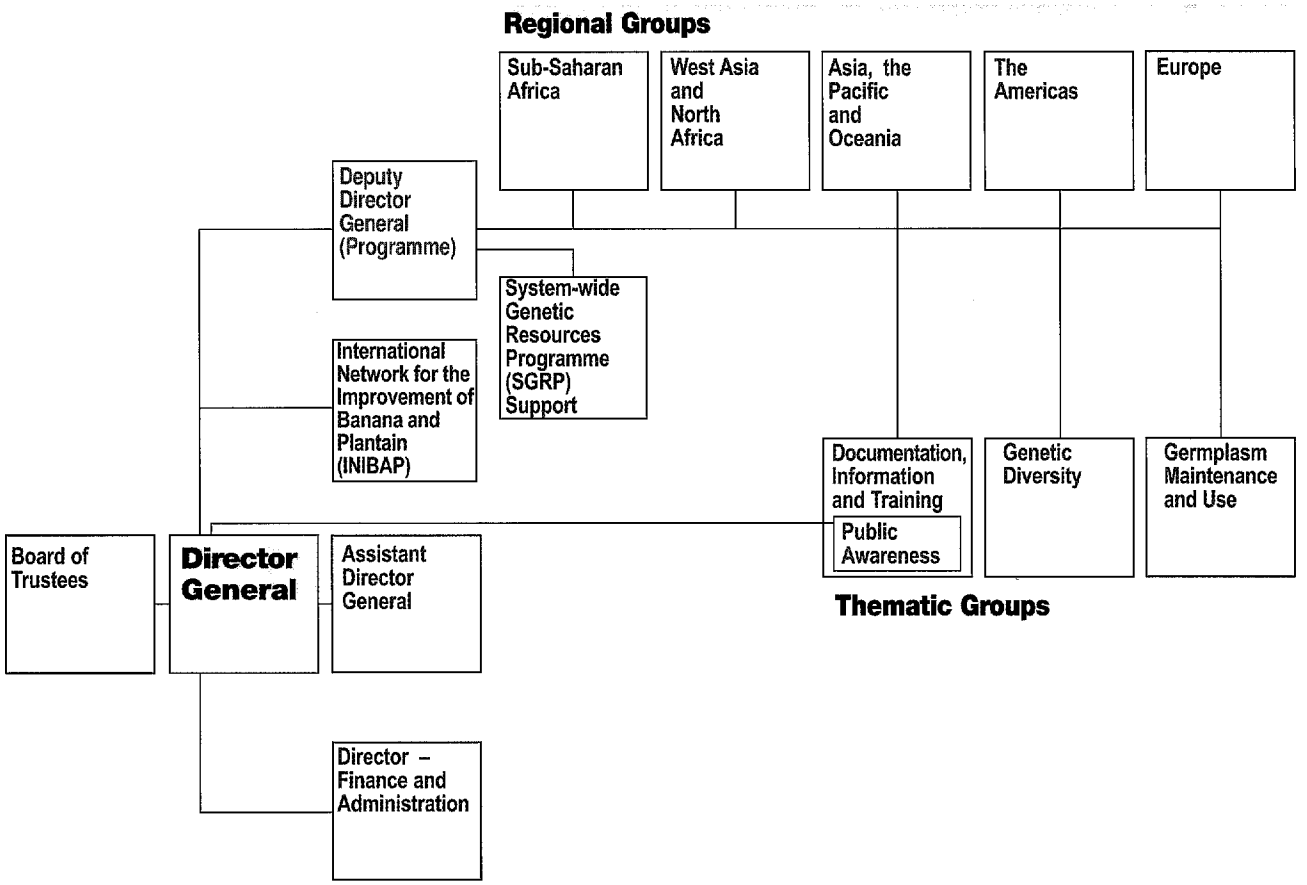
# Annual Report 1995

# IPGRI's institutional organization



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Citation:
IPGRI. 1996. Annual Report 1995. International Plant Genetic Resources Institute, Rome

ISBN 92-9043-295-X

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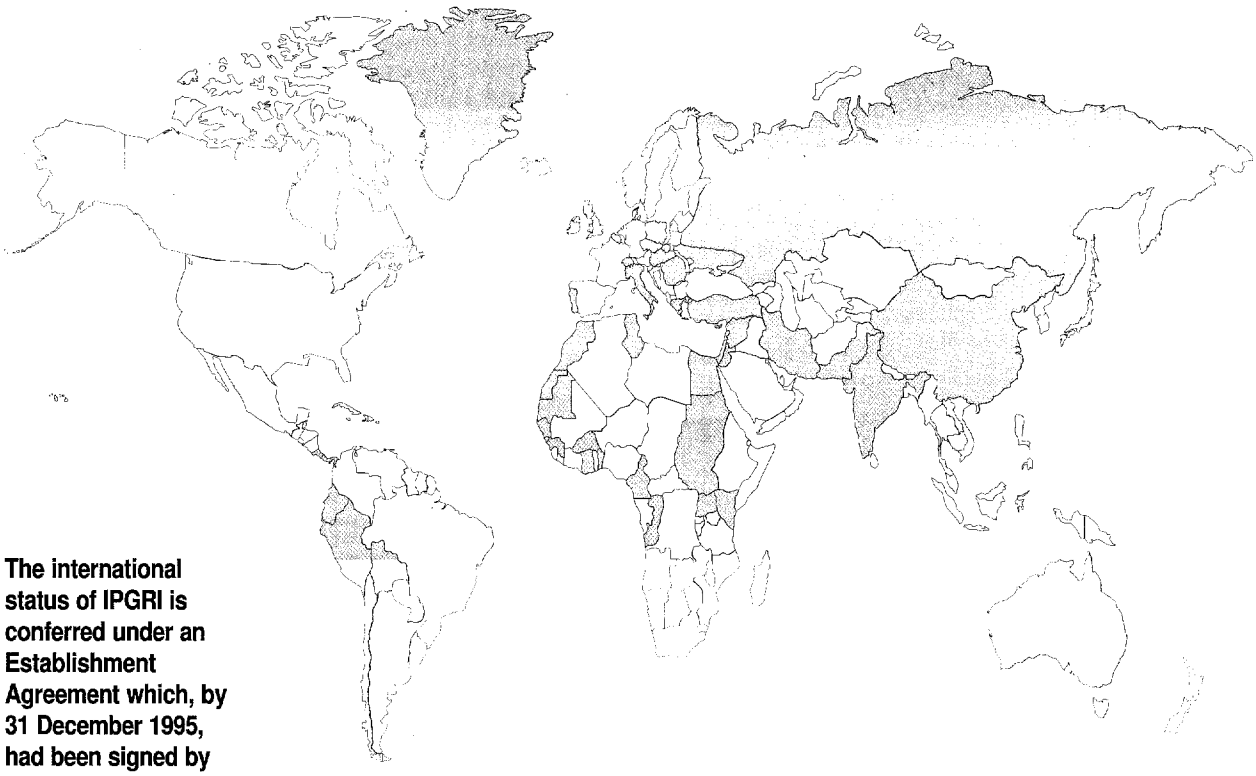

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# Foreword

Agenda 21, adopted at the Earth Summit, UNCED in 1992, set the foundation for national and international efforts to conserve biodiversity and for its sustainable use in development. The Convention on Biological Diversity, which came into force in late 1993, established a legal framework for these efforts. During 1995, IPGRI focused considerable time and effort on supporting a process which aims to provide the means of implementing the goals outlined in the Convention and Agenda 21 as they relate specifically to plant genetic resources, arguably the most important component of biodiversity.

The International Conference and Programme on Plant Genetic Resources, ICPPGR, originally agreed to by FAO in 1991, is the most ambitious programme ever undertaken in the field of agricultural biodiversity. It has put into place an unprecedented and highly participatory process of inventory and analysis which will culminate in the International Technical Conference on Plant Genetic Resources in Leipzig, Germany in 1996. The process has involved the development of more than 150 individual country reports and 11 regional and subregional meetings which, together with inputs from a number of technical meetings and electronic conferences, provide the basis for the two main documents to be considered at Leipzig: the first comprehensive report on the State of the World's Plant Genetic Resources and a costed Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture.

Throughout the ICPPGR process, IPGRI has played an extremely active role in assisting with the preparation of country and subregional reports, organizing meetings and technical consultations and providing public awareness support to the Conference and Programme.

IPGRI led the CGIAR delegation to the second meeting of the Conference of the Parties to the Convention on Biological Diversity, which took place in Jakarta in November. CGIAR Chair Ismail Serageldin attended part of the meeting and made a strong statement during the ministerial segment, underlining the CGIAR's commitment to the goals of the Convention. Agricultural biodiversity will have a high profile at the next Conference of the Parties in 1996 when it is one of the key items on the agenda.

In June 1995, the FAO Commission on Genetic Resources requested that IPGRI prepare a feasibility study on possible systems for the exchange of plant genetic resources for food and agriculture and the equitable sharing of benefits. The study describes a number of concrete options and their implications as a means to inform international negotiations concerning the revision of the International Undertaking on Plant Genetic Resources. IPGRI appointed a team of experts in genetic resources, the Convention on Biological Diversity and law to assist in carrying out the study. The work was supervised by a Task Force composed of senior IPGRI staff and two observers from FAO. Throughout the study process, a wide series of consultations were held with major stakeholder groups. The team was led by Mr Wolfgang Siebeck who was tragically killed in an accident soon after the completion of the study. His contribution to the study process was enormous, as was his intellectual input to many of the complex genetic resources issues currently being addressed in international fora.

The CGIAR System-wide Genetic Resources Programme (SGRP) links the genetic

resources activities of all of the CGIAR centres and is conceived as a vehicle to enable the CGIAR to more effectively meet the challenges posed by the Convention on Biological Diversity, Agenda 21, and the Global Plan of Action. IPGRI is convening centre for the SGRP and hosts a small secretariat in Headquarters. Important steps were taken in 1995 in the development of the year-old Programme. The SGRP Coordinator was appointed during the year and an external review examined the effectiveness of CGIAR genebank operations. The Review, which involved 20 experts from national programmes, FAO and other organizations worldwide, is expected to provide a firm basis for further improving the quality of services offered by the CGIAR genebanks, and for enhancing partner and donor confidence.

Other SGRP activities underway in 1995 included the continued development of the System-wide Information Network for Genetic Resources (SINGER). When the first phase of the SINGER project is completed in early 1997, it will greatly facilitate the management of information within the CGIAR; more importantly, it will make it easier for genetic resources workers outside of the system to gain access to the materials and related information held by Centre genebanks.

The key to the success of the SGRP will be its ability to harness the collective strengths of the individual centres through a well-defined strategic programme of collaboration. A number of collaborative activities took place during the course of the year, including a technical consultation involving IARCs and NARS on improving the management of the regeneration of species with orthodox seeds.

In 1994, the International Network for the Improvement of Banana and Plantain (INIBAP) came under the governance and administration of IPGRI. In its busy first full year of operation as a programme within the IPGRI structure, INIBAP welcomed a new Director, Emile Frison, and bid farewell to Nicolas Mateo who had led INIBAP for the past three years. Important steps were taken to strengthen and consolidate the role of the Network within IPGRI, including the development of integrated projects and a streamlined administrative structure. The Board of Trustees has confirmed its commitment to the INIBAP programme and has noted its intention to maintain the Network as a distinct and visible entity within IPGRI.

Other important programme initiatives this year included the further elaboration of a project to study the scientific basis for *in situ*/on-farm conservation of landraces. The project, which involves IPGRI and partners in nine countries, will examine factors affecting farmer and community decisions in relation to the conservation and on-farm use of genetic diversity, and the effects of farmer germplasm management on the genetic constitution of populations and the evolution of specific adaptive, productivity and quality traits.

The years since UNCED have seen an explosive growth in the size and complexity of genetic resources activities world-wide; this has resulted in a whole new set of challenges and opportunities for IPGRI and its partners. IPGRI's ability to meet future challenges requires a flexible programme structure which permits a quick and effective response to opportunities as they arise. In 1995, IPGRI staff and management re-examined the Institute's strategy and direction with an eye towards developing a more responsive programme structure. The 'consolidation' exercise, due to be completed in 1996, is expected to result in a lean and rationalized programme, with fewer projects and a streamlined project management system. IPGRI's new Director of Finance and Administration, Koen Geerts, will play a pivotal role in this process. Koen replaces Chris Thurlow, who returned to his native Australia in 1995. We would like to take this opportunity

to record our thanks to Chris for his invaluable contribution to establishing IPGRI's management systems during the formative years of the Institute.

As the following pages will reveal, 1995 moved IPGRI closer to realizing its four key institutional objectives. The Institute helped strengthen national programmes through training activities and support for national genetic resources efforts, particularly within the context of ICPPGR; it contributed to international collaboration, through its support and involvement in important regional and crop networks such as ECP/GR and COGENT; its research programme helped develop improved strategies and technologies for conservation, for example in the areas of *in vitro* and on-farm conservation; and it provided an international information resource, producing a targeted line of information products which reached over 100 000 individuals in 1995.

As we move into the final years of the 20th century, we face enormous and daunting challenges. A world population growth of 90 million people a year means that by the year 2025, food production will have to double to keep pace with new demand. In the coming years, our reliance on biological resources can only increase. Future development depends on the availability of effective policies, strategies and technologies for conserving and using genetic resources. This, in turn, requires a strong political commitment at all levels to the development and implementation of rational approaches to conservation aimed at maximum safety, cost-effectiveness and efficiency, as well as continuing accessibility of the materials for use. IPGRI's experience in 1995 is evidence that, given continued excellent support from our donors, the Institute can play a significant role in constructing an effective global effort for the conservation and use of plant genetic resources.

**Wanda Collins**
*Board Chair*

**Geoffrey Hawtin**
*Director General*

# Introduction

## IPGRI's Mode of Operation

IPGRI's mode of operation is unique within the CGIAR system and in the wider field of international research and development. IPGRI is an institute without walls. Its offices are spread around the world. It is a research institute without laboratories and a development agency that contracts research and provides direct support to NARS. IPGRI's way of working is the result of a conscious decision to give value to flexibility. Flexibility is needed because of the number of issues to be addressed in the area of genetic resources. These include crops, forestry, information management, institutional strengthening, policy, socioeconomic and geographic aspects. There is also a wide range of specializations involved in the research. IPGRI's flexible organizational structure allows the Institute to have an impact disproportionate to its limited size and core resources. It functions effectively in a broad range of areas because it does not rely only on its own resources. IPGRI's mode of operation is also based on partnerships. It works with collaborators outside its formal structure, from international organizations to small-scale farmers, in activities such as training and collecting. IPGRI can take direct or indirect action, or catalyze actions by partners in each phase of the scientific process:

- identifying and prioritizing problems and opportunities;
- formulating hypotheses and research designs;
- mobilizing resources to implement agreed research agendas;
- carrying out research;
- verifying, interpreting and evaluating research results, and
- disseminating and applying results.

## Programme operation

In 1995, IPGRI pursued its strategic objectives through 40 projects grouped into three programme elements: the IPGRI Plant Genetic Resources Programme (33 projects), the INIBAP Programme (6 projects), and SGRP support (1 project). The projects cut across all the strategic objectives of IPGRI and reflect the inter-related nature of plant genetic resources work. Each project has a number of activities that bring together teams of staff drawn from Thematic and Regional Groups, INIBAP and SGRP.

IPGRI's programme activities combine different research phases. For example, IPGRI's scientific staff, often with key partners, identify a research gap or need, then convene relevant groups to formulate approaches to the problem. The Institute then supports (financially or technically) the experimental phase, goes on to evaluate the proposed solutions or recommendations, assesses their expected impact, then publishes and disseminates supporting data and results. Finally, IPGRI helps mobilize the plant genetic resources community, public opinion, policy-makers and local communities to implement recommendations.

### *Identifying and prioritizing problems and opportunities*

IPGRI works to identify global problems in plant genetic resources that require investigation. IPGRI's scientific staff identify gaps in the international research agenda. IPGRI assists

Example - Identifying and prioritizing

**Field Genebank Training Workshop:** Representatives of national programmes, international organizations and regional networks in the Caribbean and Latin America were brought together in an IPGRI/UNEP/FAO/CATIE-sponsored training workshop in Puerto Rico in 1995 to examine problems of field genebank management. The major challenges faced by field genebank managers in developing countries were identified and solutions for meeting them were suggested.

countries and their national programmes in assessing their needs and strengths. The Institute draws attention to opportunities which can be explored, and coordinates identification of regional and national needs. Through workshops, consultations, conferences and seminars, IPGRI facilitates exchanges of views and collaboration between national programme staff, policy-makers, university researchers, NGO representatives, donor agency officials and professionals from international organizations. It then takes the lead in pinpointing where opportunities exist in the areas of conservation and use.

*Formulating hypotheses and research designs*

IPGRI addresses problems identified in the plant genetic resources arena by developing hypotheses that can be tested. IPGRI staff provide assistance in planning, developing and refining research programmes. Much of this work is aimed at meeting the needs of national programmes and communities which maintain and use plant genetic diversity.

Examples - Formulating hypotheses and research designs

**Global seed experiment:** In response to an ongoing debate in the plant genetic resources community over drastically reducing moisture content of seeds for long-term storage, IPGRI, together with its partners NSSL, CAAS and ICRISAT, formulated a research design for a 5-year global seed experiment which started in 1994. Results obtained so far from 'ultradry' seed samples in three locations were similar, indicating no measurable deterioration of seed quality at ambient temperatures.

**International *Musa* Testing Programme:** INIBAP has developed a long-range research programme to examine diseases in *Musa* and to develop disease-resistant germplasm. INIBAP designed mechanisms and research procedures for assessing a set of diverse genotypes against important *Musa* diseases at key locations around the world where pathogen diversity is either known or suspected to occur. The IMTP is designed to formalize local testing by sponsoring the micropropagation of elite germplasm for multilocational trials within countries. A global conference in Honduras defined protocols and guidelines for IMTP Phase II trials in 1995.

*Mobilizing resources to implement agreed research agendas*

A major component of IPGRI's role in the research planning stage is that of identifying appropriate key resources (human, material and financial), both in-house and external. IPGRI plays a facilitating and coordinating role in developing funding proposals and in linking national programmes and other partners with potential donor agencies. IPGRI's international web of contacts and experience is put into play in assigning priorities to proposals of merit and in targeting donor agencies most likely to be interested in seeing them come to fruition. This guiding role is nonetheless crucial for being intermediary. IPGRI also offers assistance to national programmes in developing their own research agendas. The work may involve institution-building, developing local capabilities, technical advice, facilities, equipment, training and access to information. IPGRI, through the technical expertise of its staff, assists its partners in mobilizing the necessary resources to implement and sustain an agreed programme of plant genetic resources activities and coordinates the contribution of resources from cooperating institutions, individuals and donors.

Examples - Mobilizing resources

**Recalcitrant forest seeds:** IPGRI sponsored a workshop with the DANIDA Forest Seed Centre, FAO and ICRAF which brought together national programme representatives from selected countries. In formulating a workplan for developing cost-effective techniques for handling recalcitrant and intermediate forest seeds through research and technology transfer, IPGRI established links between countries according to the distribution of species to be screened for recalcitrance and the location and availability of resources (facilities, expertise, funding). IPGRI coordinates the resulting partnerships and DANIDA provides technical and financial support.

**Assistance to Eastern Europe**: IPGRI, USAID and UNDP, working with the N.I. Vavilov Institute of Plant Industry in St Petersberg, helped to determine assistance priorities in Russia. Equipment needs were identified, resulting in the purchase and delivery of particular equipment. Advice was given to VIR on restructuring. Candidates were selected for training awards in conservation and genetic monitoring techniques.

*Carrying out research*

IPGRI is in the forefront of research and conservation activities in plant genetic resources, from ecogeographic surveys and collecting germplasm, through analysis of indigenous knowledge, to investigating conservation methods and strategies. The Institute also contracts research directly with

other scientific institutions. IPGRI staff may participate in certain key activities, such as genetic resources surveys, database development and germplasm rescue missions. Its staff, and in particular its Associate Experts and Honorary Fellows, as well as students who carry out thesis research, are involved in many areas of research, amplifying IPGRI's research presence. IPGRI's scientific staff are also involved in synthesizing and analyzing research results on conservation technologies and methodologies, and on policy issues which affect the conservation, ownership, movement and use of genetic resources.

Examples - Carrying out research

**Dryland forage and fodder**: In a project funded by GTZ and designed to examine the spatial and temporal distribution of forage genetic diversity, IPGRI combined biochemical and molecular examination of seeds collected in the Sahel region with ethnobotanical studies of three communities in the region. IPGRI employs a full-time research associate to oversee the project's activities in West Africa, under the supervision of an IPGRI scientist and a scientist based in Germany.

