a result of the consultation, FAO will be developing an action plan to seek funding to support activities on rattan resource development.

Training and meetings

Three partners, one each from Indonesia, India and Vietnam were sponsored for a "Short Course on Application of Biotechnology in Forestry" held at Universiti Putra Malaysia. The course provided training in the use of biotechnological techniques useful for bamboo and rattan genetic resources conservation. Another partner from India was partially supported to attend the 21st

IUFRO World Congress held in August 2000 in Kuala Lumpur. IPGRI participated in the satellite meeting of INBAR to discuss the holding of a rattan world conference in 2002. [Mr L. Hong, Dr Jarkko Kosekela and Dr V. Ramanatha Rao, Senior Scientist (Genetic Diversity/Conservation), IPGRI-APO, Serdang, Malaysia].

Chilli and Mungbean Improvement at AVRDC

New Chilli line 9852-173 is a standout with high yield and good disease resistance to bacterial wilt and potato virus Y, and tolerance to anthracnose fruit rot. The test was conducted in 15 locations around the world and this line ranked first or second in half of the trials. When arranged over these locations, the line yielded five times more than the long-term check variety and two times more than the mean of the trials, which tested 20 entries. The line performed well at different locations. The fruit is about 10 cm long, 1.5 cm wide, mildly pungent and light green to red. (For more details contact Mr Peter Hanson at AVRDC).

AVRDC mungbean variety VC/973A has gained popularity in Myanmar. It covered about 80% of the mungbean area in Myanmar. [Centerpoint 18(2): June 2000].

PROSEA Activities

PROSEA participates in IPGRI-APO's regional planning meeting

The PROSEA Network Office, headed by Dr B.P. del Rosario represented PROSEA during the Annual Regional Planning Meeting of the International Plant Genetic Resources Institute - Asia, the Pacific and Oceania (IPGRI-APO). The meeting was conducted at Serdang, Malaysia from 25-29 September 2000. Dr del Rosario and Dr Soedarsono Riswan participated and presented the paper "PROSEA: Prospects in Plant Resources for the Region". The paper discussed the objectives, activities and outputs of PROSEA *vis-a-vis* IPGRI-APO's mission, objectives, strategies and programmes. The report highlighted

In Memoriam

It is with utmost shock and sorrow that we received the sad news of sudden and untimely demise of Dr Crisanto R. Escano, Director of the Crops Research Division, Institute of Plant Breeding, College of Agriculture, University of the Philippines Los Baños College, Laguna 4031, Philippines. As Chairman of the Committee for the Regional Cooperation in South-East Asia on Plant Genetic Resources (RECSEA-PGR), Dr Escano supported efforts in the Regional Cooperation, particularly RECSEA's exchange of experiences on documentation of germplasm collection. He also explored the potential of the National Committee on PGR as the centre of an information network. He had a deep sense of commitment to research and development and his efforts to enhance scientific research helped ensure the collection, conservation and utilization of valuable plant genetic resources in the country. Dr Escano was well known for his sense of humour and devotion to duty. He was a firm believer of human resource development and always encouraged his staff to pursue advance studies for a brighter future.

IPGRI joins the PGR community to extend heartfelt condolences to the bereaved family.

the present contributions of PROSEA in the attainment of IPGRI's mandate. The participation of PROSEA in the IPGRI meeting proved beneficial to both parties. In the process of the planning meeting, IPGRI and PROSEA were able to identify areas of collaboration and linkage. One of these will be enhancement of the science school curriculum using information on plant genetic resources. The exercise showed the essence of synergy- through collaboration and linkage, small resources put together could produce large outcome. [PROSEA Newsletter, No.25, October 2000].

PROSEA Vietnam held national workshop

A National Workshop was held on 30 August 2000 in Thangloi Hotel, Hanoi and was attended by 50 participants. The participants were mostly researchers, scientists, educators, managers of plant resources and environment. They represented the following institutions: Institute of Ecology and Biological Resources/ National Centre for Natural Science and Technology, National University, Agro-Forestry University, Institute of Materia Medica, National Information and Documentation Centre for Science and Technology, Forestry Science Institute, Pharmaceutical

University, and National Park. The workshop recommended the following follow up: i) sustainability of PROSEA programme at the national level, ii) excellent quality of PROSEA volume translation in Vietnamese, iii) intensifying dissemination of PROSEA products to various clients, i.e. educators, farmers, extension workers and private sectors; and iv) active participation of private sector in future PROSEA activities. [PROSEA Newsletter, No.25, October 2000].

National Programmes are requested to contribute short research articles, news/ notes or other important information on PGR related topics including websites for inclusion in the next issue of the Newsletter. Please send your contributions to any of the three IPGRI-APO Offices.
[See addresses on page 24]

COGENT Update

Twenty Countries Conserve Coconut Germplasm Diversity

ADB-funded Project: Coconut Genetic Resources Network and Human Resources Strengthening in Asia and the Pacific (Phase II): Under this project twenty countries are currently involved in several activities aimed at developing a sound management of coconut genetic resources through sustainable conservation and utilization of the coconut. These are China, Vietnam, Thailand, Malaysia, Indonesia, Philippines, Bangladesh, India, Pakistan, Sri Lanka, Fiji, Samoa, Papua New Guinea, Solomon Islands, Tonga, Vanuatu, Cook Islands, Kiribati, Tuvalu and the Marshall Islands. They are involved in the project to strengthen coconut genetic resources network and human resources in Asia and the Pacific region. These 20 participating countries have collected and conserved coconut germplasm, and have submitted passport and characterization data on 1338 accessions to the Coconut Genetic Resources Database (CGRD). Five countries have conducted hybrid/variety trials and two have used molecular markers to characterize their germplasm collections. Fourteen countries have conducted farmer participatory surveys to identify farmer's varieties and multipurpose uses of the coconut.

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

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

Increase in Yields and High-Value Products to Enhance Farmers' Income

IFAD-funded Project: Sustainable Use of Coconut Genetic Resources to Enhance Incomes and Nutrition of Coconut Smallholders in the Asia-Pacific Region: Fourteen countries are participating in this project that aims to promote genetic resources conservation and use through increase in yields and to enhance smallholders' income through high-value products. These countries are China, Vietnam, Thailand, Malaysia, Indonesia, Philippines, Bangladesh, India, Sri Lanka, Fiji, Samoa, Solomon Islands, Tonga and Vanuatu. Farmer participatory surveys have been conducted in each participating country to document farmer's varieties and multipurpose uses of the coconut. A major finding of the survey is that the lack of knowledge of local farmers, especially the young ones, could lead to genetic erosion as they abandon the crop for more profitable ventures.

The Asian and Pacific Coconut Commission (APCC), the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP) and

COGENT have collaborated to evaluate the performance of 10 to 30 year old previously introduced hybrids and varieties at the farm level in 18 coconut-producing countries under different agroclimatic conditions. Their aim is to help national programmes identify high-yielding and adapted varieties.

Eight countries have undertaken research on the production of high-value products and identification of suitable varieties and hybrids. They include research on coconut palm sugar production, young tender coconut water and its by-products, and others which include rope/geotextiles, coconut shell handicraft, etc.