**Assessing genetic erosion:** In a case study of genetic erosion in Kenya, IPGRI scientists worked directly with national partners in a survey of rice and finger millet landraces. The project gathered information from farmers in the Tana River delta, collected germplasm for *ex situ* conservation and identified areas for on-farm conservation.

*Verifying, interpreting and evaluating research results*

IPGRI is in an excellent position to view the outcomes of different research programmes, find links between them, pinpoint potential areas of collaboration and, most importantly, interpret scientific data. IPGRI-commissioned research in one area may draw on or validate research carried out in another area. Professional staff from all Regional and Thematic Groups, SGRP and INIBAP work to develop appropriate conservation techniques as well as research methods which are most suitable to particular ecogeographic and sociocultural conditions.

*Publishing, disseminating and applying results*

IPGRI generates, gathers, publishes and makes information available to all sections of the genetic resources community. This is the final phase of the scientific process, where the actual scientific output is communicated and applied. In the area of research application, IPGRI facilitates the implementation of techniques, methodologies and policies resulting from research on the conservation and use of plant genetic resources. Many of these international, regional and national activities involve the partnership of CGIAR Centres, and other collaborators and networks. IPGRI encourages national and regional genebanks to adopt international standards. It collaborates with partners to formulate complementary conservation strategies with the aim of retaining biodiversity and preserving indigenous knowledge.

IPGRI develops and improves computerized techniques for storing and retrieving information on genebank accessions, as well as facilitating data exchange by promoting the use of common standards for information handling. Through publication, dissemination and application of research results, IPGRI encourages all partners, in both international and national/local fora, to share efforts and exchange resources towards a common goal.

Examples - research results

**Germplasm health:** IPGRI initiated a research project at the Philippine Coconut Authority's Albany Bay Research Centre on the pathogenicity of cadang-cadang viroid-like sequences in coconut. The study was triggered by reports on RNA sequences found by an Australian research team, responding to an urgent need to evaluate the quarantine significance of these sequences for the exchange of coconut germplasm.

**Conservation methodologies:** IPGRI, in consultation with a range of partners, is engaged in developing a global framework of scientific methods and conservation practices on *in situ* conservation. The project evaluates different conservation methodologies to find the most appropriate and effective mix of complementary approaches to apply.

At the same time, IPGRI seeks to influence policy-makers and the wider public in countries throughout the world, to make them aware of the importance of their own plant genetic resources programmes.

Examples - Publishing results

***Musa* information:** The *Musa* Germplasm Information System developed by INIBAP has disseminated information in the form of databases, software, descriptors and publications. Information exchange between researchers and genebank managers has been facilitated by training in the use of the user-friendly software and methodologies developed by INIBAP. A data delivery mechanism has been designed for linkage with the System-wide Information Network for Genetic Resources (SINGER).

**Descriptor lists:** The crop descriptor lists developed by IPGRI provide international guidelines that allow a standardized and unambiguous description of plant germplasm. IPGRI descriptors are used by the majority of national programmes around the world. In 1995 descriptors were published for *Capsicum* (jointly with CATIE and AVRDC), avocado and black pepper. Work began on coffee, tomato and banana.

*The operational whole*

In carrying through the scientific process from the articulation of problems to the publication of results, IPGRI's work is holistic in approach. Its role in each stage of the process is linked to the previous and successive stages and, as in any dynamic scientific endeavour, the final phase of disseminating and applying results leads to the identification of new problems requiring further research.

Integral to the research design of all of IPGRI's programme activities are indicators which can be used to measure impact. Impact assessments are made when a project is finished, and paired with feedback from partners. This approach often points to new aspects of a problem which could benefit from further investigation, or to entirely new avenues of research.

## Programme elements

There are three main elements in IPGRI's operational framework: partners, staffing and organizational structure.

*Partners*

The Institute operates with a primary emphasis on interaction with national programme partners in the developing world. Working with such partners throughout a project means that problems and solutions are those which are most pertinent to the country. This 'bottom-up' approach means that national and regional efforts are easier to sustain. IPGRI's collaborators are, nevertheless, found at all levels of plant genetic resources work, as follows:

> national plant genetic resources programmes;
> international and regional organizations;
> IARCs, including CGIAR Centres;
> scientific organizations, including universities and academic institutions;
> NGOs;
> private sector groups, including breeders' networks, commercial seed companies, biotechnology firms, and
> community-based organizations, including farmers' groups and women's groups.

*Staffing*

IPGRI maintains a staff with a wide range of technical expertise, selecting individual professionals for their specialized technical competence, as well as their aptitude for working within IPGRI's unique mode of operation. It is not possible, however, for the Institute itself to cover all disciplines through its internationally recruited staff, so IPGRI's staffing plan has evolved to include other staff components. Locally recruited professionals, Honorary Fellows, Associate Experts, thesis students, secondments from other organizations and visiting scientists extend the Institute's disciplinary depth.

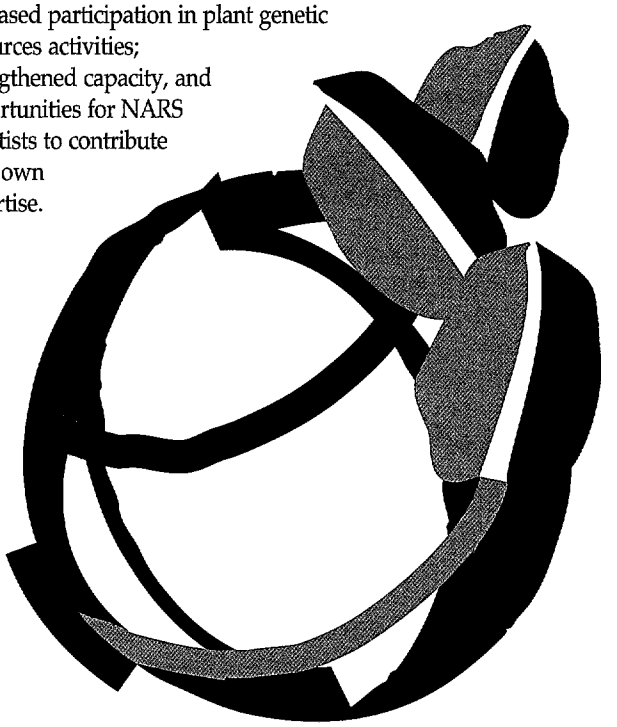
*Organizational structure*
IPGRI carries out its global operations through eight regional and subregional offices, and three thematic groups, linking them through its Headquarters in Rome. The roles of the Regional and Thematic Groups are complementary and mutually supportive. Regional Groups interface with a wide range of partners and identify needs in the respective regions, ensuring that IPGRI's regional work is needs-driven. Thematic Groups take a global approach by linking themes across regions. They supply specific expertise to complement regional efforts. This approach, to be effective, requires continual interaction and coordination among staff located in the various offices. The INIBAP Programme operates in a similar fashion, with its main operational base in Montpellier, France and offices in three other countries.

**Programme effectiveness**
IPGRI's operational choices are validated by the overall effectiveness of the programme, when measured against three criteria:
> cost-effectiveness;
> contribution to achieving institutional objectives, and
> potential impact on project beneficiaries.

*Cost-effectiveness*
Under IPGRI's partnership-based operational structure, both staff/time and financial costs are optimized by sharing them among partners. In addition, laboratory and field facilities are available indirectly to IPGRI in its project activities through partner institutions. Hand in hand with cost-effectiveness to IPGRI, of course, is the same benefit to IPGRI's partners. While enabling partners with limited international exposure and resources to obtain a wider scope for their activities and access to contacts and information which would otherwise be difficult for them, collaboration with IPGRI also affords them a considerable savings and more purchasing power to the resources they do expend.

*Contribution to achieving institutional objectives*
Each of IPGRI's projects contributes to meeting one or more of the Institute's four strategic objectives, as measured by project outputs. Periodic review during the course of the project means that progress remains focused on institutional objectives. Such a mechanism is essential in keeping strategic focus throughout the programme. Evaluation and impact assessment studies made during and on completion of the project continue this process.

*Potential impact on project beneficiaries*
The end-users of project outputs are, in almost all cases, IPGRI's partners. The impact of IPGRI's programme on its partners will depend on the value of the programme outputs to those partners. Impact may be seen in:
> greater amount of genetic resources conserved or used;
> greater efficiency and effectiveness of conservation programmes;
> increased cooperation in plant genetic resources activities;
> increased participation in plant genetic resources activities;
> strengthened capacity, and
> opportunities for NARS scientists to contribute their own expertise.



# Programme activities

Paul Stapleton, IPGRI

# Group reports

1995 was a significant year in IPGRI's development, as it saw further extension of the disciplines that the Institute covered, for example *in situ* and ethnobotanical work. In addition, many projects started to yield interesting and useful results. Reports from each of IPGRI's Groups follow, highlighting the most significant aspects of their work done in 1995. The accounts are summaries, to limit this Annual Report to a reasonable size. More comprehensive information on any aspect of IPGRI's activities is available on request to the relevant Group.

# Sub-Saharan Africa

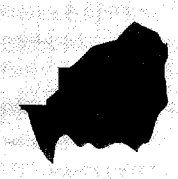
During the year, staff in the SSA region provided technical and scientific advice to collaborators such as national programmes, regional research organizations and NGOs. In addition, staff of the Regional Group collaborated with IARCs, regional research organizations, etc. in international and regional activities such as the Seeds of Hope project and the CGIAR System-wide ecoregional African Highlands Initiative. Major progress was made in understanding the status, needs and priorities of plant genetic resources in Africa through country reports and other material generated during preparations for FAO's International Technical Conference on Plant Genetic Resources.

## Selected project activities

### Spatial and temporal distribution of forage genetic diversity

Three years of field work in Niger were completed on this BMZ/GTZ-funded project. Project staff established over 20 test sites in a variety of vegetation types on a north-south transect of about 120 km, using the IPGRI Office for West Africa, located at the ICRISAT Sahelian Center, Niamey, as a base. All the sites were surveyed botanically and local knowledge of the crops gathered. Seeds of the five test genera (*Zornia, Brachiaria, Alysicarpus, Cenchrus* and *Dactyloctenium* spp.) were collected at all the sites for at least two rainy seasons, to provide different types of material for isozyme analysis. Leaf samples of the species were taken for DNA analysis. Genetic diversity was quantified using biochemical (isozyme) methods at ISC and molecular (RAPD) methods at the University of Giessen in Germany. An ethnobotanical study of

three villages (Damari, Tamaou and Tera) looked at options for *in situ* conservation which would fit in with traditional practices. More than 85% of the inhabitants of Niger are subsistence farmers or pastoralists. Many tree species have been over-exploited and have disappeared from the region. In some areas, only a few tree species remain, such as *Balanites aegyptiaca* and *Combretum* spp. In many regions women have to walk 5-7 km to find firewood. The zone of desert and sub-desert has increased to 77% of the national territory. The agropastoral zone has decreased from 139 000 km$^2$ to 78 000 km$^2$, mainly through population increase. Nevertheless, some of the locally acceptable ways of rehabilitating and conserving the environment include intensification of agriculture through home gardens, and stimulating regeneration through pasture enclosures and re-afforestation.



**The agropastoral zone in Niger has decreased from 139 000 km$^2$ to 78 000 km$^2$ in recent years**

## Coffee

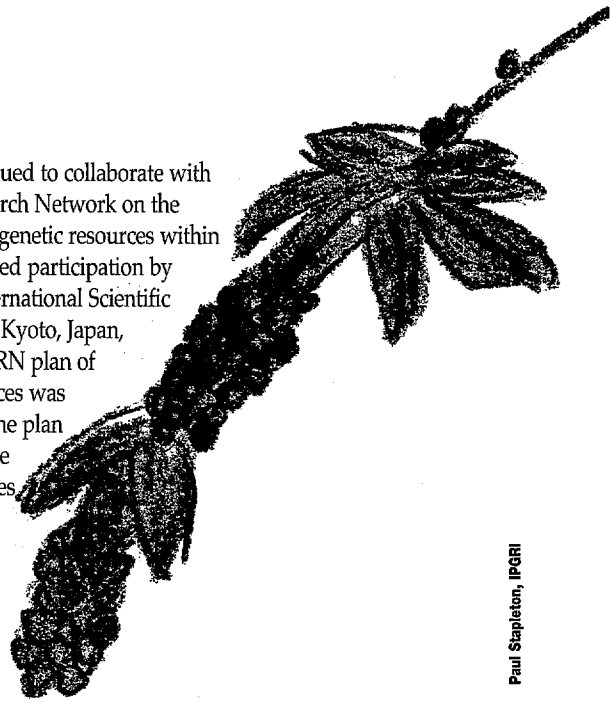
Staff in the region continued to collaborate with the African Coffee Research Network on the conservation and use of genetic resources within the network. This included participation by SSA staff in the 16th International Scientific Conference on Coffee in Kyoto, Japan, where the proposed ACRN plan of action for genetic resources was presented. Elements of the plan include strengthening the existing field programmes in Côte d'Ivoire, Madagascar and Ethiopia, implementing complementary conservation strategies, improving information services and increasing the use of stored material.

A project proposal was endorsed by ACRN to enhance the long-term competitive position of coffee in Africa by widening the genetic base of the crop, increasing the efficiency of production and improving the quality of the harvest. Specific objectives included long-term maintenance and duplication of existing major field collections of coffee, and characterization of the germplasm in these collections.

A PhD student started to study the genus *Coffea* in Mauritius. The project, in collaboration with the GMU staff, includes measuring genetic diversity within and among populations to develop a comprehensive conservation strategy for three rare and endangered *Coffea* species on the island of Mauritius. The Mauritian Wildlife Appeal, a local NGO implementing GEF-funded plant conservation projects, is the key partner.

## National programme development

IPGRI provided several national programmes with equipment to increase their capacity for work on plant genetic resources. To upgrade conservation facilities, the Sudan national programme was supplied with refrigeration equipment, Eritrea with foil bags and a heat-sealing machine, Angola with refrigeration and collecting equipment and Swaziland with



Paul Stapleton, IPGRI

The coffee plant is thought to have originated in Ethiopia. Arab traders took it to Yemen where the cultivation of coffee started in the year 575 AD. From Yemen the use of coffee beans spread throughout the Arabian peninsula and later via the Ottoman Empire to Turkey. The early Arabs called the bean and the tree that bore it, bunn; the drink, bunchum. Coffee was first used for its medicinal properties and as a ritual drink. Rhazes (AD 850-922), who sat at the feet of Hippocrates, wrote that "bunchum (coffee) is hot and dry and very good for the stomach." Dr Edward Pocoke's translation of *The Nature of the Drink Kauhi* (Oxford,1659) states that: "Bun is a plant in Yemen that flowers white, leaving a berry like a small nut. ... When it is dried and thoroughly boyled, it allayes the ebullition of the blood, is good against the small poxe and measles. ... Some drink it with milk, but it is an error, and such as may bring in danger of the leprosy."

collecting equipment through the SPGRC. Zambia received a vehicle, spare parts and a wide range of collecting and camping equipment.

## National workshops

Efforts to raise institutional awareness of plant genetic resources continued in 1995 with the organization of national workshops in Benin, Guinea, Niger, Nigeria and Senegal. The workshops were unique opportunities for workers in agricultural institutes, universities, ministerial departments and NGOs to exchange their experiences and agree on national programme activities. Many workshops established formal national committees, with the election of a national coordinator. This is a necessary step in more effective collaboration between IPGRI and the national programmes.

## Training

Thirty scientists in the region were trained in various plant genetic resources disciplines such as collecting, documentation, genebank management and germplasm handling. The trainees were drawn from across the region (see box, left). IPGRI staff participated and lectured in the various training courses and at the invitation of training institutions.

**IPGRI-sponsored plant genetic resources training in SSA**

| Country | Trainees |
|---|---|
| Angola | 2 |
| Cameroon | 1 |
| Ethiopia | 2 |
| Kenya | 2 |
| Lesotho | 6 |
| Malawi | 2 |
| Mauritius | 1 |
| Nigeria | 1 |
| Sierra Leone | 1 |
| South Africa | 2 |
| Sudan | 1 |
| Swaziland | 2 |
| Tanzania | 1 |
| Uganda | 1 |
| Zambia | 4 |
| Zimbabwe | 1 |

### *Darwin Initiative*

A regional training course on germplasm collecting was conducted in Lusaka, Zambia. This was the second course implemented on a collaborative basis between the UK Darwin Initiative, IPGRI, SPGRC and UNZA. The training offered opportunities to 19 scientists (15 from SADC and four from other countries, i.e. Kenya, Uganda and Ethiopia). The course emphasized the training of trainers by having eight of the participants drawn from teaching institutions. To promote capacity-building, the organizers made maximum use of local scientists from both UNZA and the Zambian national programme in the preparatory stages and in lecturing.

### *West Africa*

A training workshop took place in Abidjan, with the participation of university lecturers from Côte d'Ivoire, Burkina Faso and Niger. The objective was to develop an appropriate curriculum for courses to be offered at the National University of Côte d'Ivoire at the MSc level and for short-term training in plant genetic resources. Courses on plant genetic resources are badly needed in the region. A special committee was set up at the workshop to make further preparations, such as detailing the specific courses, the overall programme and the staff requirements.

### *Individual training*

The documentation officer from the Sudanese national programme was assisted to attend a practical training course on documentation at the Biodiversity Institute of Ethiopia (see also pp. 72-76).

### *On-the-job training*

Five staff members from the national programme of Lesotho were trained in germplasm collecting and the handling of seeds and herbarium specimens during collecting missions. The training was a part of the responsibilities assigned to a consultant hired by IPGRI to lead a rescue collecting mission in the Lesotho highlands.

### *SPGRC - Fellowships*

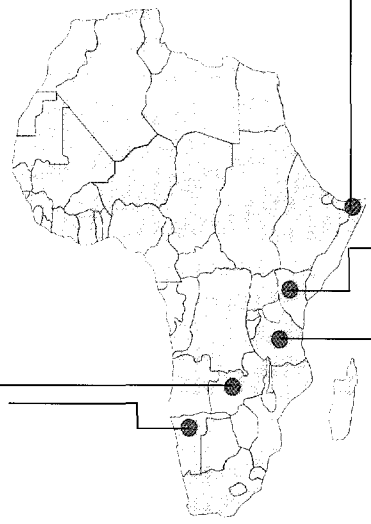
In addition to the IPGRI-sponsored training noted above, the SPGRC sponsored complementary training for 12 scientists from SADC countries, in coordination with IPGRI. Three scientists, from Swaziland, Namibia and Tanzania, were sponsored on short courses at the NGB. Three nationals, from Tanzania, Lesotho and Zambia, attended the MSc course at the University of Birmingham, UK, and six participated in a Darwin Initiative/IPGRI/SPGRC/UNZA course.

## Duplication

As a result of the work of IPGRI staff in the region, germplasm duplication is receiving more attention from the various national programmes. In SADC, 259 accessions were sent to SPGRC for duplication in the base collection, and 1000 accessions of *Sesame* were transferred to the Kenya National Genebank for duplication from the Hebrew University, Israel.

## Multiplication/Regeneration

**Various national programmes intensified their germplasm regeneration and multiplication activities throughout the region, with IPGRI assistance**



**Somalia**: Germplasm for repatriation back to Somalia went through a second multiplication cycle, resulting in 1.5 tonnes of maize and sorghum seeds for shipping. Collaborators in this activity included the Genebank of Kenya and Cooperazione Italia Nord Sud, an Italian NGO with agricultural activities in Somalia

**Zambia**: 174 accessions of groundnut, beans and cowpeas multiplied

**Kenya**: Multiplication and characterization data of 1000 duplicate accessions of the *Sesame* world base collection held by the National Genebank of Kenya compiled and computerized

**Namibia**: 300 pearl millet and sorghum accessions multiplied

**Tanzania**: 300 accessions of pearl millet and sorghum multiplied/regenerated

### Germplasm transfer and retrieval

Some 1469 accessions of sorghum were transferred from ICRISAT to the SPGRC. This material had initially originated from Namibia, Tanzania, Zambia and Zimbabwe. Tanzania transferred 228 accessions and Zambia 67 accessions for base conservation. A search for Somali material held by CGIAR Centres located accessions of groundnut, sorghum and pearl millet at ICRISAT and cowpea at IITA.

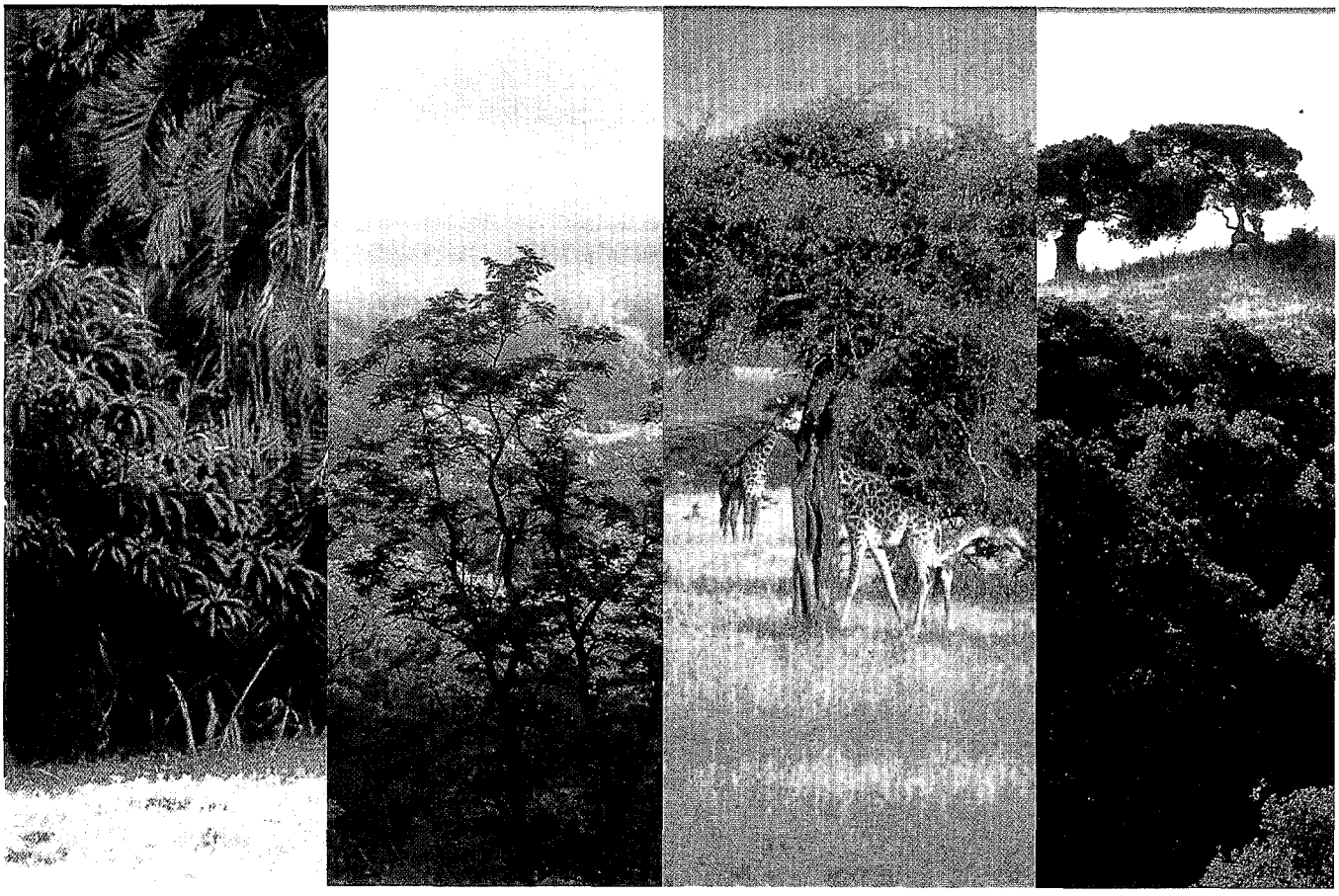
## Collaborative activities

### ICPPGR

SSA staff collaborated with the FAO/ICPPGR Secretariat in the preparatory process of the International Technical Conference on Plant Genetic Resources. IPGRI, the FAO/ICPPGR Secretariat and Programme consultants developed a workplan to assist the Sub-Saharan countries to participate effectively in the process. Staff also assisted through country visits, consultations and communications. During the preparatory process, 34 focal points or primary collaborators in national programmes were identified, representing 72% of the total number of Sub-Saharan African countries expected to participate in the Conference. Staff in the region assisted in compiling country reports with each of the collaborators. Five Subregional Synthesis Reports were also compiled- for Eastern Africa, the Indian Ocean Islands, SADC, Central Africa and West Africa. Three Subregional meetings were organized with input from IPGRI for East Africa and the Indian Ocean Islands, the SADC region and the Central and Western Africa Subregion.

### Collaboration with ICRAF

The ICRAF Genetic Resources Unit considers *Prosopis africana* a priority multipurpose tree for the semi-arid lowland West African countries. Extremely valuable as fodder, for its wood and for the medicinal properties of its bark, *P. africana* has nevertheless almost disappeared from some areas of the region. SSA staff collaborated closely with ICRAF to develop a collecting strategy, and a strategy for training national programme collectors of the species. A workshop on the tree drew participants from Burkina Faso, Mali, Niger and Senegal and reviewed the basic concepts of seed collecting, processing and storage for plant genetic resources conservation. They also agreed



on a strategy and methodology of tree seed collecting, documentation and processing. After the workshop, regional staff participated in the collecting work in Niger.

There was also collaboration with ICRAF in southern Africa. ICRAF had been commissioned by the SADC Tree Seed Centre Network to organize germplasm collecting missions of two important fruit trees, *Sclerocarya birrea* (Anacardiaceae) and *Uapaca kirkiana* (Euphorbiaceae), throughout the SADC region. IPGRI staff in the region assisted in developing the programme for a workshop that was held in Mbabane, Swaziland to standardize sampling strategies, collecting methodologies, evaluation protocols and other follow-up activities among the collaborating countries: Botswana, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe.

## Seeds of Hope

Under this initiative of CGIAR, which seeks to assist in re-establishing the agriculture of war-torn nations, in particular Rwanda, the status of conservation facilities and infrastructure in Rubona, Rwanda and IRAZ in Gitega, Burundi was assessed and a proposal for the national programme developed, compiled and submitted to USAID-Rwanda as a joint IPGRI/ISAR project.

## Collaborative research

For the third year, experimental work on sun-drying seeds for genetic resources conservation took place in the Sahelian environment of

Niamey, Niger. Millet, groundnut and maize seeds were dried in the open air, under direct sun and under shade. Results were compared with the use of a controlled drying room at 15% relative humidity and 15°C. The results confirmed that drying seeds in the open air in Niamey was as efficient as using a controlled drying room. The dried seeds were sent to RBG Kew for viability studies after accelerated ageing treatments.

### African Highlands Initiative

SSA staff participated in several meetings of this project, resulting in the incorporation of genetic resources activities into the programme of work, such as commissioning inventories of forage germplasm in the highlands from the national programmes.

### Meetings and workshops

IPGRI was invited to review the activities and assist in developing a strategy for the West and Central African Millet Network. IPGRI staff stressed the importance of genetic resources in crop improvement and proposed that the regional base collection of millet be held by a designated country on behalf of all the member countries. This proposal was endorsed by the participants for further action.

### Traditional vegetables

The IPGRI project on neglected crops that is funded by BMZ/GTZ organized a workshop entitled 'Conservation and Use of African Traditional Vegetables'. Thirty vegetable workers from universities, genebanks, national research institutes and NGOs participated. Discussion of country papers and presentations by regional institutions and projects increased the participants' understanding of problems common to the region. Working groups outlined programmes of action on indigenous knowledge in conserving traditional vegetables, the importance of understanding marketing systems, strategies for genetic enhancement, the contribution of traditional vegetables to development, options for conservation and institutional issues. A steering committee was appointed to ensure that the meeting's recommendations were pursued, such as compiling a bibliography (which was subsequently done in coordination with IPGRI library staff) and developing a database of vegetables workers and institutions.

Support was given to the GD group in formulating a project on African traditional vegetables focusing on the issues of gender, nutrition and household income. Potential partners in several countries were identified and a pilot study in Kenya planned for 1996.

# West Asia and North Africa

The new building for the WANA Group's offices was inaugurated on the ICARDA site on 17 September 1995 by His Excellency Mr Assad Mustapha, Syrian Minister of Agriculture and Agrarian Reform, Dr Wanda Collins, IPGRI Board Chair, Dr Adel El-Beltagy, Director General of ICARDA and Dr Geoffrey Hawtin, Director General of IPGRI. Also present were the Governor of Aleppo, His Excellency Mr Mustapha Mero, the IPGRI Board of Trustees and staff from the national programmes of the region, together with ICARDA and IPGRI staff.

During the opening speeches, His Excellency Mr Mustapha, on behalf of the Government of Syria, reiterated support for the activities of IPGRI, the WANA Regional Group and ICARDA. He also highlighted Syria's commitment to conserving plant genetic resources by establishing a new genebank for *ex situ* conservation and creating two more natural reserves for *in situ* conservation, bringing the total to 30 reserves across the country.

Dr El-Beltagy highlighted the importance of the WANA region in terms of its richness in crop genetic resources, and the steps taken, in the late 1980s and the early 1990s, that helped in establishing WANANET and IPGRI's Regional Office in Tel Hadya.

In his speech, Dr Hawtin thanked the Government of Syria and ICARDA for their support to IPGRI. The occasion was unique since it was within the framework of an IPGRI Board meeting, the first meeting to be held outside Europe and the first to be held at another CGIAR Centre. Dr Hawtin summarized the long history of IPGRI-ICARDA collaboration, which dated back to the early days of IBPGR.

Staff of the WANA Regional Office were closely involved during 1995 with the regional preparation process for the International Technical Conference on Plant Genetic Resources. Staff worked with FAO/ICPPGR Secretariat staff and other IPGRI personnel to assist national programmes in the region to prepare country reports. This was done by working visits to the countries and reviewing drafts of the reports. Information on the preparation process was published in the WANA Regional Newsletter to keep national programmes informed of progress and to locate sources of information. To further develop the country reports, there were sub-regional meetings on plant genetic resources in Iran for West Asia and Central Asia and in Tunisia for the South and East Mediterranean. During these meetings, summaries prepared by WANA staff were presented and recommendations adopted for the Global Plan of Action.

# Selected project activities

## WANANET

*Steering Committee of WANANET*

During the In-depth Review of the WANA Group in September 1995, the Steering Committee of WANANET met and made a set of recommendations for action in the region. These included closer coordination of plant genetic resources within and between the countries of WANA, and the development of core collections that will help in the utilization of plant genetic resources.

*Forage and Pasture Working Group meeting*

The Group recommended that work be prioritized in terms of species, collecting, characterization and maintenance. Promising species/varieties (landraces) should be given first priority. The development of a programme for the proper monitoring of genetic erosion of pasture, forage and range species was suggested. Species should be identified for specific ecogeographical areas to be used for this purpose.

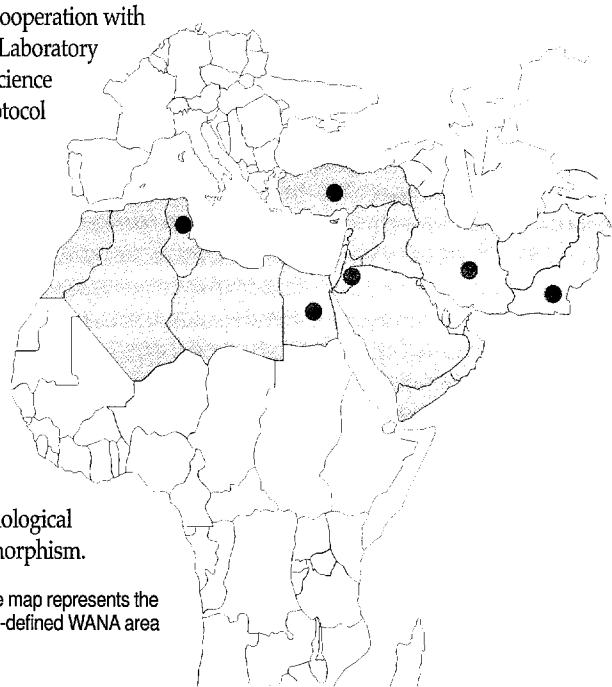
## Fruit trees and nuts

Work on the conservation and use of genetic resources of fruit trees and nuts in WANA continued for the third year, with three more national programmes joining the regional efforts to survey, collect, document and utilize these resources.

In cooperation with the national programmes in Egypt, Tunisia and Turkey, a second series of surveys and collecting was made during 1995. Experts in these countries collected more than 2000 single kernels of 236 accessions, mostly of landrace almonds. The Iranian national programme was able to collect additional accessions of *Prunus* species from East Azarbaijan. The Jordanian national programme collected an additional 100 landraces.

Information was added to the database on almond. It includes information on the habitats, an assessment of genetic variation in the field and evaluation data on the collected germplasm in preparation for the development of a core collection. The development of an *in vitro* collection continued, in cooperation with the Plant Tissue Culture Laboratory at Jordan University of Science and Technology. The protocol for the procedure is well established. Plans were formulated to collect and evaluate genetic resources of *Pistachia* in Jordan, Lebanon and Iran during the second phase of the project. In cooperation with Yarmouk University in Jordan, pistachios were collected from Jordan and evaluated for morphological traits and isozyme polymorphism.

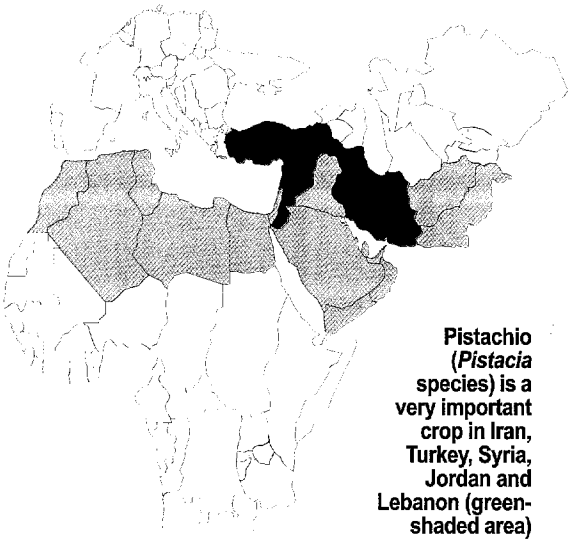
**Collecting almond**
Almond germplasm was collected in Egypt, Iran, Jordan, Pakistan, Tunisia and Turkey during 1995



The shaded area on the map represents the IPGRI-defined WANA area

## Pistachio

Asia Minor is the centre of origin of *Pistacia* species. Wild and cultivated stands spread over large parts of Central and West Asia. Nuts from wild stands in Central Asia are still being consumed by locals. In the Middle East the pistachio tree is known as the 'Pistachio of Aleppo', reflecting the abundance and long history of pistachio nuts grown there. Dr Alexander Russell wrote in his 'Natural History of Aleppo' (1750-1770) that pistachio was cultivated with great enthusiasm and tended with great care in Aleppo province.



**Pistachio (*Pistacia* species) is a very important crop in Iran, Turkey, Syria, Jordan and Lebanon (green-shaded area)**

The pistachio nut has been a rare delicacy since Biblical times. The Queen of Sheba demanded all her lands' production for her own use. The nuts, while low in sugar, have a protein content of over 20% and 50% oil. Trees of varying age are found in Iran, Pakistan and Syria. The one near Damascus (see photo) is approximately 700 years old. Another 700-year-old tree is still standing in the Kerman area in Iran, an area famous for its pistachio production.

Pistachio nut is one of the tree crops, in WANA, whose wild genetic resources are declining. Staff in the Regional Office cooperated with national programmes to collect and vegetatively propagate reference material of species and varieties in countries of the region.

**A 700-year-old pistachio tree near Damascus, Syria**

Abdullah Bari, IPGRI

## Training

### Individual programme

Mr Ch. Kizourides, from the Agricultural Research Institute of Cyprus, was trained in collaboration with ICARDA in mechanisms of data transfer and development of applications in the documentation of plant genetic resources.

### MSc programme

The Regional Office supports financially and supervises master degrees of candidates who are registered with national universities. During 1995, a graduate student, Mr Mohammed Al-Rababah, from the University of Jordan was supported and supervised by staff in the region. His study revealed the presence of unique combinations of traits in certain populations of *Triticum dicoccoides*, especially those collected in drier parts of Jordan.

### Post-graduate plant genetic resources courses

A workshop was held at the Lebanese University in Beirut, Lebanon, involving university professors and scientists from Cyprus, Jordan, Lebanon and Syria, plus IPGRI staff from the Regional Office and thematic groups. The workshop participants discussed advanced training needs in the region and agreed on follow-up actions, including the promotion of a regional Masters level course (also see p. 75 *et seq.*).

**Participants in the advanced training course on conservation of plant genetic resources in the Mediterranean held at the Institut Agronomique et Veterinairs Hassam II in Rabat, Morocco**

### Other training activities

Staff in the region participated in a number of other activities sponsored by other institutions. In particular, staff worked on a training course in Jordan on 'Collection and Conservation of Drylands Genetic Resources', within the framework of the project 'Conservation and sustainable use of dryland agro-biodiversity of the Fertile Crescent' with the support of UNEP.

### Information/ Publications

During the year, the Office produced four issues of the Regional Newsletter. The public awareness brochure *In Defence of Diversity, Focus on WANA* was finalized and published.

# Asia, the Pacific and Oceania

The APO Regional Group was strengthened during the year, with the arrival of an Associate Coordinator in the South Asia Coordinating Office, two Associate Experts from Switzerland, and an Honorary Fellow appointed to the Singapore Regional Office. The development of a new IPGRI activity on methods of documenting indigenous knowledge for more equitable and effective use of plant genetic resources was stimulated through a workshop in Chiang Mai, Thailand. Practical methods of using and enhancing crop diversity in local communities in South Asia were identified in a meeting held in Delhi, India. In Southeast Asia, this topic was addressed at a meeting in Indonesia. Two conferences in Beijing described recent research on seed bank storage and examined links with the private sector in conserving and using plant genetic resources. These meetings resulted in increased international recognition of the strong capability in China for seed conservation research.

Close collaboration with other IPGRI regional and thematic groups was particularly important in carrying out a range of activities. From the regional perspective, considering the problems with maintaining and managing refrigerated storage, emphasis was been laid on work to develop alternative methods to store seeds, to reduce the cost of conservation.

Networking activities in the Coconut Genetic Resources Network and the Biodiversity Working Group of the International Network for Bamboo and Rattan gathered momentum. Through assistance given to the Secretariat of the ICPPGR, IPGRI staff helped assess and prioritize future actions to enhance activities in plant genetic resources in the region.

# Selected project activities

## National programme support and development

Strengthening the capability of countries in the region to carry out work in plant genetic resources remained a primary focus of APO staff. National workshops held in Vietnam and Mongolia during the year led to recommendations for stronger national coordination and priority-setting. A meeting of the coordinators of South Asia plant genetic resources work improved communication among national staff in Bangladesh, Bhutan, India, Nepal and Sri Lanka. This process was complemented by IPGRI's involvement in regional ICPPGR preparations. IPGRI staff in the region facilitated the writing of country reports and subregional syntheses, and organized preparatory meetings for the conference in 1996. Eighteen country reports were generated and three subregional syntheses prepared with inputs from IPGRI. Subregional meetings held in Beijing and Bangkok made recommendations that will be taken forward to the International Technical Conference in June 1996 in Leipzig. IPGRI-supported workshops in Bangladesh, Mongolia, Nepal and Vietnam proved to be another effective mechanism to enable countries to participate more effectively in regional and international activities.

Two documentation training courses helped national staff at institutions in Malaysia implement the IPGRI-developed Genebank Management System software across the country. A 3-week training course was organized in the Philippines, attended by over 20 practising genebank staff from across the region. The course dealt with methods of conserving vegetatively propagated crops, using *Allium, Musa,* sweet potato, taro and yam as the models. A training survey conducted in 33 countries in the region revealed a strong need for both frequent practical short courses and for offering an MSc degree in plant genetic resources in the region. With support from IPGRI, the University of the Philippines at Los Baños began to establish such a programme.

During the year, IPGRI provided support to the Madras-based NGO, the M.S. Swaminathan Research Foundation, to develop a community genebank, study ethnobotany and conserve rare and endangered plants. The Foundation worked through community involvement in biodiversity conservation and training in advanced methods for locating genetic diversity. A rice-collecting mission with VASI in Vietnam, supported by Japan, collected 284 new cultivated and one new wild accessions. It also found that traditional landraces are being rapidly replaced by improved rice varieties in irrigated areas. A series of banana- and

Ken Riley, IPGRI

**In Vietnam, an enormous variety of vegetables are conserved. In collaboration between GD and APO, a project with staff at Can To University is assessing genetic diversity and rates of genetic erosion in vegetables as well as rice and root crops.**

plantain-collecting missions by VASI, supported by both INIBAP and the plant genetic resources programme of IPGRI, assembled 107 accessions, of which 19 were wild species. The material was established and characterized at research stations in both the north and south of Vietnam, with duplicate samples placed in tissue culture (see also p. 81 - INIBAP).