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

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

Improved *In Vitro* Techniques Benefit Other R&D Activities on Coconut

DFID-funded project: Improvement of in vitro techniques for collecting and exchange of coconut (Cocos nucifera L.)

germplasm: The three-year project funded by the Department for International Development (DFID) of the United Kingdom involves 13 laboratories in 11 countries. It aims to refine the coconut embryo culture and acclimatization technology. The participating countries are Brazil, China, Cuba, France, India, Indonesia, Mexico, Papua New Guinea, Philippines, Sri Lanka and Tanzania. All, except for France, Brazil and China, are funded by DFID.

Results of the DFID-funded project are being used in the conservation and safe exchange of germplasm which is being realized through the establishment of the multi-site International Coconut Genebank (ICG). The ICGs' host countries will conserve duplicates of important coconut germplasm for each region and share them with member countries for their breeding and/or replanting programmes. However, safe movement of germplasm to the ICGs and national programmes worldwide is constrained by quarantine restrictions on the transport of coconut seednuts or

seedlings which are essential to curb the spread of new diseases. Embryo culture, as a method of propagation and exchange, could prevent the introduction of new diseases as transmission of some serious diseases through embryo has not been reported or proven. Thus, serious diseases such as the Lethal Yellowing disease caused by phytoplasma found in many countries in Africa and the Latin America regions could be prevented from spreading through germplasm movement using the embryo.

Poverty alleviation is one of COGENT's main thrusts as most of the coconut farmers are smallholders with very low income. A good example of how improved embryo culture technology can help alleviate poverty is through the Makapuno industry in the Philippines. Makapuno is characterized by a soft, jelly-like endosperm rather than the normal solid endosperm (kernel) of other coconut varieties, and commands three to five times the price of a normal coconut. Makapuno coconuts, nevertheless, are quite rare owing to the

lack of true-to-type planting materials. It does not germinate *in situ* because of the abnormal composition of the endosperm. However, the Makapuno embryo could germinate and grow normally *in vitro* before transplanting to the nursery to produce the seedlings. An interesting advantage is that these embryo-derived Makapuno plants produce 100% Makapuno fruits compared to 14% from traditional palms. The Makapuno embryo culture protocol is being disseminated to 12 COGENT member countries.

Improved coconut embryo culture technology also benefits the IFAD-funded project in promoting suitable varieties for high value products. Products such as palm sugar, young tender coconuts and coir geotextile could increase the incomes of coconut farmers by three to four times. The embryo culture technology could help promote the exchange of promising germplasm among coconut-producing countries. [Dr Pons A. Batugal, COGENT Coordinator, IPGRI-APO, Serdang, Malaysia].

National

BHUTAN

National Herbarium at Serbithang

The laying of the foundation stone for the National Herbarium at Serbithang on 20 June 2000, marked an important milestone in biodiversity conservation in Bhutan. The old herbarium in Taba houses more than 1000 mounted specimens and 9000 unmounted specimens. The Ministry of Agriculture, with the assistance from DANIDA, will be constructing a 28 m x 13 m National Herbarium building at Serbithang. The building will house herbarium specimens, database for Bhutanese flora, laboratory, preparatory room, office space, meeting hall, etc. [RNR Newsletter, Ministry of Agriculture, Royal Government of Bhutan, Vol.XV, Issue No.76, June 2000].

Report on State of Environment

The environment report for Bhutan is being prepared under UNEP Environment Assessment Programme for Asia-Pacific to pave way for the production of the global state of environment report at the national, sub-regional, and regional level. The report will lead to accurate environment assessment, improve decision making in sustainable development, provide information on all aspects of environment and socioeconomic development, and establish strong information network with uniform format of data. The drafting of the State of Bhutan's Environment Report was started in April 1999 by Tata Energy Research Institute, Delhi, under the financial support of Norwegian Agency for Development Cooperation.

The final copy of the report will be ready by December 2000, to be launched by early 2001. [Druk Forestry News, Issue No. 10, October 2000].

CHINA

Ramie Genetic Resources

The Institute of Bast Fibre of the Chinese Academy of Agricultural Sciences (IBF-CAAS) collaborates with the institutes related to bast fibre crops in provinces of Hunan, Hubei, Sichuan, Guizhou, Jiangxi, Guangdong, Yunnan, Shaanxi, Henan, Fujian, Zhejiang and Anhui to collect and conserve ramie (*Boehmeria nivea* (L.) Gaud.) germplasm. A total of 1303 accessions had been collected and conserved till 1996. Based on above work, the researchers of bast fibre crops have carried out comprehensive and systematic evaluation of ramie

germplasm on botanical and agronomic characters, fibre yield, quality, stress resistance and obtained a large amount of data. The Catalogue of Chinese Ramie Germplasm Resources was published in 1984, and Records of Chinese Ramie Varieties in 1992.

During 1986-1990 (The Seventh Five - Year Plan period), the Institute established the National Ramie Germplasm Field Genebank in Yuanjiang, which covers 2.02 ha. The accessions were planted in the field with the technique of cutting of tender branches, which helps to eliminate root rot nematode and attack of underground insects. A total of 1017 indigenous accessions and 10 accessions from abroad have been conserved in the genebank. In 1990, the Ministry of Agriculture designated the genebank as the National Ramie Germplasm Field Genebank. It is the first ramie field genebank in the world with the biggest collection and advanced technologies for conservation. Cytological and taxonomic studies have been carried out. Through characterization and evaluation of local varieties, over 30 elite varieties were selected and distributed widely.

It is considered necessary now to set up core collection and use biotechnological tools for safe conservation of ramie germplasm. [For more information contact: Jie Yucheng, Leng Juan and Xu Ying, Institute of Bast Fibre Crops, the Chinese Academy of Agricultural Science, Yuanjiang, Hunan, 413100. Fax: 86-737-2725180; Email: Jie-yucheng@163.net].

Centre for Biodiversity and Indigenous Knowledge

The Centre for Biodiversity and Indigenous Knowledge (CBIK) was established in 1995. The mandate of CBIK is to protect the nature and resources of ethnic groups in southwest of China, promote the social progress and sustainable development. Through the collaboration with other multidisciplinary sectors and participatory approach, the Centre promotes the exchange and cooperation on research and conservation of biodiversity and

culture among the mountainous ethnic communities, non-governmental and governmental organizations in southwestern region and neighbouring countries, explore the new approach and strategy for sustainable and balanced development under the changing environmental, social and economic conditions. The Centre works closely with the researchers working on conservation of biodiversity and community development through memberships, research initiatives and networks. The major functions of the Centre are as follows: i) Information centre for exchange, publication and networking, ii) Applied research centre for project implementation, demonstration, and popularization, iii) Service centre for project design, technical support, and monitoring evaluation, iv) Training centre for scientists, technicians and farmers, and v) Organizing cultural exchanges. Currently the Centre has 10 staff and 110 members covering research areas of botany, resources management, participatory appraisal, gender and

development, social forestry and community development. Work on several projects has been undertaken on above lines i.e., on Cultural and biodiversity project: Community development project of Swidden Agroecosystem Improvement supported by Ford Foundation and the project on Developing Palm and Rattan Industry in Xishuangbanna supported by Yunnan Government.