## Underutilized crops

### Buckwheat

Information that was earlier collected by staff at the Beijing and Delhi offices was assembled in the form of a directory of buckwheat germplasm collections and a bibliography with summaries of a large range of information on this crop. Interest in forming a buckwheat network was expressed during an IPGRI-assisted session at the International Buckwheat Research Association Conference held in Japan.

### Sesame

During the year, work continued on a set of germplasm accessions selected from eight countries in Africa, Asia and Europe as the basis of an adaptation study. The interaction of genotype with environment was studied when the material was grown in 10 environments in South Korea and India. The study will help in understanding the highly location-specific nature of many sesame germplasm accessions. The world sesame collection held by the Rural Development Administration in the Republic of Korea was regenerated in 1995 with IPGRI support. In a separate study with IPGRI's Genetic Diversity Group, the Oil Crops Research Institute of the Chinese Academy of Agricultural Sciences in Wuhan started to identify the best method of forming a core collection. This activity, in turn, is expected to assist in rationalizing the use of *ex situ* sesame collections in the region.

### Safflower

Collaboration with the International Safflower Germplasm Advisory Committee continued, leading to the publication of a safflower germplasm directory, and the translation into English of Chinese literature on the extensive medicinal uses of safflower. Selected ecotypes of safflower were exchanged between China and India for joint studies of germplasm adaptation.

### *Lathryus*

With the collaboration of the WANA and APO groups, a meeting of grain legume and pasture specialists from West and South Asia recommended forming a network for safeguarding, exchanging and using the genetic resources of this neglected pulse crop. In particular, the meeting reaffirmed the need for continued breeding of toxin-free *Lathryus* varieties, with emphasis on developing material that possesses high genetic diversity. Staff in the region began work on *Lathryus* descriptors, a *Lathryus* directory and further follow-up to establish this network.

### Taro

Extensive information on taro genetic resources, use and improvement was compiled in a review presented during a workshop in Papua New Guinea, co-hosted with the South Pacific Commission. Collaboration with ORSTOM resulted in a comprehensive proposal to support Asia-Pacific countries to assess and conserve taro diversity and utilize it to develop more stable, disease-resistant varieties. An ethnobotanical survey of taro in Bangladesh was completed. Similar surveys began in India, the Philippines and Sri Lanka. This information was used to understand the important link between local peoples' knowledge and the genetic diversity of the crop. In a separate study with the GD group, an ethnobotanic survey and molecular analysis of taro genetic diversity was started at two institutions in China (see p. 57).

## Tropical fruits

In a continuing project, IPGRI is promoting the conservation and sustainable use of tropical fruits in the region. Activities in 1995 provided additional information on the origin, taxonomy, diversity, distribution and ecology of

fruit crops, and on germplasm collections, evaluation and conservation at a number of institutes in the region. This information is being synthesized in the form of status reports to share with partners. The data are also useful in efforts to improve various fruit varieties.

**Status reports on fruit species**

| Priority species | Country |
|---|---|
| Mango | Bangladesh, China, India, Indonesia, Philippines, Thailand |
| Citrus | China, India, Japan |
| Rambutan | Malaysia, Thailand |
| Durian | Malaysia, Thailand |
| Jackfruit | Bangladesh |
| Lichi | China |

Another activity in the project identified suitable *in vitro* media for tissue culture and slow growth using a variety of genetic stocks of *Citrus sinensis* and *Citrus reticulata* in Chongqin, China (see also pp. 60-61 - GMU section). By the end of 1995, about 50 genotypes of various citrus species and their relatives had been conserved *in vitro* in national programme facilities in Chongqin. The University of South Sumatra in Indonesia, in collaboration with IPGRI, engaged in describing, documenting, collecting and conserving the available diversity of *Lansium domesticum* or duku, a native fruit species facing the threat of genetic erosion. Collaboration in the form of discussions and meetings with 10 national fruit crop programmes in the region was established to plan further ecogeographic surveys and studies to measure genetic diversity and methods of effective conservation and use of a number of tropical fruit species. In its activities on tropical fruits in the region, IPGRI is collaborating closely with national programmes within the context of UTFANET (ICUC) as well as with CIRAD and FAO.

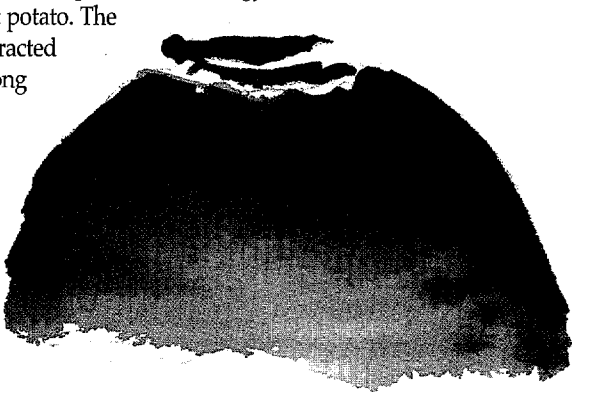
## Networking

Networks in the region are an important mechanism for increasing collaboration among institutions and countries in their work on conserving and using plant genetic resources. Staff in the region continued to act as facilitators in a number of network arrangements. The role and effectiveness of several networks in the region were reviewed during the year. Some activities on okra and groundnut were dropped as very little progress could be made in the networking activities on germplasm of these crops.

To be effective, networks must be able to exchange information among members. APO staff, in collaboration with partners in the region, developed a standard report format called the Data Interchange Protocol that allows data to be exchanged between genebanks. Passport data on accessions held in the CAAS genebank in Beijing and the NIAR, Tsukuba genebanks in Japan were exchanged very effectively using the Protocol.

Collaboration with AVRDC on an Asian Genetic Resources Network on *Allium* developed a directory of *Allium* genetic resources workers. AVRDC's Vegetables Newsletter began to feature news articles about *Allium* genetic resources.

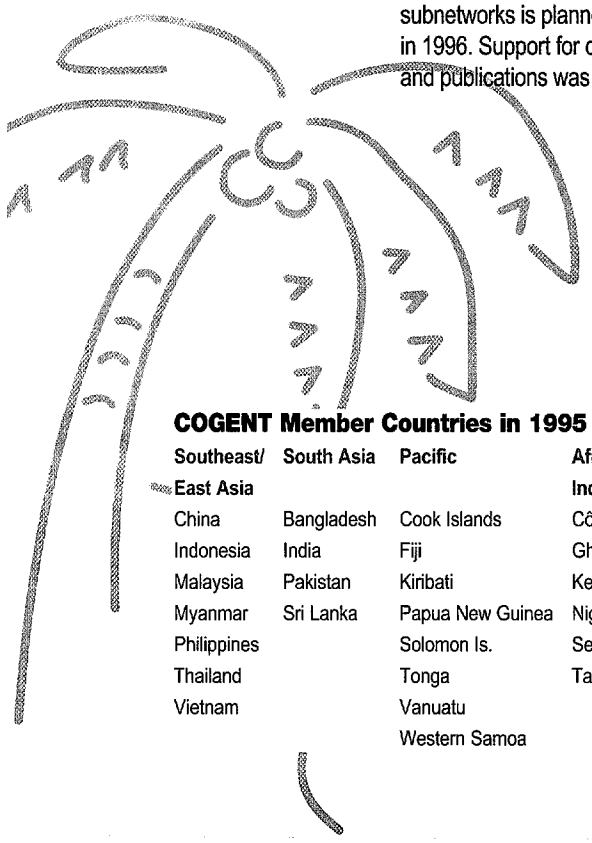
A concept paper was developed with CIP during the year. The paper put forward a number of priority issues for the conservation and use of existing collections of sweet potato in the region. The paper discussed the problems faced by national programmes in the region in managing large field genebanks. It also discussed rationalizing collections, determining the most useful accessions for immediate use, and conserving other accessions in field genebanks. This approach is expected to lead to a comprehensive strategy to conserve sweet potato. The concept paper attracted approval and strong support from national programmes as well as from CIP and IPGRI.



Patricia Tazza, IPGRI

# Coconut Genetic Resources Network (COGENT)

The International Coconut Genetic Resources Network (COGENT) was established in 1992, to improve coconut production on a sustainable basis and to increase income in developing countries through improved cultivation of the coconut and efficient utilization of its products. IPGRI is the executing agency for COGENT and provides a secretariat at its APO office in Singapore. IPGRI provides administrative and technical support, advice and some funding. COGENT operates through a steering committee comprised of two members from each of the five subnetworks, Africa, Latin America/Caribbean, South Asia, Southeast Asia and the South Pacific, and a full-time coordinator. To strengthen collaboration at the regional level and to enhance the sustainability of COGENT, support to 13 countries was established in the Asia-Pacific region with the assistance of the ADB. Establishment of similar subnetworks is planned in Africa and the Americas in 1996. Support for coordination, communication and publications was provided by ODA of the UK.



**COGENT Member Countries in 1995**

| Southeast/ East Asia | South Asia | Pacific | Africa/ Indian Ocean | Latin America/ Caribbean |
|---|---|---|---|---|
| China | Bangladesh | Cook Islands | Côte d'Ivoire | Brazil |
| Indonesia | India | Fiji | Ghana | Costa Rica |
| Malaysia | Pakistan | Kiribati | Kenya | Cuba |
| Myanmar | Sri Lanka | Papua New Guinea | Nigeria | Jamaica |
| Philippines | | Solomon Is. | Seychelles | Trinidad |
| Thailand | | Tonga | Tanzania | |
| Vietnam | | Vanuatu | | |
| | | Western Samoa | | |

COGENT is actively undertaking an international collaborative programme with member countries to improve the conservation and use of coconut genetic resources in the following areas:

> Establishing and maintaining an international database on existing and future collections;
> Encouraging the protection and utilization of existing germplasm collections;
> Identifying and securing additional threatened diversity by developing and adopting suitable technologies and conservation strategies;
> Promoting greater collaboration among research groups in producer countries and countries with advanced technology through the exchange of germplasm and the development of new techniques, and
> Pursuing training, information dissemination and funding sources.

COGENT's membership increased to 30 countries in 1995, with each country having agreed to provide access to its coconut germplasm and data as one of the conditions for membership.

An important component for sustainable production and improvement in coconut is the availability of a wide range of diversity from around the world. This material is used either directly or in breeding programmes to develop improved varieties and hybrids for coconut-producing countries. The germplasm conserved has to be documented and information and germplasm effectively exchanged, and additional diversity collected, characterized, conserved, shared and utilized.

Information on 667 accessions from genebanks in 13 member countries has been entered into the international coconut genetic resources database, which is funded by the French Government. The database information and software were distributed to COGENT member countries. Additional passport and characterization data were generated from member countries to increase the content and usefulness of the database.

With ADB support, additional germplasm collecting was started in eight Asia-Pacific countries to secure germplasm in areas at risk and to fill gaps in the range of germplasm in national collections. The material will be conserved in the

respective national genebanks.

COGENT intends to establish an international multi-site genebank based in each of the five COGENT regions. These regional collections will further ensure the security of germplasm conserved in national collections, which are important at the regional level, and provide member countries with germplasm to develop better varieties and hybrids. In 1995, four countries were identified as potential countries to host regional genebanks: India for South Asia; Indonesia for Southeast Asia; Papua New Guinea for the South Pacific; and Côte d'Ivoire for Africa. These countries committed themselves to providing access to member countries to the germplasm held in trust, to gather and submit data to the international database and to maintain the collections.

To utilize available germplasm, five Asia-Pacific countries, with ADB support, are evaluating local and introduced germplasm, with the help of farmers and consumers, to select high-yielding and adapted varieties and hybrids. Planning began on similar initiatives for Africa and the Americas.

COGENT in 1995 conducted a trainers' course on research techniques in coconut breeding in Manado, Indonesia in collaboration with CIRAD and Indonesia's AARD. The objective was to upgrade national research capability and increase the number of trainers on the conservation and use of coconut genetic resources. National programmes and projects in India, Indonesia, the Philippines and Thailand were visited by coconut researchers of COGENT member countries to enhance collaboration and sharing of resources and technologies.

Collaborative linkages of COGENT members were established with partner institutions such as CIRAD in France, Long Ashton Research Station in the UK, the Max Planck Institute in Germany and the University of Adelaide in Australia, in the areas of biotechnology, conservation, safe movement and use of germplasm. Collaboration was also been strengthened with the Asian and Pacific Coconut Authority, the South Pacific Commission and the Bureau for Development of Research on Tropical Perennial Oil Crops.

Within the okra network, IPGRI funded the Institut des Savanes, Côte d'Ivoire to regenerate some of its valuable okra genetic resources. A study on understanding genetic diversity and species relationships in okra, in collaboration with NBPGR, India, indicated narrow genetic diversity within cultivated okra. Though divergence of species could be related to geographic region, the divergence itself was found to be limited.

## Regeneration in genebanks

An IPGRI project aimed at developing strategies to maintain genetic integrity and diversity in collections of plant genetic resources is based in the APO region, but closely linked with activities in both the GD and GMU thematic groups. Data from a survey of over 100 genebanks showed that most of the regeneration carried out by genebank managers was intended to maintain seed stock, rather than to maintain seed viability. Similar material is maintained very differently by managers in different genebanks. These results were presented at a meeting on the regeneration of germplasm of seed crops and their wild relatives; an initiative

Joo Ann Foh

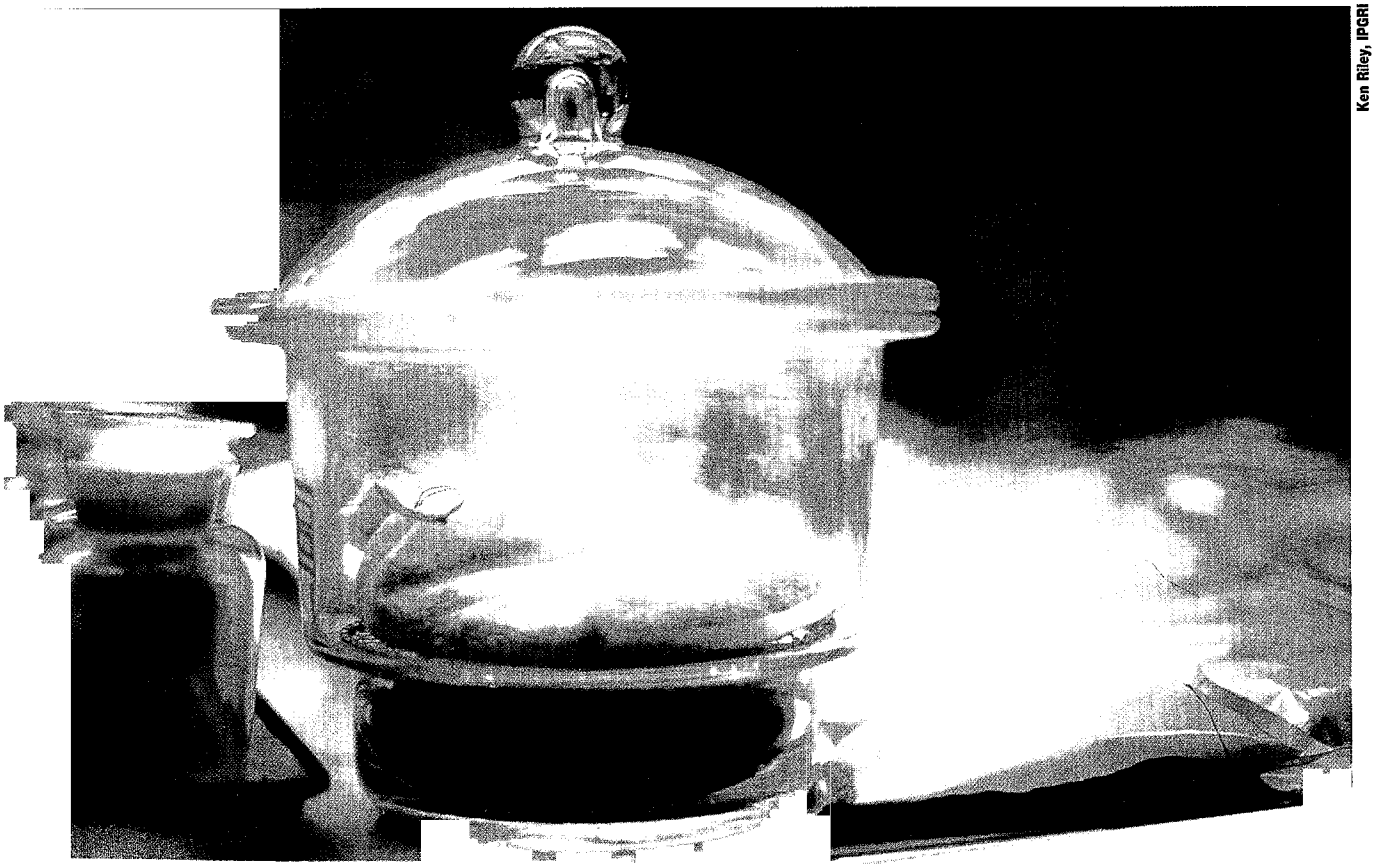
**Measuring the length of 11 leaf scars to characterize coconut germplasm.**

of the SGRP (see pp. 86-88) held in collaboration with FAO. Experts from IARCs and national programmes decided to develop the framework for a decision-guide on germplasm regeneration procedures to aid genebank staff.

Work on the effect of breeding systems on maintaining genetic diversity during regeneration of accessions began as a collaborative activity with IPB, NPGRL and UPLB. The experiment included 10 variables within accessions of mung bean (self-pollinated), okra (often cross-pollinated) and bittergourd (*Momordica charantia*) (cross-pollinated). Additional treatments were created by forcing self-pollination in okra by holding the flowers closed during anthesis and by full sibling crosses in bittergourd. Morphological characterization and electrophoresis of seed protein and leaf indicated considerable variability in the material. Based on information from these initial studies, appropriate accessions were selected for the second round of studies in 1996.

Work on determining effective pollination methods and isolation techniques, in collaboration with FAL, Braunschweig and IPK, Gatersleben, Germany, was completed on carrot, onion and spring turnip rape. The studies found that plant species strongly influence the behaviour of pollinating insects. Climate, light, arrangement of the plants and insect nesting material can be manipulated to maximize and standardize pollination by insects.

A third group of investigators, based at ICGR in Beijing, worked on developing optimum methods of regeneration in both autogamous and allogamous species. Seed set in sweet buckwheat could be increased to over 70% by polycrossing. Seed set in Chinese cabbage was raised to a similar level using chain or pair crossing with flies and bees. For Job's tears (*Coix lachryma-jobi*), hand-crossing was effective, while multiflora bean (*Phaseolus mitiflorus*) was effectively pollinated using honey bees and nylon netting as an artificial



Ken Riley, IPGRI

barrier. No changes could be detected in esterase banding patterns between original seed and regenerated material. Similarly, no chromosome abnormalities could be detected in the root tip cells of regenerated seed.

## Conservation

At the Oil Crops Research Institute, Wuhan, China, seeds of groundnut, rapeseed, sesame and soyabean have been stored in desiccators with silica gel for over 15 years. This provided an opportunity to check the feasibility of storing very dry seeds (moisture content around 3.0-3.5%) under ambient conditions. Such handling, if effective, would reduce the cost and risk of storing material in refrigerated rooms, given the uncertain power supply in many of the developing countries in the APO region. A study was conducted in collaboration with the Beijing Botanical Garden, ICGR and OCRI.

Seeds of sesame, groundnut and rapeseed showed satisfactory viability after storage under ambient temperatures for 11-17 years at less than 3.5% moisture content. The germination percentage of sesame seeds of two different cultivars, with 2.3% and 2.39% moisture content respectively, were 80% and 85%, after storage for 17 years in a desiccator. Groundnut seeds of cultivar Robut 33-1 with 3.37% moisture content showed 74.95% germination percentage after an 11-year storage period. Seeds of rapeseed cultivars Gan You No.1 and ORO, with 3.42% and 3.45% moisture respectively, showed 100% and 70% germination percentages. Initial tests in the field with those seeds to study genetic stability showed no significant changes in major agronomic characters. Studies at BBG with onion, elm (*Ulmus pumila* L.) and eucomia (*Eucommia ulmoides* Oliv.) showed that the optimum moisture content at 35°C storage was 3.5-4.5% for onion seeds, 3-4% for elm seeds and 3.1-4.2% for *Eucommia*. Additional studies at ICGR with buckwheat, jute, kenaf, millet, oat, rice, sorghum and wheat showed that the optimum moisture content at 45°C was 4-6% for those eight crops. The results of these studies support the possibility of developing alternative techniques, at least for oily seeds, to cold storage.