Professional capacity building has been given due emphasis to strengthen exchange and cooperative ability for multidisciplinary sectors, cultures and regions. It covers the capacity building of researchers and organizations in library database establishment, training courses, workshops, publishing newsletter and proceedings, database development (including medicinal plants, natural protection areas and culture). The capacity building project is supported by International Conservation and Development Forum, World Wide Foundation, Winrock Foundation and

New Director at NBPGR

Dr B.S. Dhillon joined as the new Director of the National Bureau of Plant Genetic Resources (NBPGR) on 11 September 2000. Prior to this, he was Assistant Director General (Food and Fodder Crops), in the Indian Council of Agricultural Research (ICAR). Dr Dhillon is a plant breeder and has a rich expertise in maize. His major contributions include development of new breeding methods, mating designs, dual-purpose designs (for selection and inheritance studies) and a scheme for sampling of foundation plants for inbreeding. Other major achievements include development of 15 cultivars and 53 inbred lines in maize. He has more than 260 publications to his credit, of which 144 are research papers.



Dr Dhillon also has the opportunity to work as an Associate Scientist, CIMMYT, Mexico. He is a recipient of prestigious Alexander von Humboldt (AvH) Fellowship, German Academic Exchange (DAAD) Fellowship and University of Hohenheim Fellowship in Germany and AvH Europe Fellowship in England. Dr Dhillon is the recipient of Rafi Ahmed Kidwai Memorial Prize of ICAR for outstanding research in plant breeding during 1991. He is a Fellow of several important professional bodies, including the Indian National Science Academy and National Academy of Agricultural Sciences. With his profound experience in the field as a plant breeder and research manager, Dr Dhillon is expected to provide a dynamic leadership as Director of NBPGR.

IPGRI staff heartily congratulate Dr Dhillon and look forward to increased collaboration in PGR programmes.

U.S. Yale University. [For details, contact: Centre for Biodiversity and Indigenous Knowledge, Zhonghuandasha, Yanjiadi, Kunming, Yunnan 650034, China. Tel: 86-871-4123519; Fax: 86-10-4124871].

INDIA

NRC for Medicinal and Aromatic Plants: Research Highlights

Conserving *Rauvolfia sumatrana* - an Endangered Medicinal Plant: *Rauvolfia sumatrana* of Apocyanaceae family is used extensively by the tribals of Andaman and Nicobar Islands in curing various ailments especially as an antihelminthic medicament, for relieving gastro-intestinal troubles, epilepsy, fits and headache. The species was reported to be distributed across different islands ranging from Neil Island at the north to Kopenheat, Koshin and Campbell Bay of Great Nicobar at the extreme south. The tree is found only in the Andaman and Nicobar biogeographic zone of the Indian Sub-continent. Its propagation is predominantly through seeds. However, macro-propagation by stem cuttings is also evident. At the Central Agricultural Research Institute, Port Blair, attempts are being made towards conservation, isolation and biochemical profiling of the active ingredients and development of suitable *in vitro* micro-propagation protocol for mass propagation of this species. [Director, NRC for Medicinal and Aromatic Plants, Borievi, Anand 487 410, Gujarat, India].

NRC for Citrus Conducts Workshop on Citrus Decline and Management

The National Research Centre for Citrus, Nagpur, the nodal agency for development of technologies in the field of Citriculture at the country level, organized the First Workshop on Citrus Decline and Management in Northeastern Region from 4-5 September 2000 at Umiam (Shillong), Meghalaya in collaboration with ICAR Research Complex for Northern Hill (NEH) Region. In all 90 participants from these states, including extension personnel, trainers and scientists of

ICAR Research Complex, and its Regional Stations located in this region attended the programme. The workshop technical session covered lecture topics such as Research and Development of Horticulture in the NEH Region, Citrus Industry of India, Mandarin Orange Rejuvenation in Sikkim, Nursery Management in Citrus, Soil and Nutrition Management in Citrus, Role of Intercrops in Citrus Decline in NEH Region, Role of Insect Pests in Citrus Decline and their Management, Citrus Diseases and Management in NEH Region, and Improvement in Cultural Practices of Citrus in NEH Region. [Dr Shyam Singh, Director, National Research Centre for Citrus, Nagpur 440 010, Maharashtra, India].

CSGRC Holds National Workshop on Management of Sericultural Germplasm

The Central Sericultural Germplasm Resources Centre (CSGRC), Hosur under the Central Silk Board (CSB), organized a National Workshop on 'Management of Sericultural Germplasm for Posterity' from 26-27 July 2000. The objective of the workshop was to interact with various stakeholders on seribiobiodiversity conservation and was attended by more than 125 participants. In total, eleven lead papers and some specific papers on the important issues pertaining to the various elements of seribiobiodiversity were presented in three technical and two poster sessions. The



Central Sericultural Germplasm Resources Centre (CSGRC), Hosur



Fruit Diversity in Mulberry Germplasm

lead papers presented by different scientists emphasised on the availability of diverse germplasm *vis-a-vis* threatened species, and drew attention to their conservation. PGR related lead papers dealt with: (i) management of mulberry germplasm, (ii) molecular characterization of mulberry germplasm and (iii) registration, import/export including quarantine of mulberry germplasm. Dr S.B. Dandin, Director of the Centre presented a paper on National Biodiversity Strategy and Action Plan of the Govt. of India and the proposed draft action plan for sericobiodiversity conservation. The recommendations laid emphasis on characterization, evaluation, documentation, utilization and conservation of germplasm diversity held by the Centre. [Dr S.B. Dandin, Director, Central Sericultural Germplasm Resources Centre, Central Silk Board, PB No. 49, Hosur 635 709, Karnataka, India].

JAPAN

Medicinal Plant Germplasm: Conservation and Exchange

The Tsukuba Medicinal Plant Research Station affiliated with the National Institute of Health Sciences (NIHS), Ministry of Health and Welfare has come to play the central role in national networking activities on medicinal plants. The Research Station is located in Tsukuba-City, Ibaraki Prefecture (36°01'N). Four regional sister stations, Experiment Station for Medicinal Plants, NIHS, are located in Hokkaido (44°22'N), Izu (34°38'N), Wakayam (33°54'N) and Tanegashima (30°32'N), and conduct research for their respective climatic conditions. Management of genetic resources is a major role entrusted to the Network. The "Index Seminum 2000" lists 1065 accessions of medicinal plants.

About 4000 samples are being distributed annually on request. Over 400 institutions in more than 60 countries have taken advantage of this germplasm exchange programme.

A sizeable part of the research activities are directed at technology of germplasm preservation. Seeds of many medicinal plants are recalcitrant and require special care. To cope with various biological requirements of particular seeds, store rooms are set at 10°C, 4°C, -1°C and -20°C. Some materials are also cryopreserved at -80°C. *In vitro* preservation and cryopreservation of calli and vegetative tissues are also being attempted. Breeding projects utilizing genetic resources have also been operating. Poppy for medicinal purposes has been improved for the better yield of its ingredients. Some species have been noted as important indigenous medicinal plants. *Lithospermum erythrorhizon*, a traditional source of dye, has offered a major component of some kinds of dermatological medicines. *Glycyrrhiza* spp., widely used in traditional oriental medicine, *Geranium thunbergii*, a well known herb for a Japanese folk medicine and other traditional pharmaceutical plants are also targets of current research. [Source : Tsukuba Medicinal Plant Research Station, National Institute of Health Sciences, Hachiman-dia, Tsukuba-City, Japan 305-0843; GRP Newsletter No. 37].