**In China, seeds of sesame, groundnut and rapeseed stored at room temperature in desiccator jars over silica gel were found to retain satisfactory germination after 17 years.**

# Americas

1995 was a year of intense activity in the technical and political arena of plant genetic resources in the Americas. IPGRI staff in the Americas region were heavily involved in the preparatory processes for the International Conference and Programme on Plant Genetic Resources. The involvement provided new technical and political insights for staff in the region. Country reports provided valuable information on the strengths, weaknesses, opportunities and needs that countries have in dealing with their plant genetic resources. It also revealed trends in the work on plant genetic resources in the Americas, and helped IPGRI to define its future involvement in the region. The information helped to support and modify the Regional Group's agenda. Participation in the process also provided an opportunity to raise awareness of IPGRI activities in the region, and to assess countries' perception of the Institute's work in the region. A dynamic was created by the multilateral strategic alliances and the global actions initiated by the preparatory process. To a large extent, the achievements in plant genetic resources in the Americas during 1995 were a result of this unprecedented convergence of activities. The securing of additional funding for REMERFI and TROPIGEN were important achievements for the networks and the Regional Office during the year. The German donor BMZ approved nearly US$900 000 to fund the research and coordination components of REMERFI. The European Union approved about US$600 000 for a pineapple project that will be conducted within TROPIGEN.

## Highlights of the networks

Within REDARFIT and REMERFI, significant advances were made in implementing the project 'Biodiversity, conservation and sustainable use of native fruit germplasm of tropical America', which is funded by IDB. National institutions in Costa Rica, Guatemala, Honduras and Nicaragua completed half of their inventories of the economically important species of the Sapotaceae family using agromorphological traits and ethnobotanical information for *in situ* characterization. The University of San Carlos, Guatemala, developed isoenzyme markers to complement this characterization. A descriptor list of Sapotaceae germplasm was produced on the basis of an agreed set of characters and the latest findings in the management of trees in this family. CATIE developed a new submersion method of *in vitro* conservation for sapote (*Pouteria sapota*), to overcome problems caused by latex and phenols. REGEN-UNA worked on another technique for sapodilla (*Manilkara zapota*). Project collectors were trained in species identification and collecting methodology (see p. 72 *et seq.*), and a morphological descriptor list was developed. CORPOICA selected aggressive strains of nematodes and *Fusarium* to evaluate resistance in collected germplasm, addressing two very important problems faced by granadilla (*Passiflora ligularis*) growers. Collaboration on *Passiflora* between CIAT and CORPOICA resulted in protocols for RAPDs, RFLPs and AFLPs that enabled both institutions to examine some taxonomic issues of the genus. INIAP experimented with *in vitro* collecting methods and several institutions began studies of *Passiflora* seed physiology.

The annual meeting of REMERFI took place in Panama. The participating institutions committed themselves to signing the Cooperation Agreement, making the Network official. BMZ (Germany) approved funding of $900 000 for research and coordination work. CATIE became interim coordinator of the network, in close collaboration with IICA and IPGRI. The meeting was attended by member countries and representatives from IPGRI, CATIE and IICA, sponsors of the meeting.

IPGRI and IICA/PROCITROPICOS sponsored the annual meeting of TROPIGEN, the Amazonian Network on Plant Genetic Resources. Priorities were redefined within the network for the genus *Theobroma*. Cupuassu (*Theobroma grandiflorum*) was clearly separated from cocoa (*T. cacao*) and given higher priority as a fruit, rather than as a source of chocolate. The European Union approved for funding within the INCO-DC programme a project entitled 'Evaluation and utilization of pineapple genetic resources from the Amazon to breed resistant varieties'. The project involves institutions from Brazil, France, Portugal and Venezuela, and could include Peruvian germplasm.

***Above*, Sapotaceae - *Manilkara zapota* - níspero; left, harvested fruits demonstrating the undesirable trait of a high latex content (photos courtesy Mikkel Grum).**

## National programme development

By sponsoring the First Meeting on Biodiversity and Plant Genetic Resources, IPGRI supported Panama in raising awareness of the importance of plant genetic resources among the various actors involved in agriculture in the country and in paving the way for the creation of a national programme on plant genetic resources. Participants in this 2-day meeting discussed the needs, strategies and priorities involved in setting up the country's plant genetic resources programme and its objectives. The potential structure of the programme was considered in relation to the country's legislation. The role and future collaboration of various national institutions in the operation of the programme were discussed. Participants strongly recommended that the National Commission on Plant Genetic Resources prepare, with the assistance of IPGRI, a final proposal for a national plant genetic resources programme, and submit it for approval to PanAmerican authorities.

## Meeting reports

As part of the preparatory process for the International Technical Conference on Plant Genetic Resources, the Regional Office for the Americas promoted and supported the organization, under FAO auspices, of two consultation meetings in the Caribbean. The first meeting was a brainstorming session on the plant genetic resources of the Caribbean, held in Barbados within the annual meeting of the Caribbean Food Crops Society. The second meeting, in St. Lucia, discussed the possibility of east Caribbean countries setting up a joint programme on plant genetic resources. Outcomes of these meetings included upgrading and completing country reports for the Global Plan of Action. Recommendations of the Barbados meeting included further efforts towards conserving the plant genetic resources of the Caribbean, and building capacities within national programmes. Information and training activities were also seen as important. The St Lucia meeting came to similar conclusions, and included developing a proposal to create a joint programme on plant genetic resources for the east Caribbean states, and a series of recommendations for the Global Plan of Action. Important input for IPGRI's future activities in the Caribbean arose from these meetings. Participants in both meetings made explicit their expectations of IPGRI support to their plant genetic resources activities.

## Genetic diversity

A joint mission sponsored by USDA and IPGRI, in collaboration with INIAP, collected indigenous peanut landraces in Amazonian Ecuador. Despite the fact that Ecuador is known to contain more botanical varieties of peanut than any other country, the Amazonian lowland provinces had never before been explored for peanut landraces. A special effort was made to procure varieties grown by the indigenous groups inhabiting the region, virtually all of which grow peanuts as a traditional crop. The material collected was rich in genetic diversity, greatly increasing the known distribution and variability of the rare botanical variety *Arachis hypogaea* var. *aequatoriana* and filling important gaps in genetic resources of the Ecuadorian national as well as international peanut collections.

IPGRI provided scientific guidance to local personnel collecting the *Passiflora* subgenus *Tacsonia* in Boyacá (Colombia) and on establishing a small collection of about 30 entries. This

## Cooperative initiative for research and training

The Spain/Latin America Cooperative Initiative for Research and Training on Plant Genetic Resources started with a workshop in Costa Rica attended by 36 participants from 11 countries. The workshop, supported by Spanish funding, was the first in a series of multilateral actions that will bring Spain and Latin America closer together. Four areas of potential collaboration were defined. They included research on conservation and utilization of plant genetic resources native to the region; development of a common core curriculum for training on plant genetic resources; development of training materials in Spanish; and developing mechanisms for cooperation and information sharing among participating institutions. Future work will be promoted and coordinated by a Follow-up Task Force composed of representatives from INIA (Spain), CENARGEN (Brazil), Colegio de Postgraduados (Mexico), Universidad Nacional de Colombia, IICA and IPGRI.

work was done in collaboration with CIRAD-FLHOR, with UPTC. Similar work was conducted in the Colombian Cauca Valley in collaboration with Universidad Nacional - Palmira. (See also p. 48 for details of collecting in the Andean Region.)

## Documentation, information and training

### Germplasm documentation and information

On request from INIA, Uruguay, which maintains the germplasm of numerous crops in various genebanks, IPGRI documentation staff from the DIT Group and the Regional Office provided advice on selecting and establishing a documentation system for the country's genetic resources. As a result, INIA is currently testing GMS and will continue receiving updated versions of this software.

### Training

Regional Office staff and collaborators organized two courses on the documentation of plant genetic resources. The syllabus provided an overview of the role of documentation in the effective management of germplasm collections. Participants were taught different documentation techniques and were exposed to some of the documentation technologies (hardware and software) available.

The first of these courses, jointly organized by IPGRI, CIAT and Universidad Nacional, was held in Palmira, Colombia: 16 trainees attended the course, most of them coming from the Colombian national programme, private research institutes and agricultural universities. The Regional Office sponsored the participation of two genebank specialists from Bolivia and Peru and provided input to the course content and lecturers on several topics.

The second course took place in, and was jointly organized with, Universidad de San Carlos in Guatemala. This course, offered as an activity of the IDB-funded project on *Passiflora* and Sapotaceae, was designed to strengthen documentation of plant genetic resources within the project: 14 trainees from five Central American countries attended.

Mikkel Grum

***Passiflora mollissima***

Two other training events were offered within the IDB-funded project, in collaboration with national partners. One was a workshop for *Passiflora* collectors and the other a workshop on taxonomy, collecting and maintenance of Sapotaceae genetic resources. The first event, jointly organized with CORPOICA, was held in Colombia and attended by 19 participants from four countries of the Andean Region. The second, offered in collaboration with DICTA-SRN, was held in Honduras and attended by 19 participants from five Central American countries.

### Field genebank management

A workshop on problems of field genebank management and their potential solutions, held at the Mayagüez Campus of the University of Puerto Rico, was organized in the context of IPGRI's UNEP-sponsored project 'Capacity building for training in plant genetic resources conservation and use in developing countries'. Participants in this collaborative effort of national, regional and international organizations recognized the many problems that field genebanks in the Caribbean and countries in Latin America have in common as well as the benefits of seeking solutions through international cooperation. Closer interaction of the national programme participants, not only among the Caribbean nations themselves but also with IPGRI, were additional benefits of this initiative. Topics discussed at the workshop included the technical, political, institutional and economic challenges confronted by field genebank managers in developing countries. This event was an important step towards establishing a subregional network on crop genetic resources for the Caribbean, which is a high priority for the Americas Regional Office.

# Europe

Staff in the region spent much time and effort assisting in the preparatory process for the International Technical Conference on Plant Genetic Resources. These efforts culminated in the European Preparatory Meeting held in Nitra, Slovakia and the European Forest Genetic Resources Workshop held in Sopron, Hungary. The preparatory process itself had a significant impact in that it raised awareness of plant genetic resources, stimulated the establishment of national programmes of plant genetic resources and coordination frameworks. The process also led all countries in the region to express a firm will to collaborate, and produced a clearer vision of the role the Europe Group should play in genetic resources in the future.

EUFORGEN became fully operational after the appointment of a coordinator in January. During the year, staff of the Regional Office maintained a high level of technical cooperation with eastern Europe and the Newly Independent States of the former USSR. Besides USAID-funded assistance to VIR, a number of specific research contracts were concluded to strengthen east European programmes on plant genetic resources.

Continued financial support by the Italian government allowed five scientists from Africa and South America to receive specialized training in Italy and a collecting mission to be made in Albania. A project on conserving and using plant genetic resources of underutilized Mediterranean species successfully established two new networks and contributed to raising awareness beyond the Mediterranean region. Consequently, recommendations on underutilized crops made by three ICPPGR preparatory meetings led to the establishment of a minor crops network within ECP/GR.

# Selected project activities

## ECP/GR

During 1995, Croatia, Lithuania, Romania and the Federal Republic of Yugoslavia joined ECP/GR, bringing the membership of the Programme to a total of 30 countries. A meeting of the Technical Consultative Committee in Nitra, Slovakia provided the National Coordinators of member countries with a review of activities undertaken since the beginning of the current Phase V. The role ECP/GR would play within the global context of the conservation of crop genetic resources was discussed and a new structure established, which includes ten broadly focused networks dealing with groups of crops or general themes related to plant genetic resources.

The Technical Consultative Committee was renamed the Steering Committee to better reflect the Committee's role and supervisory function. The European Commission (DG VI) and the Man and Biosphere Programme of Unesco were invited to become full members of this Committee.

**The 10 networks of ECP/GR**

- cereals
- fruit
- forages
- grain legumes
- minor crops
- industrial crops and potatoes
- vegetables
- documentation and information exchange
- *in situ* and on-farm conservation
- technical cooperation

During its meeting in February, the Forages Working Group developed a protocol to evaluate the European *Lolium perenne* Core Collection. This collection, which is the first one within the framework of ECP/GR to come to the evaluation stage, was recommended during the fourth meeting of the group in Budapest in 1991. A total of 162 accessions was regenerated and multiplied by the respective national genebanks and the seed distributed to 17 countries. This region-wide evaluation is expected to provide a valuable assessment of the traits that can be found in the different national collections.

The Grain Legume Working Group held its first meeting in Copenhagen, Denmark and decided to establish European databases for *Cicer, Glycine, Lupinus, Phaseolus* and *Vicia faba*. These databases will facilitate managing the large number of collections of grain legumes maintained in Europe. They will also improve user access to information about these collections.

The ECP/GR Steering Committee followed the recommendation of a *Malus* germplasm meeting in Wye, UK and established a *Malus/Pyrus* Working Group.

**Regenerating wheat genetic resources - Swiss Federal Research Station for Plant Production at Nyon, Switzerland**

## European Forest Genetic Resources Programme

EUFORGEN became fully operational at the beginning of 1995. By the end of the year, 24 countries in Europe had agreed to collaborate in conserving forest genetic resources in this new Programme. A further five countries participated in some of the activities and expressed a strong interest in formally joining the Programme.

The main activities of EUFORGEN are accomplished through four pilot networks, initially selected as part of the implementation process of Resolution 2 of the Strasbourg Ministerial Conference on the Protection of Forests in Europe.

All the networks have chosen a similar approach to common problems and tasks. Activities focus on undertaking inventories of genetic resources, developing joint databases and descriptor lists, identifying common research needs and preparing joint project proposals. Long-term conservation strategies and practical guidelines are then developed and the establishment of national gene reserve

**Networks of EUFORGEN**

- *Populus nigra* (black popular)
- *Quercus suber* (cork oak)
- *Picea abies* (Norway spruce)
- Noble hardwoods (a group of species with timber of high quality, similar scattered distribution patterns and high ecological demands)

forests and complementary measures are promoted to strengthen national conservation programmes. During the year, the networks further developed their workplans, and some of the tasks were supported by contributions in kind from the participating countries.

The *Populus nigra* network agreed to establish a core collection of clones representing the whole distribution area of the species in Europe. It serves as a common reference for characterization and evaluation of national collections and is hosted by the Istituto di Sperimentazione per la Pioppicoltura in Casale Monferrato, Italy. For *Quercus suber*, a collaborative project, coordinated by Estação Florestal Nacional in Lisbon, Portugal, with IPGRI providing the conceptual basis for the activities of the network, including exchange of material. The first meeting of the *Picea abies* network began to describe the status of the conservation of genetic resources of this species in Europe. Preparations also began to produce a technical manual for forest officers and decision-makers that provides guidelines for the practical conservation of *Picea abies* genetic resources.

National coordinators confirmed the strong interest of their countries in this international collaboration at the first meeting of the EUFORGEN Steering Committee in November. Providing guidance in developing national policies and encouraging long-term activities on forest genetic resources remain the most important objectives of the Programme. The Steering Committee agreed to open up the existing pilot networks to include other species and initiated a new network on 'social broadleaves' focusing mainly on European oaks and beech. Immediately following the Steering Committee meeting, a one-day workshop addressing issues in European forest genetic resources was convened by EUFORGEN. Delegates from 28 countries attended

Jozef Turok, IPGRI

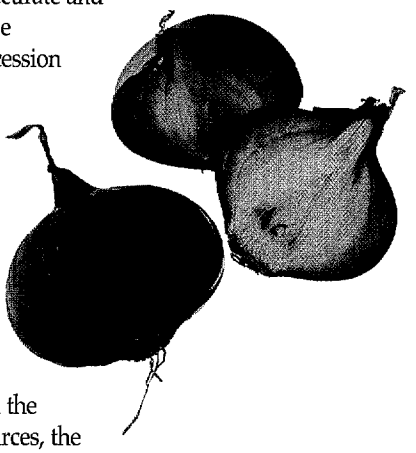
the workshop and provided a forestry-focused input to the preparatory process leading up to the International Technical Conference.

## Sustainable plant genetic resources programmes in eastern Europe

In 1995, efforts focused on implementing the USAID and UNDP project objectives for the N.I. Vavilov Institute of Plant Industry in Russia. Following decisions based on the extensive technical missions undertaken in the two previous years, much of the priority equipment identified was purchased and delivered during the year. This included additional drying equipment for VIR substations, freezers to conserve crops with short-lived seeds and over 1000 isolation cages for the regeneration of outcrossing species. A further two missions early in the year assessed needs in *in vitro* conservation, discussed priorities for further support to VIR and investigated the possible restructuring of the institute. The first technical training fellowship funded by USAID in cooperation with USDA was awarded in 1995 to the Head of the Plant Biotechnology Laboratory of VIR to train in PCR methods for assessing collected germplasm and monitoring its genetic stability. Preparations for further awards to VIR staff were started by identifying candidates and providing intensive English courses. These awards are being undertaken in various centres of excellence within USDA and research institutes in Europe.

Assistance to the European collection of vegetatively propagated long-day *Allium* in Olomouc, Czech Republic, secured through funds provided by ODA, UK, drew to a close with taxonomic evaluation by an expert from IPK, Gatersleben, Germany of wild *Allium* species maintained as part of the collection. This collection now fully complements the European collection of short-day *Allium* held at Rehovot, Israel and the collection of seed-propagated material held at Wellesbourne in the UK.

Documentation of information associated with conserved crop genetic resources is as important as the collections themselves. It is essential that detailed, accurate and up-to-date information be documented for each accession conserved, since it is the availability of this information in a catalogue form or through direct access that enables breeders, researchers and others to use the material. The Regional Office for Europe collaborates with the Centre for Genetic Resources, the Netherlands on the Dutch-funded project 'Technical support to east European genebanks to improve access of privatized plant breeding to germplasm collections'. This collaboration included the publication of a report on the state of documentation systems in eastern Europe and the provision of funding for a number of external participants to attend the second meeting of coordinators held in October 1995 in Radzikow, Poland.



During the year, some specific needs of national programmes in eastern Europe were identified within the context of ECP/GR, for example, funding Romania to participate in the region-wide evaluation of the European *Lolium* core collection. In this case, computer facilities were required for the data to be centralized and analyzed. An agreement was established with the Research Institute of Plant Production in Slovakia to duplicate potentially threatened collections from breeding institutes undergoing privatization at the national genebank.

## Underutilized Mediterranean species

Two international Workshops, one on hulled wheat species (einkorn, emmer and spelt) and another on *Pistacia* species, were the highlights of the UMS project activities in 1995. Both meetings brought together experts from across the Mediterranean to discuss avenues for the better conservation and utilization of these species, which have been insufficiently protected in the past. For example, einkorn is now a relic species in Italy. Also at risk are

## Underutilized Mediterranean species - a brighter future ahead?

Subregional meetings leading up to the International Technical Conference strongly endorsed the need for strengthening conservation efforts and promoting the more sustainable use of underutilized species. Policy-makers increasingly recognize this need, endorsing the consolidation of activities on underutilized species that IPGRI has already started. There was recognition of the clear need to safeguard not only 'major' crops responsible for meeting basic nutritional requirements, but also all other useful species. Such species are largely under-represented in genebank collections, even though they make significant contributions to agricultural and diet diversification, meet market requirements for alternative products and contribute to safeguarding rural and cultural identities. Around the world, hundreds of species of fruits, vegetables, spices, forage species and other useful crops await proper conservation, research and sustainable exploitation. The European region is home to many of these species, which have been partly or completely domesticated from wild indigenous plants.

Although it is difficult to provide precise estimates on the number of underutilized species, owing to the scarcity of studies conducted in this domain, data on the Mediterranean ecogeographic region indicate that out of 137 lesser known vegetables recorded (indigenous or introduced from other parts of the world), this region is the primary centre of origin for at least 45. This number would increase considerably if all species gathered in a traditional manner directly from the wild were also taken into consideration.

A key to meeting the challenge of underutilized species is a committed effort by national and international research organizations and institutions throughout the world. The Global Plan of Action is a step in this direction. Preparatory meetings for the International Technical Conference have stressed that initial actions by the international community should include the preparation of inventories on germplasm availability of underutilized species, the degree of genetic erosion of these species, names of experts in the field, relevant publications and current activities in this area.