SRI LANKA

Postgraduate Institute of Agriculture Launches M.Sc. Course in PGR Conservation and Management

The objectives of this degree course at the Postgraduate Institute of Agriculture,

University of Peradeniya, Sri Lanka are to: i) train graduates in the fundamentals, theory and practice of Plant Genetic Resources Conservation and Management with particular reference to imparting knowledge and skills; ii) plan and implement conservation and management strategies for economic crop/tree species; iii) use concepts and principles of plant genetic resources conservation and management, iv) develop capabilities to manage genebanks, living botanical collections, natural reserves, and conservation areas, bio-reserves, etc., and; v) influence government policies on plant genetic resources conservation and management.

The core areas of study in this programme include Plant Systematics, Taxonomy, Crop Genetic Resources, Reproductive Biology, Evaluation and Characterization of Plant Genetic Resources, Exploration and Collection of Plant Genetic Resources, Methods in Plant Genetic Resources Conservation, Documentation and Information on Plant Genetic Resources, Policy Issues, Intellectual Property Rights, International Initiatives and Bio-safety, Applied Forest Genetic Conservation, Plant Quarantine and Valuing Plant Genetic Resources. In addition, there are several optional courses which should be completed to fulfil the degree requirements. The development of the curriculum of this degree programme received the assistance of several local scientists, University of the Philippines, Los Baños and the International Plant Genetic Resources Institute, Regional Office, Serdang, Malaysia. [For further details contact: Dr I.P. Wickremasinghe, Department of Agricultural Biology, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka, Email: preethi@agbio.pdn.ac.lk].

Meetings/Training Programmes

JAPAN: International Taro Symposium at Tropical Root Crop Congress, Tsukuba, Ibaraki, 11-14 September 2000.

IPGRI organized a special session on Global Perspectives on Taro Genetic Resources: Genetic Diversity, Adaptation and Uses during the Twelfth Symposium

of the International Society of Tropical Root Crops (ISTRC 2000), held at Tsukuba, Ibaraki, Japan from 11-14 September 2000. This session was

attended by more than 65 participants, in addition to the invited partners. The objectives of the meeting were to: assess the uses and role of taro in food cultures around the world and the status and potential of taro genetic resources in taro improvement; discuss research on the distribution of genetic diversity and adaptation of taro in the major taro producing regions (Asia, Pacific, West Africa, and the Caribbean) and review new technologies and complementary approaches to develop and conserve taro genetic resources for diversified uses. This is the first time that the taro workers around the world gathered to discuss the work on this important underutilized crop. The emphasis was on the use of conventional genetic diversity studies using morphological and biochemical methods in conjunction with the traits that farmers value, which have been used in the evolution of landraces of taro. Thus, the presentations made could be divided mainly into three categories, namely: i) those that focused on the use of morphology, isozymes molecular markers; ii) those that focused on ethnobotany and indigenous knowledge, and iii) those that tried to inter-relate these. From IPGRI, there were two presentations, one on 'Ethnobotany and global diversity of taro' and the other on 'Taro genetic diversity and its use in taro improvement'. Clearly the networking efforts in taro in Asia (through TaroGen and TANSO) showed that a great deal of progress could be made through working together.

PHILIPPINES: Regional Training Course on Strengthening National Capacity to Manage Information on Tropical Fruit Trees Genetic

Resources, Institute of Plant Breeding, UPLB, Los Baños, Philippines, 9-20 October, 2000.

IPGRI-APO in collaboration with ADB and the Institute of Plant Breeding organized this course from 9-20 October 2000 at the Institute of Plant Breeding, University of the Philippines, Los Baños, Philippines. Nine participants from IPGRI Tropical Fruits Project countries (India, Sri Lanka, Bangladesh, Vietnam, Thailand, Malaysia, Indonesia, Philippines, and Nepal) attended the course. The course opening programme had welcome messages from Dr Violeta N. Vilegas, Director of IPB, Dr Emil Q. Javier, Chair, Technical Advisory Committee, CGIAR and Dr Domingo E. Angeles, Associate Dean, College of Agriculture. Topics covered in the course included GIS based application (Flora Map and DIVA); data exchange using DIP format, electronic catalogues development; field genebank monitors; data analysis and experimental designs.

The major outcome of the course is an action plan for documentation work developed by the participants. Public awareness activities were stressed to ensure that collaborators within the country are well informed and hence will provide assistance and support in the tropical fruit genetic resources documentation work. The participants expressed the need to develop an Internet site managed by them for information networking. For the Chinese participant who was not able to attend the course, a separate training was provided to ensure that all the TFT member countries can implement the action on time.

Forthcoming Meetings

MALAYSIA: International Technical and Trade Seminar on Tropical Fruits, Kuala Lumpur, June-July 2001.

A two-day seminar will be conducted in conjunction with the Special Assembly to encourage countries and organizations to attend the Special Assembly of the International Tropical Fruits Network. The topics proposed for the two-day seminar are: i) Overview on Global Tropical Fruits Development - Potential and Problems, ii) Issues on International Trade of Tropical Fruits, iii) Biotechnology and Tropical Fruits Development, iv) Post Harvest Handling and Technology Transfer, v) Phytosanitary Requirements for Tropical Fruits Export, vi) Nutritional Value of Tropical Fruits and R&D, and vii) Regional Development of Tropical Fruits - Financing and Investment. [For further details, contact Coordinator, International Tropical Fruits Network (TFNet), GPO Box 12301, 50774 Kuala Lumpur, Malaysia; email: tfnet@mardi.my].

JAPAN: Sixth ISRR Symposium on Roots; the Dynamic Interface Between Plants and the Earth, Nagoya University, 11-15 November 2001.

The symposium will be cosponsored by the Society for Root Crops and the International Society of Root Research (ISRR). Oral and poster sessions will be organized. [For details, contact: Mr Shigenor Morita, Chairperson of the Organizing Committee, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Tokyo 113-8657, Japan; Fax: +81-3-5841-5070].

Interesting Books, Periodicals and Websites

Anonymous. 2000. Status Report of Conservation and Sustainable Utilization of Agrobiological Diversity in China. Department of Science and Technology, The Ministry of Agriculture of China. Meteorology Press, Beijing, China. 124 p.

The report presents the current status on conservation and sustainable utilization of agrobiological diversity in China. Part I presents status of conservation and utilization of plant genetic resources, Part II deals with conservation and utilization of animal

resources and Part III presents the effects of agricultural production and other factors to agrobiological systems and measures to reduce such effects.

Ali, M., editor. 2000. Dynamics of Vegetable Production, Distribution

and Consumption in Asia. Asian Vegetable Research and Development Centre. AVRDC Publication No. 00-498, 470 p. [ISBN: 92 9058-116-5].