### Some of the many underutilized species in the Mediterranean region

**Vegetables**

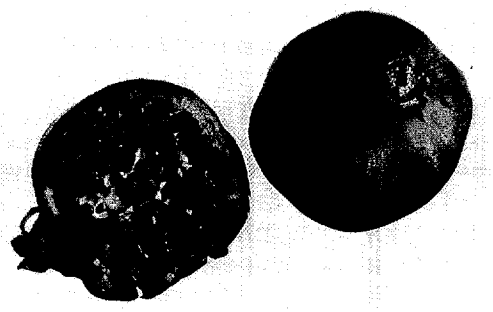
- asparagus (*Asparagus officinalis*)
- beetroot and swiss chard (*Beta* spp.)
- borage (*Borago officinalis*)
- capers (*Capparis spinosa*)
- chicory (*Cichorium intybus*)
- cornsalad (*Valerianella locusta*)
- garden cress (*Lepidium sativum*)
- horseradish (*Armoracia rusticana*)
- onions (*Allium* spp.)
- parsnip (*Pastinaca sativa*)
- rocket (*Eruca* and *Diplotaxis* spp.)

**Fruit trees**

- pomegranate (*Punica granatum*)
- quince (*Cydonia oblonga*)
- azerole (*Crataegus azarolus*)
- service tree (*Sorbus domestica*)

**Aromatic and condiment species**

- dill (*Anethum graveolens*)
- oregano (*Origanum* spp.)
- rosemary (*Rosmarinus officinalis*)
- thyme (*Thymus vulgaris*)
- cumin (*Cuminum cyminum*)
- caraway (*Carum carvi*)
- saffron crocus (*Crocus sativus*)
- anise (*Pimpinella anisum*)



species with rising market potentials, which require sufficient conservation measures to prevent genetic erosion and to enable sustainable exploitation. This is the case of emmer ecotypes from central Italy and pistachio varieties from Sicily, where the introduction of non-indigenous material and monocultures dramatically affect the on-farm conservation of valuable landraces. During the year, members of the Rocket Genetic Resources Network began preparing a descriptor list for the crop.

## Training

Five scientists from Argentina, Cameroon, Kenya, Nigeria and Sierra Leone undertook training at Italian institutions through the support of the Italian government. Two of the scientists received specific training on different aspects of conservation and use of plant genetic resources. Three undertook longer term research fellowships. Further details are given on pp. 72-73.

## Directory of European Institutions

A new edition of the ECP/GR *Directory of European Institutions Holding Germplasm Collections* was published in 1995 in close collaboration with FAO. In two volumes, the first lists more than 500 institutions in 37 European countries, with full addresses (including telephone, fax, telex, email and cable), staff names and details of germplasm collections. These data were collated from information received from the institutions themselves, and through surveys conducted by FAO and IPGRI. Volume 2 contains a species index and appendixes, including a list of national coordinators of crop genetic resources, European Central Crop Databases and relevant publications. These data are maintained and updated in IPGRI and FAO databases.

# Genetic Diversity

The Group has the major responsibility for work that addresses the key generic genetic diversity issues. Its concern is with the plant material that is or should be conserved, the forestry, agroforestry, forage and crop genetic resources and their wild relatives that constitute the physical basis of IPGRI's mandate. Since this material is potentially useful, as it constitutes a resource for human societies, the Group is also concerned with the nature and extent of that use by farmers' communities and societies. Two important areas of work for the Genetic Diversity Group in 1995 were establishing IPGRI's programme of work on ethnobotanical and socioeconomic aspects of conservation, and developing a global project on *in situ* conservation of agrobiodiversity. Work on the latter was carried out with funding from the Swiss Development Cooperation. These two areas of work reflect the Institute's increasing concern with all aspects of the conservation process and with the human dimensions of using and maintaining plant genetic resources. Work on linking ethnobotanic and human aspects of conservation with biological approaches has already resulted in the development of a revised form for plant genetic resources collectors.

The Group's work on conservation of forest genetic resources made substantial progress, particularly in locating diversity and estimating genetic erosion of commercially valuable species in Thailand and exploring the impact of disturbance on intra-specific diversity of important species in Malaysia, Thailand and India. Locating genetic diversity by studying the extent and distribution of diversity in vegetable crops in the WANA region and investigations of genetic erosion of rice and millet in East Africa also made good progress. Work on improving the use of genetic resources has also been supported through the development of a core collection of sesame. Towards the end of the year the opportunity was taken to revise the Genetic Diversity Group projects to reflect more accurately the content of its current programme. Important changes were the development of a project focusing on *in situ* conservation of crop and wild relatives to include work that was previously concerned with conservation of landraces. Projects on collecting and on the extent and distribution of genetic diversity were combined into a single project on the location of diversity.

# Selected project activities

### Status and change of the extent and distribution of diversity

Belgium supported two studies on the extent and distribution of diversity. The first, in collaboration with the Faculté Universitaire des Sciences Agronomiques, Gembloux and the School of Biology, University of Costa Rica, aimed to clarify the mechanisms controlling variability and genetic structure in wild *Phaseolus lunatus* (lima bean) and to develop appropriate *in situ* conservation strategies. The study provided information on planning *in situ* conservation of self-compatible species with variable levels of outcrossing. During 1995 the work showed that high levels of selfing were likely to be the rule in the species. There has been a high turnover of populations, with almost half being replaced by other new populations during the last 3 years. Studies on seed protein and isozyme variation have provided data on the extent and distribution of diversity. A protocol to use RAPDs for further studies has been developed.

The second investigation concerned genetic diversity in the interaction between the anthracnose fungus, *Colletotrichum gloeosporoides*, and its host plant *Stylosanthes*. The objective was to explore the distribution of plant and pathogen diversity to better understand the key factors that affect their distribution. During 1995 analysis and isolation of *Colletotrichum* samples collected in Mexico were completed and 25 strains became available for pathogenicity, morphological, biochemical and biomolecular studies. Pathogenicity tests and methods of molecular analysis developed earlier in the project were used to investigate the strains themselves and compare strains from various origins and hosts. The technique of analyzing internal transcribed spacer regions was developed and used to study species variability.

### Collecting strategies

#### Agro-ecological surveying

During the period 1994-95, IPGRI launched several survey missions with national programmes of crop genetic resources in the WANA region. Objectives of the work were to test agro-ecological survey methodologies and to assess intraspecific genetic diversity in vegetable crops such as *Brassica, Capsicum, Cucumis, Cucurbita, Daucus, Lactuca, Lycopersicon, Raphanus* and *Solanum*.

*Jordan*
Of the variation observed within and between crops distributed over seven agro-ecological regions, 40% can be accounted for by differences in factors such as rainfall, soil and other physical characteristics that are associated with changing latitude. In fact, up to 94% of variation observed in genetic diversity within crops may be ascribed to the physical factors related to latitude. Overall, the study indicated that diversity increases with progression into agriculturally marginal habitats.

*Morocco*
Oases had the highest level of within- and between-crop diversity over five agro-ecological regions. Diversity was greatest in Ouerzazat oases. Soil factors significantly influence farmers' choices of crops: 62% of the genetic diversity observed could be explained by soil stoniness, 10% by collecting source (e.g. farmers' fields, farmers' stores or village markets) and 33% by variation in soil texture.

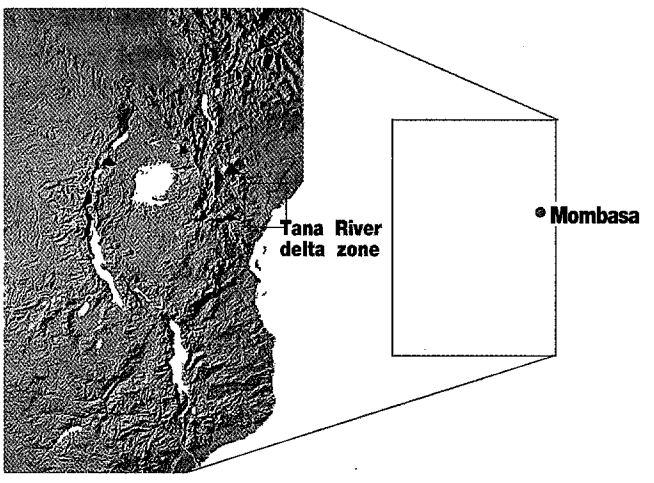
*Syria*
Crop variability within each of six provinces was greater than that between the provinces. Within-crop variability was highest for Homs province (a central location with varying environmental, particularly soil, conditions). There, 78% of crop variation was found to be correlated with physical properties of the site, like variation in slope, soil texture and soil drainage. There was also significant correlation with variation in types and amount of stoniness (54%).

*Iran*
Farming in parts of Iran is largely confined to valleys separated from each other by mountainous areas. Very high levels of intracrop diversity were found within individual valleys. Location-specific factors, particularly slope form and certain soil characteristics, could account for 90% of the diversity observed.

**Genetic erosion in rice in the Tana River delta in Kenya**

62 landraces of rice were identified as having been cultivated in the study area over the last 20 years. Out of these, 9 are now common, 12 rare, 17 endangered and 24 are already extinct.

**Major causes of genetic erosion**
- erratic flooding
- lack of seed of landraces
- resettlement of farmers from traditional communal irrigation schemes dependent on landraces to formal irrigation schemes dependent on commercial varieties
- introduction of other crops into traditional rice-growing areas through government policies on diversification of products and food security.




## Genetic erosion indicators in Kenya

*Rice*
IPGRI started a study, funded by UNEP, aimed at identifying major indicators of genetic erosion. Rice landraces in the Tana River delta in Kenya were used as a model, with survey and exploration missions locating subregions and populations with maximum genetic diversity. Follow-up characterization and data analysis will lead to the selection of sites for *in situ* conservation and for further collecting for *ex situ* conservation. The project was carried out by the GD and SSA Groups, in collaboration with the National Gene Bank of Kenya, the Kenya Agricultural Research Institute, Muguga, the Tana Athi River Development Agency, Tana River region, and the

Regional Station 'Garissa' of the Kenya Agricultural Research Institute.
Enumerators were stationed in the area for a month collecting information from farmers. These data were used to plan germplasm-collecting missions by selecting sites and farms. Analysis of accessions from the sites distributed over the two agro-ecological / genetic erosion zones showed that an appreciable amount of genetic erosion has occurred in the last 50 years. This loss of genetic diversity appears to be due to a combination of environmental and socioeconomic factors, in particular, changes in natural flooding regimes due to construction of dams upstream, and difficulties in obtaining seeds of landraces once they cease to be cultivated on a continuous basis.

*Finger millet*
Erosion indicators in genetic resources of finger millet (*Eleusine coracana)* in western Kenya were investigated in a separate study, in collaboration with the National Gene Bank of Kenya and the Kenya Agricultural Research Institute, Muguga. Finger millets have been one of the most important traditional crops under cultivation among the various ethnic groups in Kenya. The introduction of other crops, changes in farming systems and socioeconomic set-up prior to the turn of the century, have led to the decline of the crop and its genetic diversity, especially in arid and semi-arid regions such as those in western Kenya. This decline marked the beginning of genetic erosion in finger millets in Kenya. Genetic diversity of finger millets seems to have remained almost unchanged over the last 25 years among the Luhya communities in Kakamega and Busia. A total of 14 cultivars were identified under cultivation though by fewer farmers. In Siaya (Ukwala division), 10 cultivars were identified and one cultivar, 'Hulure', was reported by farmers to have become extinct. The possible causes for erosion in this region include preferences for other crops, decrease in land holding, preference for only a few early maturing *Eleusine* cultivars and a belief that finger millets can only grow well in virgin lands.

In the Transmara, Bomet, Kisii, Kuria, Migori, Homabay and Nyamira districts, ethnic group and farmer age class influenced the choice of local cultivar. Only farmers over 50 years of age were keen on finger millet cultivation. Causes of erosion in these regions include: lack of interest in growing the crop by young farmers, preference for cash crops, decrease in land holding and high labour demand required by finger millet production. In Meru, Embu, Thakara Nithi and Nyambene regions, a few farmers still grow the crop, mainly for porridge and occasionally for sale in local markets. However, in the south Imenti division, finger millet grown under irrigation is very popular with all age groups. A variety of socioeconomic, agricultural and biological factors have thus been identified as being linked to, or even causative of, erosion, and as having the potential for use as indicators.

## Manual on collecting

In recent years, IPGRI staff realized that there was no single publication that provided the prospective collector of plant germplasm with a complete review of current theory and technique. To fill this gap, IPGRI collaborated with FAO, IUCN and UNEP to produce a comprehensive volume dealing with generic, specific, theoretical and practical issues in collecting. The many stages of the development, writing and review of the text were coordinated by the GD Group, with intensive assistance from the other sections of the Institute. The resulting 750-page volume entitled *Collecting Plant Genetic Diversity. Technical guidelines* was published by CAB International. Starting with a general section looking at the history and legal issues of collecting, the book continues in four sections: 'Before setting out', 'In the field', 'Back at base' and 'Case studies'. Many of the world's foremost experts, including many IPGRI staff (see p. 98) in collecting plant genetic resources contributed chapters to produce a comprehensive and expert text. On publication the book was immediately acknowledged as an authoritative reference work, and remains in high demand.

## Germplasm collected in 1995

In total, over 2500 accessions of plant material were gathered during IPGRI-sponsored collecting trips in 1995. All accessions are stored in the national programme facilites of the country, and samples are also stored with participating institutes.

| Collector | Country | Target taxa |
|---|---|---|
| The National Genebank of Kenya, Kenya Agric. Research Institute, Muguga, Kenya<br>Tana Athi River Development Agency, Tana River province, Kenya | Kenya | *Eleusine, Pennisetum, Sorghum, Zea, Setaria* |
| The National Genebank of Kenya, Kenya Agric. Research Institute,<br>Regional research station 'Garissa', KARI, Garissa, Kenya | Kenya | *Oryza, Zea, Cleome, Sesbania, Vigna, Clitoria* |
| National Center for Agricultural Research Training and Technology Baq'a, Jordan | Jordan<br>*Sesame,* | *Prunus, Abelmoschus, Vigna, Cucumis, Capsicum, Lycopersicon, Phaseolus, Helianthus, Lactuca, Carthamus, Raphanus, Citrullus, Sorghum, Vicia* |
| Aegean Regional Agricultural Resarch Institute, Izmir, Turkey | Turkey | *Prunus, Abelmoschus, Cucurbita, Cucumis, Citrullus, Lagenaria , Luffa, Lycopersicon, Capsicum* |
| Seed and Plant Improvement Institute, Karadj, Iran | Iran | *Prunus* |
| Institut National de Recherche Scientifique et Technique, Hammam-Lif, Tunisia | Tunisia | *Prunus* |
| Horticultural Research Institute, Agricultural Research Center, Giza, Egypt | Egypt | *Prunus* |
| Department of Horticulture, Faculty of Agriculture, University of Ain Shams, Cairo, Egypt<br>The Lesotho Highland Development Authority<br>The National Plant Genetic Resources Center | Egypt<br>Lesotho | *Abelmoschus, Cucumis, Cucurbita, Citrullus*<br>Wild species of various forages, fodder, food, ornamental and medicinals |
| INRAN/DRP, Niger Centre de Semence Forestieres du Niger ICRAF | Niger | *Prosopis* |
| Fruit-trees Research Station, Ministry of Agric. Forestry and Fisheries, Tsukuba, Japan<br>VIR, St. Petersburg, the Russian Federation | N. Caucasia | *Malus, Pyrus, Corus, Corylus* |
| Fruit Trees Research Station, Ministry of Agric., Forestry and Fisheries, Tsukuba, Japan<br>VIR, St. Petersburg, the Russian Federation | Turkmenistan | *Malus, Pyrus, Prunus* |
| PCGRI, PDR Korea | Korea | *Oryza, Zea, Triticum, Hordeum,* Legumes |
| Instituto Nacional Autonomo de Investigaciones Agropecuarias, Quito, Ecuador<br>USDA/ARS, Beltsville, Maryland, USA | Ecuador | *Arachis, Capsicum* |
| (IPGRI/CIRAD-FLHOR) and UPTC, Tunja, Colombia | Colombia | *Passiflora* subgenus *Tacsonia* |
| (IPGRI/CIRAD-FLHOR) and Universidad Nacional de Colombia, Palmira, Colombia | Colombia | *Passiflora* |
| CORPOICA, La Selva, Colombia* | Colombia | *Passiflora* |
| INIAP, Quito, Ecuador and Universidad Técnica de Ambato, Ecuador* | Ecuador | *Passiflora* |

*within the IDB-funded REDARFIT project

## *In situ* conservation of crop genetic resources

Work on the *in situ* conservation of crop and forage species and their wild relatives explores general issues in both the conservation and use of germplasm maintained by farmers and communities, or in the case of wild relatives, in appropriate protected areas. A large number of farmers throughout the world continue to use and maintain traditional cultivars of a wide range of crops. Conservationists have realized the contribution that the use of these cultivars can make to continued maintenance of genetic diversity. Germplasm kept in this way is continually selected by farmers and will evolve and adapt to meet changing needs.

During 1995, with support from the Swiss Development Cooperation, IPGRI was able to develop a substantial proposal for a global framework of scientific methods and tested conservation practices, as well as a system for disseminating useful experience and tools between countries to support conservation of traditional cultivars in farming situations (see box opposite). The project will be a major component of IPGRI's work on *in situ* conservation. It was developed through an extensive process of consultation over a period of one year. The framework for a global project was developed at a technical workshop that brought together experts from CGIAR Centres, national programmes and NGOs. The meeting identified key issues that should be addressed and the characteristics needed for successful implementation of the work proposed. Each of the potential participant countries was later visited by IPGRI staff from the GD Group and Regional Offices to confer with colleagues in national programmes, local institutions, NGOs and, where possible, farming communities. This phase elaborated the content, objectives and activities planned and listed possible crops, sites and collaborators. Burkina Faso, Ethiopia, Hungary, Mexico, Morocco, Nepal, Peru, Turkey and Vietnam agreed to be partners.

Participants from the different countries, together with technical advisors, colleagues from CGIAR Centres, NGOs, interested donors and IPGRI staff, then met in Rome to develop further the project, its collaborative components and complementary activities. Subsequently, each country considered the specific activities that it envisaged being undertaken and developed a costed budget. By the end of the year the project proposal had been developed far enough to identify core coordination activities and the recruitment of a full-time coordinator was in progress.

### A global project: Strengthening the scientific basis of *in situ* conservation of agricultural biodiversity

**Objectives**

1. > A global framework of science and practice to support *in situ* conservation of agricultural biodiversity.
   > Developing methodologies, tools and guidelines; collecting and analyzing data on crop biology, genetics and social science; supporting networks and links between communities and national programmes; developing a common framework for monitoring and evaluating *in situ* conservation and linking it to *ex situ* conservation work.
2. > Strengthened national institutions with capacity to plan and implement programmes to support *in situ* conservation of agricultural biodiversity.
   > Assisting national programmes to identify partners and priority agroecosystems and crops; strengthening research capacity, especially in conservation biology; developing multidisciplinary centres of expertise.
3. > Improved use of agrobiodiversity in traditional cultivars and participation of farmers and communities in conservation work.
   > Developing links with communities and farmers; promoting collaboration between local groups and national institutions; supporting participatory breeding; identifying policies which remove disincentives to maintenance of traditional cultivars.

**Participating countries**

Burkina Faso, Ethiopia, Hungary, Mexico, Morocco, Nepal, Peru, Turkey, Vietnam

## Incorporating ethnobotanical information into a revised IPGRI collecting form

*Ethnobotanical information is what local people know about the plants in their environment*

In July 1995, IPGRI revised its collecting form to include ethnobotanical information in the list of fields. This is part of IPGRI's continuing efforts to increase the use and accessibility of genetic resources held in genebanks by improving information and documentation systems. The changes to the form will also help collectors work in partnership with local people to identify useful genetic diversity that would otherwise be lost or ignored. The collecting of plant genetic resources and use of indigenous knowledge is embedded within a code of conduct. Ethical concerns support the traditional resource rights of local peoples. Many of these codes and procedures need to be developed through the informed consent and partnership of local communities who are the custodians and developers of local knowledge about plant genetic resources.

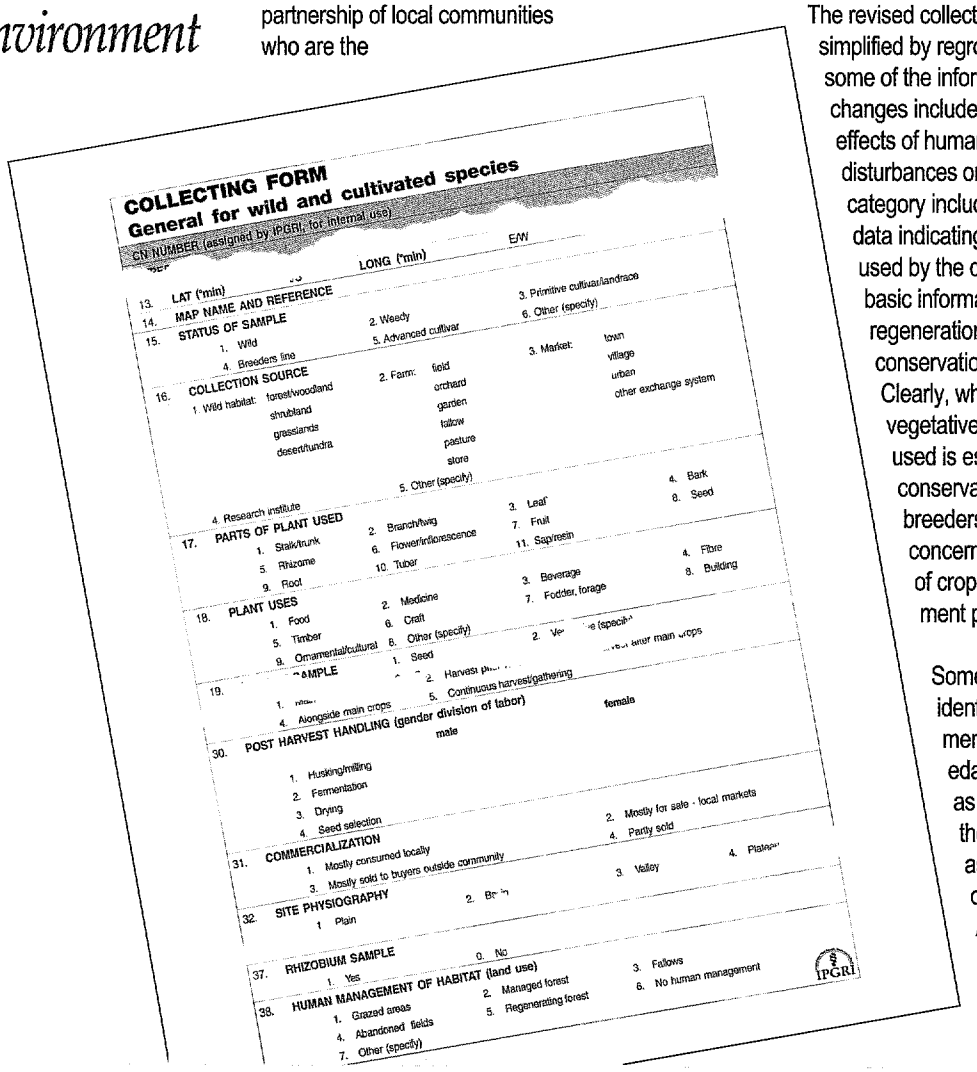
**What is ethnobotanical information?**

Ethnobotanical information is what local people know about the plants in their environment. The main unit of analysis in ethnobotany is the rural community where collecting is to be done. The types of information that the local communities possess are mainly about how plants are used, how plants are distributed across the ecosystems they manage and use, and the relationships between plants, people and animals.

**How will the information be gathered?**

The revised collecting form has been simplified by regrouping and reordering some of the information categories. Other changes include more information on the effects of human and other uses and disturbances on the species. A new category included under the passport data indicating the parts of the plant used by the community is crucial and basic information that affects the regeneration, distribution and conservation status of a species. Clearly, which reproductive or vegetative sections of a plant are used is essential information for conservationists as well as plant breeders, who are increasingly concerned with the multiple uses of crops in their crop-improvement programmes.

Some changes allow greater identification of microenvironments. This includes the edaphic microenvironment as well as the niches within the farm environment such as boundaries, water courses, fallow areas, etc. Another important change allows for cross-


COLLECTING FORM
General for wild and cultivated species
CN NUMBER (assigned by IPGRI, for internal use)
LONG (°min) E/W
13. LAT (°min)
14. MAP NAME AND REFERENCE
15. STATUS OF SAMPLE
1. Wild 2. Weedy 3. Primitive cultivar/landrace
4. Breeders line 5. Advanced cultivar 6. Other (specify)
16. COLLECTION SOURCE
1. Wild habitat: forest/woodland, shrubland, grasslands, desert/tundra
2. Farm: field, orchard, garden, fallow, pasture, store
3. Market: town, village, urban, other exchange system
4. Research institute 5. Other (specify)
17. PARTS OF PLANT USED
1. Stalk/trunk 2. Branch/twig 3. Leaf 4. Bark
5. Rhizome 6. Flower/inflorescence 7. Fruit 8. Seed
9. Root 10. Tuber 11. Sap/resin
18. PLANT USES
1. Food 2. Medicine 3. Beverage 4. Fibre
5. Timber 6. Craft 7. Fodder, forage 8. Building
9. Ornamental/cultural 8. Other (specify)
19. SAMPLE
1. Seed 2. Harvest pl... 2. Ve... (specify)
4. Alongside main crops 5. Continuous harvest/gathering ...ther main crops
30. POST HARVEST HANDLING (gender division of labor)
male female
1. Husking/milling
2. Fermentation
3. Drying
4. Seed selection
31. COMMERCIALIZATION
1. Mostly consumed locally 2. Mostly for sale - local markets
3. Mostly sold to buyers outside community 4. Partly sold
32. SITE PHYSIOGRAPHY
1. Plain 2. Br... 3. Valley 4. Plateau
37. RHIZOBIUM SAMPLE
1. Yes 0. No
38. HUMAN MANAGEMENT OF HABITAT (land use)
1. Grazed areas 2. Managed forest 3. Fallows
4. Abandoned fields 5. Regenerating forest 6. No human management
7. Other (specify)
IPGRI

referencing wild and cultivated species. There are useful wild species within areas used primarily for cultivation. Cultivated species may also be found in wild habitats. The ability of wild species to survive in cultivated areas and for cultivated species to survive in wild habitats is an important indicator for potential users of germplasm. This type of information may assist in identifying useful wild species that could be domesticated. Finally, a brief section on the local uses of the species in the passport data allows for more rapid screening of conserved germplasm by a wide range of users.

Passport and collecting data are important aspects of plant genetic resources documentation that allow a broad range of users to screen and gain access to the relevant germplasm. They also allow managers of national collections of plant genetic resources to have a better idea of how the material is being used and by whom. Including information on gender differences in the access and management of genetic resources is important for identifying genetic resources users and partners in conservation that might otherwise be ignored. Finally, including ethnobotanical information in the passport data is a way that communities which provided the genetic resources can identify and gain access to those genetic resources to restore local genetic diversity that has been lost, or to exchange useful germplasm with other communities.

Ethnobotanical information has been an implicit tool that collectors of plant genetic resources have used in the past in targeting their collecting sites and in selecting plant samples. Explicit recognition of ethnobotanical information in collecting forms is essential. It is part of the process of validating and supporting the conservation of indigenous knowledge on plant genetic resources by the rural communities that are custodians of the genetic diversity of economically useful plants.

## Improving the use and accessibility of plant genetic resources

### A sesame core collection

Work progressed during the year at the Oil Crops Institute of the Chinese Academy of Sciences, Baojian, Wuhan, China, to establish a sesame core collection. Developing a core collection will provide the country's breeders and international collaborators with an entry point to China's extensive collection of sesame germplasm. In addition, the work provides an opportunity to investigate the development of a core collection for a national collection where there is already substantial passport and agronomic data available on the accessions. The 4200 accessions maintained by the Oil Crops Institute were assigned to groups based on national origin, varietal type and agro-ecotype. The agro-ecotypes chosen were characteristic of different sesame production areas. Various clustering methods were compared using data on 14 quantitative and qualitative characters on a random subset of 50 accessions. A cluster analysis of each of the groups was then performed and the results compared with those from analyzing a pre-selected core of 884 accessions. This analysis showed that the maxima, minima, mean and ranges for the preselected core within each group were comparable with those for the total collection. With respect to these characters, the preselected core represented the whole collection. A field trial at three centres was carried out using the preselected core to confirm the performance of these accessions. The relationship between each of the accessions in the preselected core and the total collection was established so that all accessions in the whole collection with clustering and grouping characteristics identical to those in core can be identified. A final core of about 10% of the total collection will be established from the preselected core and its characteristics for 23 characters determined, together with the analysis of isozyme variation of the accessions selected.

## Molecular genetic techniques for plant genetic resources

There are clear potential benefits to using molecular genetic techniques to support work on conserving plant genetic resources. The uses of such techniques include studies on diversity, identification of likely duplicate accessions and monitoring key conservation processes such as regeneration. Several individual IPGRI projects explore the use of such techniques. GD staff convened a workshop with some key international experts to review current progress in this area and identify future needs for using molecular techniques more effectively. The workshop listed a number of areas, such as locating genetic diversity in long-lived perennials, developing core collections, and detecting especially useful traits in collections. The workshop particularly recommended that IPGRI support the building of appropriate capacity in developing country programmes through training and the initiation of specific projects.

## Forest genetic resources

During 1995 work on forest genetic resources developed in four main strategic areas: *in situ* conservation, *ex situ* conservation, locating and assessing diversity, and information systems and databases. Efforts went into consolidating existing activities in Asia as well as developing specific projects in Africa, Indochina and Latin America. Within IPGRI, close collaboration was maintained with the GMU Group for work on recalcitrant and intermediate forest tree seeds, *in vitro* collecting, cryopreservation and safe movement of forest tree germplasm. Information was regularly exchanged also with the European regional programme on forest genetic resources.

Patrizia Tazza

### Locating diversity in tropical forests

With UNEP funding, partners at the ASEAN Forest Tree Seed Centre in Thailand established criteria and indicators for assessing genetic erosion, based on ecogeographic surveys and genetic diversity in selected species. Forest encroachment had endangered populations of some commercially valuable tree species. Ecogeographic surveys of populations of several important species indicated severe genetic erosion (see table below).

**Populations of priority species located in northeast Thailand**

| Species | Populations | Trees |
|---|---|---|
| *Afzelia xylocarpa* | 10 | 193 |
| *Dalbergia cochichinensis* | 40 | 918 |
| *D. oliverii* | 18 | 389 |
| *Xylia xylocarpa* | 14 | 2050 |

Genetic diversity studies assessed the level of erosion. Data obtained from the surveys were used to develop GIS-based methodology to locate areas for *in situ* conservation and determine appropriate interventions (including *ex situ* conservation). Isozyme protocols were developed for both seed and vegetative tissues of *Dalbergia oliverii* and *Xylia xylocarpa.* Lessons from the work in Thailand will be useful in other countries, such as Cambodia, Laos, Myanmar and Vietnam.

### Conservation and use of bamboo and rattan genetic resources

The INBAR/IPGRI Working Group on Biodiversity, Resources and Conservation that was established in 1994 met in Jogjakarta, Indonesia in November, 1995 to review work progress.

## Survey of bamboo and rattan resources in Thailand

The Royal Forest Department of Thailand, Silviculture Division, surveyed bamboo and rattan resources in locations in 21 provinces and five regions of Thailand. During the survey herbarium specimens were collected and deposited in the Royal Forest Herbarium, Bangkok. Location maps and photographs were also made. The information will assist in planning further work on genetic resources of the species and their conservation.

*Bambusa tulda*, *Cephalostachyum pergracile*, *Dendrocalamus giganteus*, *D. strictus* and *Thyrsostachys siamensis* are well distributed from the central and west-central up to the north and northeastern parts of the country. *Gigantochloa apus* is restricted to the south. *Dendrocalamus strictus* has the widest distribution and is most abundant. *T. siamensis*, *B. tulda*, *Cephalostachyum pergracile* and *Dendrocalamus giganteus* are less frequent and less abundant. *Dendrocalamus giganteus* is common in the highlands. *T. siamensis* grows well on poor soil and tolerates drought. *Dendrocalamus asper*, *B. blumeana* and *B. vulgaris* are widely cultivated throughout the country. *Calamus palustris* is widely distributed and tolerates drought. *Cephalostachyum caesius* is found mostly in the south, in areas where soil is wet and flooded.

### *Bamboo*

An existing priority list based on importance and value attached by national programmes was extended to include additional species, in close collaboration with partners in Bangladesh, Bhutan, India, Korea, Pakistan, the Philippines, Sri Lanka and Vietnam. Descriptors were developed with partners in Bangladesh, India and Indonesia. Ecogeographic surveys were made in China and Thailand. Work progressed on seed handling and storage of five bamboo species in Thailand. A handbook on bamboo has been prepared with the University of Singapore.

### *Rattan*

More than 40 species, including four species complexes, were included in the work plan. Surveys located and assessed diversity of priority species in India, Indonesia, the Philippines and Thailand. Genetic diversity of *C. palustris* was assessed in Thailand and in three species of *Calamus* in Malaysia. Work began on a handbook on rattan, in collaboration with partners in the Philippines. A list of descriptors for rattan has been prepared in collaboration with partners in India and Indonesia.

## Impact of disturbance on genetic resources of tropical forests

This joint CIFOR-IPGRI project, which has received scientific endorsement and financial support from the SGRP, made progress in the three participating countries: India, Malaysia and Thailand. The project has two major objectives. One is to develop a general methodology for assessing, monitoring and forecasting the impact of economic activities on forest ecosystems. The second measures the impact of conservation policies and practices on dependent people and industries.
In Malaysia, eight species were selected representing widely different life history strategies, including large trees, solitary species, fruit trees and understorey species. The commercial and socioeconomic values of the species selected vary from timber to non-timber forest products, such as rattan, fruit trees and medicinal products. Three sites were selected where disturbance factors include commercial logging, extraction of non-timber forest products, illegal logging and grazing. After selecting species and site, work began on developing protocols for isozyme and DNA extraction for RAPD analysis, as indicators of genetic diversity.

In Thailand, sampling of six sites revealed that the major disturbance factors were fire, grazing, collecting of forest products for local use and unmanaged and managed logging. Demographic studies assessed the regeneration status of the trees. In India, three sampling sites were selected, representing low, moderate and high disturbance. Major disturbance factors were found to be collecting of non-timber forest products, fire and grazing. Seven species were selected for analysis of genetic diversity.

**Proposed forest species for screening for recalcitrance and possible partner countries in research**

| Family | Species | Suggested physiology | Habitat | Country and proposed partners |
|---|---|---|---|---|
| Anacardiaceae | *Sclerocarya birrea* | intermediate | dry/semi-arid | Burkina Faso/South Africa |
| | *Lannea microcarpa* | intermediate | dry/semi-arid | Burkina Faso/South Africa |
| Apocynaceae | *Hancornia speciosa* | recalcitrant | semi-arid | Brazil/France |
| Canellaceae | *Warburgia salutaris* | recalcitrant | upland dry forests | Tanzania/South Africa |
| Dipterocarpaceae | *Dipterocarpus alatus* | intermediate | humid and dry | Thailand/Malaysia |
| Dipterocarpaceae | *Shorea leprosula* | recalcitrant | humid wet | Malaysia/Indonesia |
| Dipterocarpaceae | *Shorea parvifolia* | recalcitrant | humid wet | Malaysia/Indonesia |
| Euphorbiaceae | *Hieronyma alchorneoidis* | intermediate | humid | Costa Rica/Denmark |
| Lecythidaceae | *Bertholletia excelsa* | intermediate | humid | Brazil/South Africa |
| Meliaceae | *Azadirachta excelsa* | intermediate | dry/humid | Thailand/Malaysia |
| Meliaceae | *Azadirachta indica* | intermediate | semi-arid | Burkina Faso, India, Thailand, Myanmar, Kenya, Tanzania, Nicaragua |
| Meliaceae | *Azadirachta indica* var. *siamensis* | intermediate | semi-arid | Thailand, Myanmar, South Africa |
| Meliaceae | *Khaya anthotheca* | intermediate | semi-arid | Tanzania/UK |
| | *Khaya senegalensis* | intermediate | semi-arid | Burkina Faso/UK |
| Meliaceae | *Swietenia macrophylla* | intermediate | humid | Nicaragua/Thailand/Denmark |
| Meliaceae | *Trichilia emetica* | recalcitrant | humid lowland | Tanzania/S. Africa, UK |
| Myrtaceae | *Syzygium cumini* | recalcitrant | humid lowland | Tanzania/S.Africa/UK |
| Myristicaceae | *Virola surinamensis* | recalcitrant | humid | Brazil/France |
| | *V. dixonii* | recalcitrant | humid | Colombia |
| | *V. koschyni* | recalcitrant | humid | Costa Rica |
| Rosaceae | *Parinari macrophylla* | intermediate | semi-arid | Senegal/South Africa |
| Palmeae | *Euterpe* sp. | Intermediate | semi-arid | Brazil/ Colombia/S.Africa |
| Sapindaceae | *Pometia pinnata* | intermediate | humid | Indonesia/Thailand |
| Sapotaceae | *Vitellaria paradoxa* (syn. *Butyrospermum parkii*) | recalcitrant | semi-arid | Burkina Faso/UK |
| Vochysiaceae | *Vochisia ferruginea* | intermediate | humid | Costa Rica/Denmark |
| Vochysiaceae | *V. guatemalensis* | intermediate | humid | Costa Rica/Denmark |

## Handling and storing recalcitrant and intermediate seeds of forestry species

As a follow-up to earlier initiatives in the area of recalcitrant seed conservation, a Workshop was organized jointly by IPGRI and the DANIDA Forest Tree Seed Centre, at the Centre in Humlebaek, in collaboration with FAO and ICRAF, with DANIDA providing funding. The Workshop developed a project to strengthen research on seeds of forest tree species in developing countries, listed forest species for screening for recalcitrance, and suggested possible partner countries to undertake the research (see table above). The project involves 18 countries in Africa, Asia, Central and South America and Europe. It aims to develop cost-effective techniques for handling economically valuable tropical forest and agroforest trees with expected intermediate or recalcitrant seed storage behaviour. Standard procedures for collecting, conserving, germinating, exchanging and testing seeds for storage behaviour were developed. The GD and GMU thematic groups cooperated to coordinate the project, in close collaboration with the DANIDA Forest Tree Seed Centre,

which also provided technical support to countries participating in the project.

## Ethnobotany and the human aspects of plant genetic resources

Conserving plant genetic resources has an intimate relationship with their use. Conservation depends on how the material is used. In some cases the uses are neither sustainable nor efficient, placing their conservation for future generations at risk. In other cases, formal research and development processes have ignored local and traditional uses of plant genetic resources that are both sustainable and add value to the resources. IPGRI's project on ethnobotany aims to understand how the uses of plant genetic resources affect the distribution of genetic diversity in agro-ecosystems and how social institutions can help maintain biodiversity. Consultation throughout the world in 1995 developed activities in conjunction with major partners. The People and Plants Initiative of Unesco, WWF and the RBG Kew was an important guide to approaching and identifying local partners.

The project began to develop strategies for conservation through promotion, improvement and increased use of genetic resources, with key issues involving gender, nutrition, income, equity and value. Another element of the project focused on methods that address the need for conservation approaches that involve resource users and local communities. Key issues in this area include indigenous knowledge, participatory approaches such as community genebanks and *in situ* conservation, traditional resource rights, ethics, documentation and use of local knowledge.

Background research showed a trend towards decentralization and a broadening of institutional partnerships in many national programmes. With growing involvement of local communities and users in the conservation efforts, staff in the GD group began working with these new partners - farmers, local communities and other users of plant genetic resources - to develop methods for use in community genebanks, *in situ* conservation and the documentation of their indigenous knowledge. These are among the practical and cost-effective ways in which local participation strengthens efforts to conserve genetic resources.

## Biodiversity of leafy green vegetables in Africa: indigenous knowledge, gender and nutrition

Staff in IPGRI's SSA Regional Office have worked with national programmes to conserve the diversity and extend the use of Africa's traditional crops. The GD group began working in 1995 on traditional leafy green vegetables species where women are the principal experts and users of genetic diversity. The activity links conserving plant genetic resources to improving incomes and nutrition of both rural and urban poor. Traditional expertise and local production and use systems are the basis for conservation efforts. Staff working on the project contributed to a regional meeting in Nairobi of African scientists, NGOs and development workers interested in promoting, conserving and using these valuable but neglected genetic resources.