The publication provides a very comprehensive treatment of country-to-country analysis of the vegetable sector in Asia. It deals with country status reports (Bangladesh, China, India, Indonesia, Korea, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan and Vietnam) covering South, Southeast and East Asia. For each country, data are provided on vegetable area, production and yield, cost of production, prices, and details of marketing structure and behaviour, international trade, and consumption patterns. These data have been analysed to determine changes in vegetable production, distribution and consumption. Broadly, the structure of each country report is the same, which makes the book useful for easy comparisons across countries. The chapter by the editor, Dr Mubarak Ali on 'Dynamics of Vegetables in Asia: A synthesis' provides an overall view of vegetable sector in regional context.

Bhatia, Anupam, editor. 2000. Participatory Forest Management Implications for Policy and Human Resources' Development in the Hindu Kush-Himalayas. International Centre for Integrated Mountain Development, GPO Box 3226, Kathmandu, Nepal. 235 p [ISBN: 92 9115-9700, 92 9115-0231].

The proceedings are based on the deliberations of the regional workshop on 'Participatory Forest Management: Implications for Policy and Human Resources Development' held in May 1998 wherein senior policy makers from seven countries of the Hindu Kush-Himalayas participated. The participants discussed the people-centred forest policies and their objectives of supporting and strengthening participatory forest management to ensure that the needs of mountain people receive the desired priority. The constraints and opportunities were discussed in depth based on papers

presented by the participants. Part I deals with challenges to the management of forests in the mountain regions of India; Part II on training issues in joint management in the Hindu Kush-Himalayan states of India; part III to V - on the status of participatory forest management, implications for policy and human resources' development in Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh respectively.

Dong Yushen and Zheng Diansheng. 2000. Wheat Genetic Resources in China. China Agriculture Press, Beijing, China.

The publication includes 12 chapters. The first two chapters deal with the history, current status and prospects of wheat research in China. Chapters 3-10 deal with: i) taxonomy, origin, evolution, ecology system and ecology of wheat, ii) wild relatives and genetic constitutions, iii) conservation technology and number of accessions conserved, iv) characterization and evaluation of main characters, v) germplasm improvement and enhancement, vi) success of introduction of wheat germplasm from foreign countries. The last two chapters introduce the applications of biotechnology in wheat research, database of wheat and information system for wheat.

Duhoon, S.S., B.R. Singh, H.K. Jharia, U. Goswami, N. Srivastava, H.C. Jain, M.K. Srivastava and M.R. Deshmukh. 2000. Genetic Resources of Sesame (*Sesamum indicum* L.). All India Coordinated Research Project on Sesame and Niger, Jawaharlal Nehru Krishi Vishwa Vidyalaya Campus, Jabalpur (Madhya Pradesh) 482 004, India. 16 p.

This publication deals with documentation of passport and characterization data on important morpho-agronomic characters. It also provides observations on the damage by capsule borer at harvest. These data were recorded on 576 accessions, major collections being from Rajasthan (148),

Andhra Pradesh (126), Uttar Pradesh (93), Maharashtra (85) and Orissa (38).

Engelmann, Florent, editor. 1999. Management of Field and *In vitro* Germplasm Collection. Proceedings of a Consultation Meeting, 15-20 January 1996. CIAT, Cali, Colombia. International Plant Genetic Resources Institute, Rome, Italy. 165 p. [ISBN: 91 9043-432-5].

The proceedings deal with the deliberations of the meeting organized by IPGRI together with the CGIAR System-Wide Genetic Resource Programme (SGRP), the Food and Agriculture Organization of the United Nations (FAO) and the International Centre of Tropical Agriculture (CIAT), and held at CIAT, Cali, Colombia. The meeting was attended by 48 participants, and lists over 40 presentations which examine the role of field and *in vitro* germplasm collections in strategies to conserve and use clonally propagated crops, problems and constraints in their management, and the complementarity of field and *in vitro* germplasm collections. The meeting recommended the development of general guidelines for the management of field and *in vitro* germplasm collections. It is hoped that these proceedings will contribute to improving the conservation of vegetatively propagated crops through a more rational, complementary, and cost-effective use of field and *in vitro* conservation techniques.

Friis-Hanson, Esbern and Bhuwon Sthapit, editors. 2000. Participatory Approaches to the Conservation and Use of Plant Genetic Resources. International Plant Genetic Resources Institute, Rome, Italy. 214 p. [ISBN: 92 9043-444-9].

This technical bulletin presents over 20 case studies that will enhance the understanding on participatory approaches to conservation and use of plant genetic resources. The bulletin is divided into five sections; each section starting with an overview of issues

involved (written by the editors), followed by several case studies. Section I deals with crosscutting issues related to integrating gender analysis and institutional context. Section II documents 4 case studies that enhance access of germplasm and information to farming community from the genebank. Section III lays emphasis on various ways and methods of local plant genetic resources management at community level. Section IV deals with participatory approaches to community seed bank management and seed exchange and its role in on-farm conservation. Section V emphasizes on participatory methods of increasing public and policy awareness of PGR conservation and use, and describes the challenges to crop genetic diversity, presents value-addition strategies that are being implemented to reverse the erosion of the diversity, and also concludes with some policy implications. The publication of this bulletin was supported by IPGRI and the Centre for Development Research (CDR) in Copenhagen, Denmark.

Gautam, P.L., G.D. Sharma, Umesh Srivastava, B.M. Singh, Ashok Kumar, R.K. Saxena and Kalyani Srinivasa, editors. 1998. 20 Glorious Years of NBPGR (1976-1996). National Bureau of Plant Genetic Resources, New Delhi. 333 p.

The National Bureau of Plant Genetic Resources (NBPGR) has developed a state-of-art in the field of germplasm collecting, introduction, exchange, evaluation, documentation, conservation and utilization of genetic resources. This publication presents two decades of achievements of NBPGR and provides all activities in wider perspective alongwith infrastructure strengthening, capacity build-up and strong coordination/networking. A list of publications is also appended.

Gunasena, H.P.M., editor-in-chief. 2000. Multipurpose Tree Species in Sri Lanka. Fruits for the Future. Proceedings of the Tenth National

Workshop on Multipurpose Trees, Kandy, Sri Lanka. 212 p.

This is a joint publication of the National Research Network on Multipurpose Trees (NRNMT) and the Department of Agriculture, based on a workshop organized/sponsored by NRNMT and Department of Agriculture and the National Science Foundation of Sri Lanka. The objective of the workshop was to focus on few of the major underutilized fruit species, document their potential status, prioritise according to ecological, agronomic, economic criteria, assign them to relevant institutions for research and development and provide a document for their domestication and commercial exploitation. The fruits dealt with include woodapple (*Linoris acidissima*), mangosteen, tamarind, goraka (*Garcinia quaesita*), kitul (*Caryota urens*), durian, rambutan and *Annona* species, and account of each of these fruits is well presented by different experts. Also in wider perspective, four papers deal with the recent development in underutilized fruit crops in Asia, their improvement and processing aspects for commercial exploitation and utilization of such fruits grown in Kandy homegardens.

IDRC/IPGRI/DHF. 2000. Crucible II Group: Seeding Solutions. Vol.1. Policy for Genetic Resources (People, Plants and Patents revisited). Jointly published by International Plant Genetic Resources Institute, Via delle Sette Chiese 142, 00145 Rome, Italy [ISBN: 92 9043-433-0]; Dag Hammarskjold Foundation, Ovre Slottsgatan 2, 753 10 Uppsala, Sweden [ISBN: 91 85214-27-2] and International Development Research Centre, P.O. Box 8500, Ottawa, ON, Canada K1G 3H9. 121 p.

This volume provides viewpoints on this topic as they stood in the late 1999. It offers policy makers a clear description of the facts and figures relevant to genetic resources. Those new to these issues will also be offered a clear picture of why germplasm is important and how

it relates to trade negotiations, intellectual property disputes and national and international food and health security. Part one of this volume has two sections. The first - a wider lens for considering Biodiversity and Intellectual Property Issues provides a wider context for understanding the intellectual property (IP) and biodiversity debate. The second section deals with 'changes in molecular bioscience'. Part two on outstanding issues scrutinizes three major areas of discussions : Policy Issues, Access and Exchange, Knowledge and Innovation.

IPGRI. 2000. Descriptors for Jackfruit (*Artocarpus heterophyllus*). International Plant Genetic Resources Institute, Rome, Italy. 64 p. [ISBN: 92 9043-450-3].

IPGRI encourages the collectig of data for all five types of descriptors, whereby data from the first four categories - Passport, Management, Environment and site, and Characterization should be available for any accession. Descriptors listed under evaluation allow for a more exclusive description of accessions. This format represents an important tool for a standardized characterization system. The descriptor list provides an international format and thereby produces a universally understood language for plant genetic resources data. The Annexure I contains multi-crop passport descriptors. Also, the collecting form for jackfruit that will facilitate data collecting is given.

Molina, A.B., V.N. Roa, J. Bay-Petersen, A.T. Carpio and J.E.A Joven, editors. 2000. Managing Banana and Citrus Diseases. Proceedings of a Regional Workshop on disease management of banana and citrus through the use of disease-free planting materials held in Davao City, Philippines, 14-16 October 1998. International Network for the Improvement of Bananas and Plantain - Asia and the Pacific Network, Los Baños, Laguna, Philippines. 164 p. [INIBAP ISBN: 971 91751-1-7].

These proceedings cover all aspects of disease management of banana and citrus. Section I deals with epidemiological review of citrus greening and viral diseases of banana and citrus with special reference to disease-free nursery system; production and cultivation of virus-free banana and methods of their detection, with country reports from Taiwan and Malaysia. Session II has four papers covering disease management aspects of citrus orchards, recent progress on citrus greening research, its control in Japan, and control of insect vectors of citrus systemic diseases. Session III deals with pathological and molecular characterization of BBTV Strains in Asia, rehabilitation of BBTV affected areas in Philippines, integrated management of Abaca Bunchy Top in the Philippines. Session IV includes four papers on management of diseases in citrus in the Philippines, Vietnam, Indonesia, disease-free citrus seedlings, disease-free foundation and nursery for controlling greening disease and *Citrus tristeza* in Sarawak.

Molina, A.B. and V.N. Roa, editors. 2000. Advancing Banana and Plantain R&D in Asia and the Pacific. Proceedings of the 9th INIBAP-ASPNET Regional Advisory Committee Meeting held at South China Agricultural University, Guangzhou, China, 2-5 November 1999. International Network for the Improvement of Bananas and Plantain - Asia and the Pacific Network, Los Baños, Laguna, Philippines. 154 p. [INIBAP ISBN: 971 91751-3-3].

The proceedings highlight the accomplishments of INIBAP-ASPNET activities for 1999. Five papers deal with research and development in banana in China. Country reports provide details on R&D activities in banana in Vietnam, Thailand, Taiwan, Malaysia, Indonesia, Pacific Islands, Bangladesh and Sri Lanka. The paper on 'Biodiversity of wild Musaceae in Northern Thailand' gives interesting information on wild diversity occurring in *Musa acuminata* and *M.*

balbisiana, and other species in *Eumusa*, *Rhodochlamys* and *Ensete*.

Padolina, W.G., editor. 2000. Plant Variety Protection for Rice in Developing Countries: Impacts on Research and Development. Limited Proceedings of the Workshop on the Impact on Research and Development of *Sui Generis* Approaches to Plant Variety Protection of Rice in Developing Countries, 16-18 February 2000. International Rice Research Institute, Los Baños, Laguna, Philippines. 233 p. [ISBN: 971 22-0132-5].

The proceedings include a set of papers representing a wide spectrum of topics related to plant variety protection (PVP), written by experts in the field of intellectual property and plant variety protection. The compendium, thus, produces a rich synthesis of ideas and strategies to guide future activities. It includes 27 papers presented in five sections. Section 1 on implications of changes in PVP and IP legislation; Section 2 analyzing *sui generis* PVP represents related IP legislation and its impact on rice research; Section 3 dealing with overview and analysis and group discussion on specific issues or areas of concern related to PVP and IP as it affects rice research; Section 4 on PVP and the private sector perspective and Section 5 on summary presentation of key issues discussed. Section 6 includes workshop discussion and recommendations summarized by 5 working groups and finally a summing up of the results by Dr William G. Padolina.

Rao, N. Kameswara and Paula J. Bramel. 2000. Manual of Genebank Operations and Procedures. International Crops Research Institute for the Semi-Arid Tropics, Patancheru 502 324, Andhra Pradesh, India, 190 p. [ISBN 92-9066-421-5].

The publication in 10 chapters provides information on germplasm assembly, plant quarantine, registering new germplasm, seed processing, seed

storage, germplasm distribution, monitoring, germplasm regeneration, characterization and preliminary evaluation and taxonomic classification. This well illustrated, easy to understand, practical manual will be very useful to genebank curators and researchers in their work for preserving plant germplasm in *ex situ* collections.

Periodicals/Reports

Asian Seed and Planting Material. 2000. [Vol. 7 No. 4]. Asia Pacific Seed Association P.O. Box 1030 (Kasetsart), Bangkok 10903, Thailand, 26 p. [ISBN 0859-1976].

Among other news items, this issue provides information on China to grow genetically modified crops commercially in 2001 as a government backed project moves from research to production.

CABI/IPGRI. 2000. Plant Genetic Resources Abstracts (Vol. 9, No. 22. pp. 92-183). CAB International, Wallingford, Oxon Ox10 8DE, UK.

This publication abstracts references on diverse topics dealing with plant genetic resources, taxonomy, evolution and origin of crops, genetic and population diversity, conservation, local and traditional uses of genetic resources, biotechnology, genebanks, documentation and information management, germplasm characterization and evaluation, germplasm enhancement and utilization, plant health, quarantine and safe movement of germplasm. Information is also provided on proceedings of the recently held conferences, other reports and on books published. Subject indexes are given.

Diversity. 2000. (Vol. 16, No. 1&2). Genetic Resources Communication Systems. Inc. 4905 Del Ray Avenue, Suite 401, Bethesda, MD 20814, USA 73 p. [ISSN 0744-8163].

This journal is published quarterly and provides information on activities relating to the conservation and utilization of genetic resources. This volume provides special focus on turfgrass - how to both preserve and constructively exploit its

genetic diversity for current and future use. Information on varietal improvement is given for a wide range of species being researched under different projects at different locations/institutions. Besides this, information is given on CGIAR Vision, and Global Environment Facility.

International Chickpea and Pigeonpea Newsletter (No. 7), 2000. ICRISAT Patancheru 502324, Andhra Pradesh, India. 89 p. [ISSN 1023-4861].

The International Chickpea and Pigeonpea Newsletter (ICPN) is published annually by ICRISAT. It is intended as a worldwide communication link in research and development of chickpea (*Cicer arietinum*) and pigeonpea (*Cajanus cajan*) and their wild relatives. Recent research findings on breeding, genetics, pathology, entomology, agronomy, physiology, chemistry, biotechnology and utilization in these two crops have been reported.

IPGRI/FAO. 2000. Plant Genetic Resources Newsletter (No. 123). International Plant Genetic Resources Institute, Rome, Italy. 80 p. [ISSN 1020-3362].

This newsletter is quarterly published by IPGRI/FAO and deals with activities on plant genetic resources in wider perspective. The issue includes among other articles, an interesting article from the APO region on 'Utilization of germplasm conserved in Chinese National Genebank - a survey'.

PROSEA. 2000 (Newsletter No. 25,

October 2000). PROSEA Newsletter, PROSEA Network Office C/o Herbarium Bogoriense, RDCP-LIPI, Jalan Ir. H. Juanda 22, P.O, Box 332 Bogor 16912, Indonesia. 8 p [ISSN 0853-2958].

The PROSEA Newsletter is a bi-annual publication of the Plant Resources of South-East Asia Foundation. This issue provides information on PROSEA books, CD-Roms, meetings held and national workshops organized. Dr B.P. Del Rosario is the new Director of the PROSEA Network Office.

SGRP. 2000. Annual Report 1999 of the CGIAR System-wide Genetic Resources Programme. International Plant Genetic Resources Institute, Rome, Italy. 33 p. [92-9043-455-4].

The System-wide Genetic Resources programme (SGRP) joins the genetic resources programmes and activities of the Future Harvest Centres in a partnership whose goal is to maximize collaboration as per its new strategy particularly in five thematic areas - policy, awareness, information, knowledge and technology and capacity building related issues or fields of work that are critical to the success of global genetic resources efforts in agriculture, forestry and fisheries. The report highlights activities/ programmes designed to meet SGRP's two main objectives : (i) Countries are able to meet their needs and responsibilities for the conservation and use of genetic resources, and (ii) CGIAR Centres can meet their commitments to manage genetic resources in particular their

obligations to the in-trust plant genetic resources collections.

New Interesting IPGRI Websites

<http://www.ipgri.cgiar.org/regions/europe/home.htm>

Information platform regarding PGR in Europe containing information on: National Programmes, PGR contacts, Policy and research issues, networks activities, publications, crops and species database and important external linkages.

<http://www.ipgri.cgiar.org/system/page.asp?frame=geneflow/geneflow.asp>

Geneflow, a publication about the earth's plant genetic resources, on-line in three languages (English, French and Spanish).

www.ipgri.cgiar.org/system/page.asp?frame=pgr/pgr.asp?nb=3

IPGRI PGR bulletin, a quarterly news sheet providing up-to-date information on IPGRI activities to donors and policy makers.

www.ipgri.cgiar.org/networks/euforgen/Biblio/select.asp

EUFORGEN bibliographic database - currently offers about 1000 references on grey literature related to conservation and use of forest genetic resources.

Scientific Contributions

Genetic Improvement and Conservation of Bamboo Resources in Northeastern India

Recently, a project entitled "Genetic improvement of bamboos and broom grass on homelands and *jhum* lands in Arunachal Pradesh" was successfully

taken up with the support of WWF - India, New Delhi. The study aims at improving the productivity and quality of economically important species of bamboos and broom grass, preservation of elite germplasm, large scale propagation of improved genotypes and their distribution to the farmers.

Germplasm collecting, characterization and evaluation: Population survey of bamboos was carried out in Arunachal Pradesh, Assam and Tripura, within the distributional range of each species to identify the genetically superior genotypes (plus clumps/ stands). Data on morphological parameters directly related to the productivity and quality of

bamboos, viz., new culms/clump, culm height, culm girth, rind thickness, internode length, and space between culms were recorded. A minimum value for grading and selection of plus clumps was fixed for each parameter based on result of preliminary survey and analyses of data of base population (candidate clumps). In addition, the main criteria of selection for all the species except for *Bambusa affinis* and *Dendrocalamus giganteus* was a minimum of 80 new culms per clump per year and circumference and height of clump, and susceptibility to diseases and pests for all species.

Details of the species, candidate and plus clumps selected in different areas of the region are presented in Table 1. Out of 3452 candidate clumps evaluated, 226 plus clumps/ stands of nine species were selected finally. Mean estimated over the minimum selection values for five traits of selected population were studied. Mean of the selected population was significantly higher than the selection values as well as from the mean of base population confirming their superiority over rejected clumps. The estimates of coefficient of variation showed presence of sufficient variability in all the traits of

nine species except in culm girth, rind thickness and internode length of two or three species. It indicates that still there is enough scope for improvement within the selected population.

Among the sympodial bamboos, *B. nutans* produced highest number of culms per clump followed by *Bambusa* sp. (Nal) and *B. tulda*. *B. balcooa* was found to have maximum girth of culms and rind thickness, among all species of genus *Bambusa*. Therefore, it has high demand in construction works. *B. nutans* had the longest internode followed by *B. tulda* and *B. pallida*. Spacing between culms of a clump indicates the suitability of species for cultural and management operations. Maximum culm space was recorded in *B. tulda* followed by *B. balcooa*. It is difficult to take up management activities and extract mature culms of the species having congested clumps like *Bambusa* sp. (Nal), *B. nutans* and *B. pallida*.

Bambusa affinis which is found in Tripura only, has completely solid culms that are used for making fishing rod and javelin. The productivity of new culms/ clump, girth, and height of culms as well as clump of this species was found

comparatively lesser than all other species. However, due to smaller size of clump, a large number of plants can be raised in a unit area than other species. *Dendrocalamus giganteus*, one of the fastest growing bamboos has maximum culm girth and longest internode among all the species. However, productivity of new culms is low compared to other species. Among monopodial bamboos, *Melocanna baccifera*, showed better productivity (213 culms per 10 m² area), rind thickness and height of culms than *Phyllostachys bambusoides*.

Germplasm propagation, maintenance and conservation: To preserve the germplasm of improved clumps and utilize them in production forestry, rhizomes of selected mother clumps were collected from fields and home gardens at different places (Table 1) and planted in germplasm bank at Field Research Station (FRS), Chessa, (near Itanagar) and FRS, Namsai (district Lohit). However, rhizomes of plus stand of *Phyllostachys bambusoides* were planted in subtropical zone at Ziro, located in Lower Subansiri district at 1500 m due to specific ecological requirement of this species. All species

Table 1. Bamboo plus clumps/stands selected in northeastern India

S.No.	Species	Candidate clumps screened	Plus clumps selected	Areas surveyed (Arunachal Pradesh, Assam and Tripura)
1.	<i>Bambusa affinis</i>	335	40	North and Western Tripura (Tropical area)
2.	<i>B. balcooa</i>	654	31	Barpeta, Bihupuria, Chabua, Chowkham, Diyun
3.	<i>B. pallida</i>	214	7	DoomDuma, Dibrugarh, Jagun, Jamuguri
4.	<i>B. nutans</i>	377	11	Kakopathar, Lekhapani, Manabhum, Morigaon
5.	<i>B. tulda</i>	882	38	Nalbari, Nagaon, Rupai, Sadia, Sootea,
6.	<i>Bambusa</i> sp. (Nal)	399	14	Tejpur, Thalmara,
7.	<i>Dendrocalamus giganteus</i>	50	6	Chowkham, Namsai, Miao in Arunachal Pradesh
8.	<i>Melocanna baccifera</i> *	85	23	Silchar, Assam
9.	<i>Phyllostachys Bambusoides</i> *	443	56	Hapoli, Ziro, Yachuli in Arunachal Pradesh

* Monopodial bamboo species

except *B. affinis* were planted at spacing of 8 x 8 m. Plus clumps thus raised in germplasm banks have been multiplied successfully through the rooting of branch cuttings, binodal culm cutting, offset and rhizome separation techniques. Sprouting and rooting response of culm cuttings varied from 18 to 90% depending upon the species. Maximum response was obtained in *B. balcooa* (87.5%) followed by *B. nutans* (85.0%), *B. pallida* (49.9%) and *B. tulda* (37.66%). Other species were multiplied through rhizome separation technique. These plants were distributed to the farmers free of cost for cultivation on their farm/homelands in Arunachal Pradesh. [Dr Sudhir P. Ahlawat, Forest Geneticist, State Forest Research Institute, P.B. 159, Itanagar 791 111, Arunachal Pradesh, India].

Cryopreservation of Shoot-tips of *Dioscorea deltoidea* Wall. - An endangered medicinal plant

Dioscorea deltoidea Wall. is an important medicinal plant commercially exploited for the extraction of diosgenin, a precursor of steroid drugs. Due to over

exploitation and shrinking of natural habitat, this species which is native to India, faces a serious threat to extinction. Being vegetatively propagated, the species faces problems for its *ex situ* conservation using the conventional method of field maintenance. Thus, development of a cryopreservation protocol for *D. deltoidea* is especially desirable. Studies carried out at the Tissue Culture and Cryopreservation Unit, National Bureau of Plant Genetic Resources (NBPGR), New Delhi are briefly presented.

Cryopreservation of shoot-tips

Cryopreservation protocols have been developed and applied to cell cultures of various plant species to retain the capability of cultures for regeneration and production of secondary metabolites. However, shoot-tips/meristems are ideal explants for *in vitro* conservation of plant diversity as plants regenerated from organized explants such as shoot-tips/meristems, usually maintain their genetic integrity. Research on cryopreservation of shoot-tips of *D. deltoidea* has been initiated, recently, at the Tissue Culture and Cryopreservation

Unit of NBPGR using material obtained from Dr Y. S. Parmar University of Horticulture and Forestry, Solan, Himachal Pradesh, India. Employing the newly emerged techniques of vitrification as well as encapsulation-dehydration, successful cryopreservation of shoot tips of *in vitro* grown plantlets has been achieved with subsequent high frequency plant regeneration (80%). The dissected shoot-tips were cultured in preculture medium for 16 h before using for either of the techniques. For vitrification procedure, the precultured shoot tips were treated with loading solution followed by dehydration with plant vitrification solution (PVS 2, i.e. 15% DMSO, 30% glycerol and 15% ethylene glycol) and plunging in liquid nitrogen. Maximum survival and regeneration was obtained when the shoot-tips were treated with PVS2 at 0°C compared to that at 25°C. After rewarming, the shoot tips were treated with high sucrose unloading solution and plated on medium supplemented with plant growth regulators for recovery growth. During recovery growth, the cryopreserved shoot tips showed high frequency regeneration of shoots within 5 weeks after plating and subsequent proliferation of shoots in 12 weeks (Fig. 1 A&B). Likewise, for encapsulation-dehydration procedure, the precultured shoot tips were encapsulated in calcium alginate beads, pretreated in high sucrose solution (0.75M), dehydrated in laminar airflow for 4 h and then plunged in liquid nitrogen. Both vitrification and encapsulation-dehydration techniques were found to be equally effective for cryopreservation of shoot tips of *D. deltoidea*. As these procedures are simple and technically less demanding, the routine use of these cryopreservation procedures for the *ex situ* long-term conservation of *D. deltoidea* will provide additional security before the species becomes extinct. [Dr B.B. Mandal and Ms Sonali Dixit, Tissue Culture and Cryopreservation Unit, NBPGR, Pusa Campus, New Delhi 110012, India].

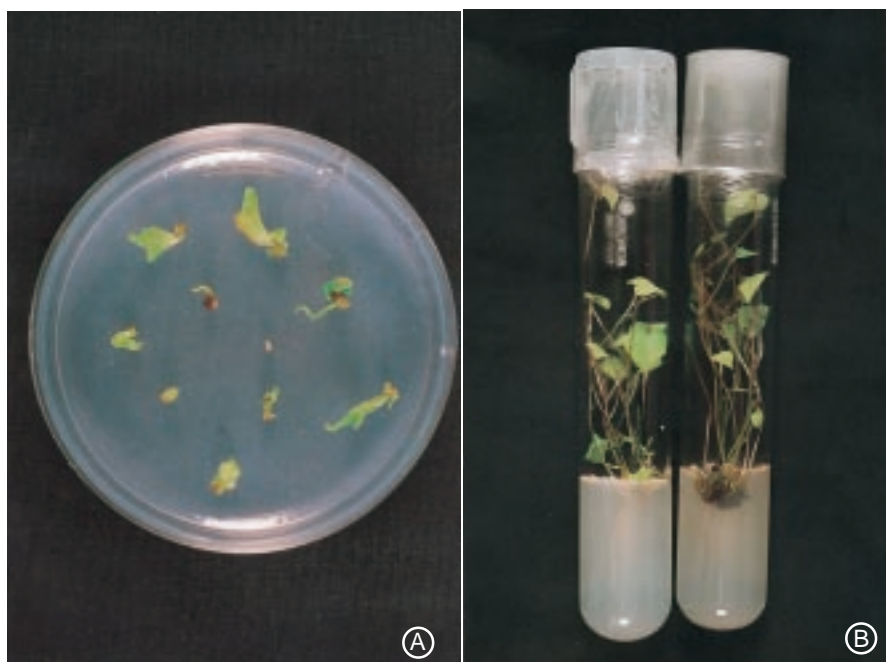


Fig. 1. Regeneration of shoots from cryopreserved shoot-tips of *D. deltoidea* (A) High frequency regeneration after 5 weeks of plating on regrowth medium, (B) Proliferating shoot culture after 12 weeks

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