Based on this consultation a protocol was designed for a pilot study in Kenya. The study began by assessing how diversity within the many leafy vegetable species is used and how it could form a basis to extend and improve their use. A first step was to support the wider dissemination of the results of the work of partner institutes such as the National Museum of Kenya and NGOs that have already identified and documented useful diversity in leafy green vegetables. As the use of traditional leafy vegetable species increases and market opportunities arise, greater involvement from formal institutions conserving plant genetic resources will be needed to ensure that future development of these nutritionally and socially important but scientifically neglected species does not rely on a narrow genetic base. The pilot study demonstrated the potential for collaboration among conservation partners across sectors and disciplines.

## Indigenous knowledge, traditional resource rights and the value of biodiversity

Much of the incentive for conserving genetic resources depends on the knowledge available on the material. It also depends on the availability of the material, and the value that is placed on it. These socioeconomic and cultural concerns became issues for debate in 1995 as a result of the entering into force of the Convention on Biological Diversity.

## Documenting indigenous knowledge: an information system for farmers, local communities and scientists

'Indigenous knowledge' or local knowledge is an important resource for the conservation and use of plant genetic resources. It is, however, ensnared in a host of complex issues that confound attempts to use the knowledge in ways that support and maintain the knowledge system itself. Working with partners in Asian NGOs, the M.S. Swaminathan Research Foundation and universities, the APO and GD Groups began to develop documentation systems that can place indigenous knowledge on a par with scientific knowledge, in terms of availability and attribution. This process will promote equal and fair exchange between the two knowledge systems. Most importantly, it will contribute to the maintenance, continued use and evolution of indigenous knowledge systems. Consultations in Asia and Africa defined the information needs of users and farmers.

## The value of the biodiversity of plant genetic resources

Classical economic approaches to genetic resources as inputs to increased agricultural productivity only tell half the story. Many of the genetic resources being conserved may not end up as inputs to a new variety that raises productivity. The production value of genetic resources being held *in situ* by farmers and local communities can be easily calculated, but their conservation or biodiversity value is often ignored. Work in collaboration with the Centre for Socioeconomic Research at the University of Cambridge, UK focused on public policy. The report showed how economic valuation of biodiversity can encourage policy-makers to consider the conservation of plant genetic resources as an element in the sustainable management and future productivity of a country's natural resources sector.

Traditional resource rights and ethical issues arise when formal institutions work with indigenous peoples and local communities. Global and bilateral debates on property rights pertaining to plant genetic resources have followed the western industrial paradigm of intellectual property rights. 'Plant breeder's rights' under UPOV and the World Trade Organisation and 'farmer's rights' under the Plant Genetic Resources Commission of the FAO, are among the more widely discussed areas. However, such rights are difficult to apply to the innovation process and property regimes of local communities living in areas of high biodiversity. Consultation with the NGO Cultural Survival - Canada, which co-ordinates the Indigenous Peoples Biodiversity Network, and the Working Group on Traditional Resources Rights at the University of Oxford, UK, enabled staff of the GD Group to begin to apply the concept of traditional resource rights for local communities to community-based conservation programmes. Such an approach provides a holistic way to support and recognize the entire sociocultural system of peoples that continue to depend upon and manage diversity for their immediate survival.

## The contribution of home gardens to the *in situ* conservation of neglected tropical crops

Home gardens are microenvironments containing high levels of species and genetic diversity in agroecosystems. This diversity is intimately linked to the many different uses of plants by traditional households. Home gardens may contain many species and varieties, and the owners use agricultural practices which may have fallen into disuse in larger-scale agricultural systems. Home

gardens can also form points for experimentation and introduction of new species and genetic diversity as a result of germplasm exchange. Many studies have shown the nutritional benefits, economic importance and gender aspects of home gardens.

A pilot collaborative research project between IPK, Gatersleben and IPGRI in the study of Cuban 'conucos' was completed in 1995. It identified ways to incorporate and maximize the contribution of these dynamic microenvironments into the *in situ* (on-farm) conservation of agricultural biodiversity. The Cuban studies identified 80 species in local gardens. Home gardens were also noteworthy as microenvironments for the introduction of new species. In Cuba 46% of the species were from Central and South America, 20% from Southeast Asia and 11% from Africa. The diversity in species is comparable to home garden studies in Nigeria (99 species) and Indonesia (92 species).

## Gender analysis in support of the conservation of agricultural biodiversity

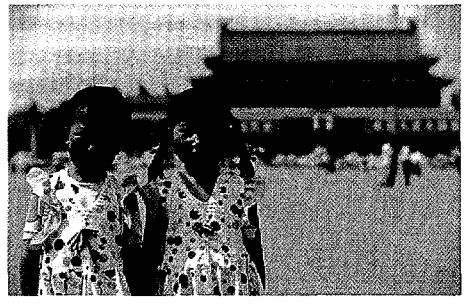
Gender is a fundamental cultural component in the access, knowledge and management of genetic resources. FAO has been a key partner of IPGRI in developing work that explores the technical and social dimensions of gender and the use of gender analysis in the conservation of plant genetic resources. The partnership extends the experience of FAO and other groups into the field of biodiversity conservation. Within the CGIAR, IPGRI benefited from methodologies and experience contributed by the System-wide Gender Programme.

A result of these partnerships was IPGRI's participation in the Fourth World Conference on Women held in Beijing in September 1995. A GD Group staff member was part of a special panel on rural women organized under the leadership of FAO, describing the important roles that women play as custodians and developers of crop genetic resources. Further research is needed into the key roles that women play in conserving biodiversity. Working directly with women farmers and managers increases the understanding of factors such as multiple use of genetic resources and how this affects genetic diversity, and management of microniches in farming systems. Women farmers often manage their plots in ways that have distinct and positive effects on the maintenance of diversity in plant genetic resources.

## Linking ethnobotanical information to the measurement of genetic diversity

Farmers have several ways to classify, segregate and manage diversity in their crops. Human practices, cultural preferences and social institutions exert a selective pressure on crops that influences the distribution and amount of genetic diversity in the species. While anthropologists in particular have done much ethnobotanical work on the plant classification and plant management practices of local communities, there are few cases where these human processes and selection pressures have been analyzed in terms of their effect on the distribution and use of genetic diversity.

In 1995, GD staff helped to organize one of the first research trials in China that combined ethnobotanical and molecular analyses. The study looked at taro *(Colocassia)* populations maintained by distinct ethnic groups in Kunming, southern China. This is an area of high production and varietal diversity. The work brought together the ethnobotany programme of the Kunming Institute of Botany and the biotechnology and horticultural institutes of the Chinese Academy of Agricultural Sciences. An objective is to test the potential value of linking ethnobotanical and socioeconomic information on farmer management of local varieties with the measurement of genetic diversity using molecular techniques and isozyme studies. This activity contributed to a continuing IPGRI project to measure and conserve taro genetic diversity in Asia, the Pacific and Oceania.



# Germplasm Maintenance and Use

GMU pursues research on technologies, strategies and policies in *ex situ* conservation and use of plant germplasm. In its research on conservation methodologies, the Group continues to give special priority to developing broadly applicable and cost-effective techniques to address specific problems; particular emphasis is placed on techniques appropriate for resource-limited programmes. During 1995, considerable progress was made in a number of project areas. In seed conservation, for example, substantial headway was made in developing the concept for a new series of technical bulletins, and producing the final drafts of the first volumes. This series is targeted at scientists and technicians managing collections of genetic resources. It aims to provide guidance on implementing conservation techniques and experimental procedures. The bulletins will also put forward options to adapt the methodology to local operating conditions and target species. In collaboration with partners, GMU prepared technical bulletins on a number of topics, including a protocol to determine storage behaviour of species, and the use of silica gel to dry seed. With IPGRI's increased involvement in the area of forest genetic resources, the Group began to identify and develop inexpensive technologies and equipment to conserve the seeds of forest trees. Through a special activity on the conservation and use of neglected crops, eleven monographs were in the process of publication. Through the project on institutional and policy frameworks for the conservation and use of plant genetic resources, GMU staff collaborated in addressing global policy issues, with continued focus on intellectual property rights and access to germplasm.

# Selected project activities

## Seed conservation

The draft of a technical bulletin entitled *A Protocol to Determine Seed Storage Behaviour* was prepared by the University of Reading, UK and finalized for publication. This bulletin provides advice on determining the behaviour of stored seed of species that have not yet been studied. Examples of ways in which results could be misinterpreted due to various confounding factors are cited. In addition, several alternative approaches for estimating seed storage behaviour prior to actual investigations on the seed are described. Notable among these is the 'multi-criteria' approach, which uses key indicators, including seed weight and size, moisture content at shedding, seed shape and taxonomic data to predict seed storage behaviour.

Closely related to the work on this technical bulletin was the production of a *Compendium of Information on Seed Storage Behaviour*. This volume, which was prepared jointly by the University of Reading and RBG Kew, was also finalized for publication. It consists of an introduction to seed storage behaviour, then gives concise information on the storage behaviour of seeds of approximately 7000 species in more than 250 families. The *Compendium* will be disseminated mainly in electronic form.

A 5-year global seed experiment started in 1994 to resolve questions on the use of (very) low seed moisture contents in seeds stored for the long term under different temperature regimes. The study involves collaboration among CAAS, ICRISAT, IPGRI and NSSL. The experiment was started at NSSL where lettuce seeds (as a model) were equilibrated at 22°C to 14 different levels of relative humidity, ranging from 0 to 75%, and sealed in aluminium foil-laminated bags prior to storage. Samples were then shipped to storage facilities in China and India, where they are maintained at four different temperatures: 18°C (control), 20°C, 35°C and 50°C. After 24 weeks of storage, the preliminary results obtained at all three locations were similar. There was no measurable deterioration when seeds that had been previously equilibrated to relative humidities of 50% or less were stored at 20 or 35°C. Neither was there deterioration in seeds that had been previously equilibrated to relative humidities of 8% or less and stored at 50°C. Conclusions on optimum water content will be drawn when all samples at a given storage temperature begin to deteriorate.

A research project on ultradry seed storage of rape seed, groundnut, sesame and soyabean at the Oil Crops Research Institute of CAAS at Wuhan confirmed earlier findings that ultradry oil seeds with a seed moisture content of less than 3.5% keep well at ambient temperatures for at least 12 years (see p. 33, APO section).

ESTIA of the Universidad Politecnica de Madrid investigated the performance of 25 different seed containers for the long-term storage of ultradry seeds. Preliminary results demonstrated how quickly moisture enters non-hermetically sealed containers.

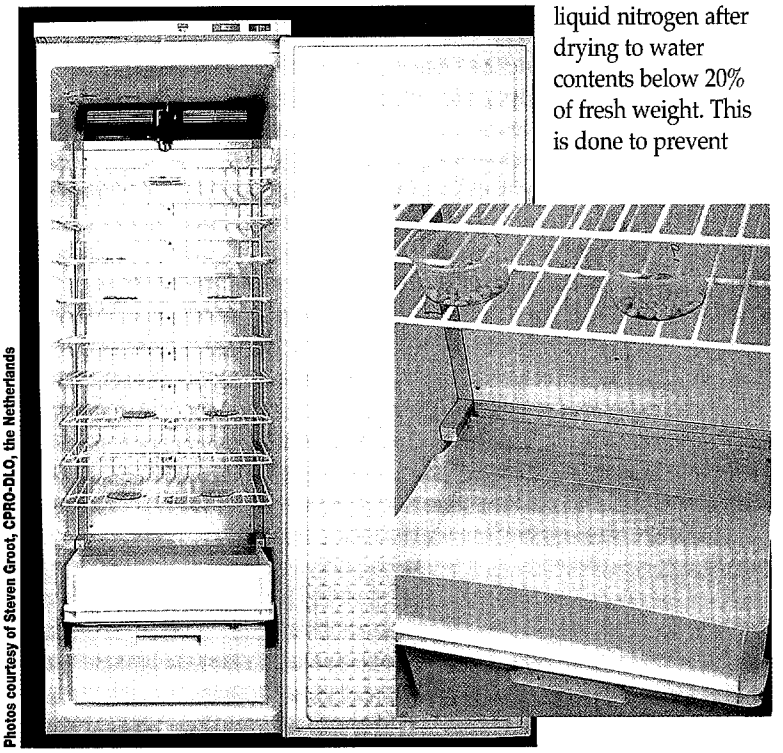
Including forestry species in IPGRI's mandate made the handling and conservation of forest tree seeds an important area for research. Accordingly, a project was initiated with financial and technical support from DANIDA to strengthen the research capacity on forest tree seed in developing countries. This project is being implemented as a joint effort between GMU and the forestry programme of the GD group (see p. 54).

In another activity, neem seeds were collected in Sri Lanka, dried to different relative humidities and stored at key temperatures to evaluate their responses. This research revealed the need for an inexpensive seed dryer with controlled temperature and relative humidity. By modifying a wine cooler, a

prototype seed dryer was developed using saturated salt solutions as the drying agent. (see photographs below). Scientists at CPRO-DLO, Wageningen are conducting the study.

A study made at the Agricultural University of Wageningen on the feasibility of using pollen as an alternative or additional *ex situ* conservation method came to some interesting conclusions. The storability of pollen of approximately 1600 species was assessed. Pollen survived for between 10 and 100 times less than seed when stored dry at room temperature. In fact, there are plant species with pollen that has a storage life of a few days only. A considerable number of the 1600 species studied displayed recalcitrant or intermediate seed storage behaviour, but this is not necessarily correlated with the storage behaviour of their pollen. For instance, members of the Gramineae family are known for their orthodox seed storage behaviour. However, according to the water loss that can be tolerated, the storage behaviour of the pollen of these species can be considered intermediate. Thus, where appropriate, pollen should be stored in liquid nitrogen after drying to water contents below 20% of fresh weight. This is done to prevent formation of ice crystals. However, the drying should not be too rigorous, preferably not below about 6-7%, as this reduces storage life.

**Scientists at CPRO-DLO, Wageningen modified a wine cooler to make a prototype seed dryer (main photo). The saturated salt solution that acts as the drying agent is simply poured into the tray at the bottom of the cabinet (inset)**



Photos courtesy of Steven Groot, CPRO-DLO, the Netherlands

## *In vitro* conservation

At the University of Birmingham, UK, a project using the RAPD technique to detect off-types of banana and plantain generated by *in vitro* culture found somaclonal variations in several plantain cultivars. The work then continued in field trials to attempt to trace the origin of these variations. However, the variations measured by RAPD were not correlated with any of the off-types that are known. Experiments to assess the genetic diversity of African plantains using RAPD detected only little variation in the range of material studied.

Universiti Pertanian Malaysia used oilpalm as a model to assess the efficiency of different cryopreservation techniques for recalcitrant species. Encapsulated embryos survived best after pretreatment with sucrose followed by desiccation to 10% water content on a fresh weight basis. Sucrose pretreatment also increased the resistance of naked embryos to desiccation and freezing. Both techniques gave similar survival rates. Encapsulation gave more reproducible results.

A new project started during the year with NBPGR, with ODA support. This work aims at developing cryopreservation techniques for almond and litchi embryos, apices of sweet potato and yam, and at establishing a pilot cryopreserved collection of jackfruit embryos. Before the project started, IPGRI supported the training of an NBPGR staff member in the University of Abertay, Dundee, UK in new cryopreservation techniques.

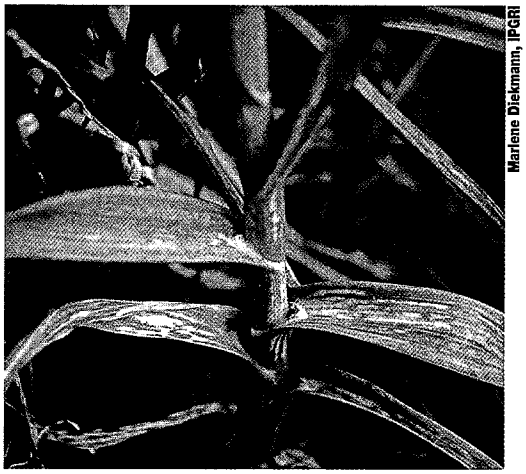
The Citrus Research Institute at Chongqing in China worked on *in vitro* conservation of *Citrus* germplasm. Culture conditions allowing accessions of two *Citrus* species to be stored for more than 12 months without subculture were successfully applied to over 50 different *Citrus* species and varieties.

GMU staff worked with Universiti Kebangsaan Malaysia to organize an international workshop on *in vitro* conservation of plant genetic resources. The workshop

identified priority research areas that included understanding the biological mechanisms involved in seed recalcitrance, and developing *in vitro* conservation techniques for vegetatively propagated crops and species with recalcitrant seeds. The workshop underlined the need in the APO region for training focused on *in vitro* conservation of root and tuber crops, fruit species, forest tree species and medicinal plants. The group also recognized that there is an important need for exchange of information between scientists and recommended that adequate mechanisms of communication should be established or reinforced.

## Germplasm health

Technical guidelines for the safe movement of germplasm of small grain temperate cereals were published as number 14 in the joint FAO/IPGRI series. Twelve scientists met in Rome to revise the guidelines for *Musa*, previously published in 1989. Guidelines for *Allium* spp. were developed at a meeting in Prague, Czech Republic, which was hosted by the Institute for Crop Production. ACIAR funded a meeting to develop guidelines for *Eucalyptus* spp. The meeting was hosted by the ASEAN Forest Tree Seed Centre in Bangkok, Thailand.



Marlene Diekmann, IPGRI

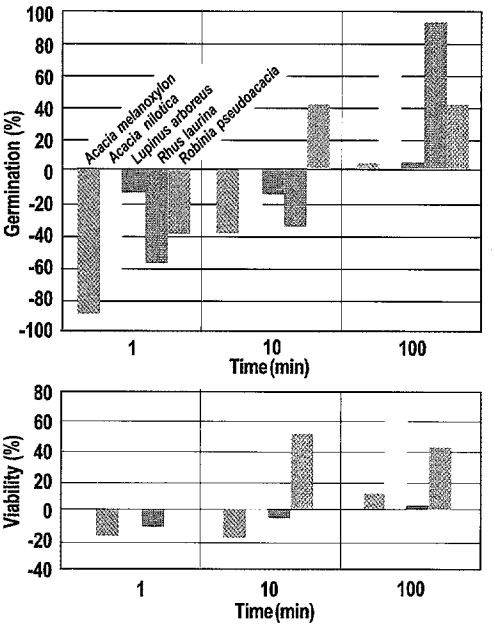
Virus-infected garlic in Taiwan

In collaboration with Bonn University, GMU staff gave a 1-week seed pathology course for graduate and undergraduate students. One student completed an MSc thesis on seedborne fungi of *Pinus* spp., which will serve as a basis for the planned guidelines for

## Hard seed impermeability

GMU-sponsored work at RBG Kew, UK looked at ways to break the 'hard seededness' in five forest species from the Leguminoseae and Anacardiaceae. The objective was to devise a reliable dormancy-breaking treatment for this type of seed. The proportion of untreated seeds germinating ranged from 60% in *Lupinus arboreus* to 4% in *Rhus laurina*. Seed weight and coat thickness were related but had no simple relationship with the level of hard-seededness in the population. Surface cracking of the seed/fruit coat was not a reliable indicator of permeability to water.

*Rhus laurina* seeds had a near-complete covering of wax, and soaking the seeds for 100 minutes in ethanol increased germination by 40%. However, there was no simple relationship between the presence of a surface layer of wax and the hard seed fraction in the species tested. The effects of a dry heat treatment on removing seed coat impermeability were assessed, and dry- and wet-heat treatments compared at 85°C (see the bar charts on the right). Except for *L. arboreus*, which had a low hard seed fraction, fewer seeds that had been treated with dry heat for 1 minute germinated than those that received a similar wet-heat treatment. Generally, both dry- and wet-heat treatments removed seed coat impermeability to water in a range of species with varying coat characteristics without compromising seed viability, although the relative effectiveness of the treatment did depend on the species.



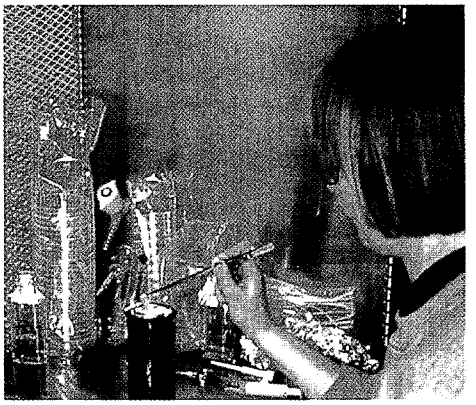

Effect of exposure time on the difference in germination (above) and viability (below) between hard seeds treated with dry heat and hot water at 85°C. Values below zero signify the benefits of the hot water treatment over the dry heat method.

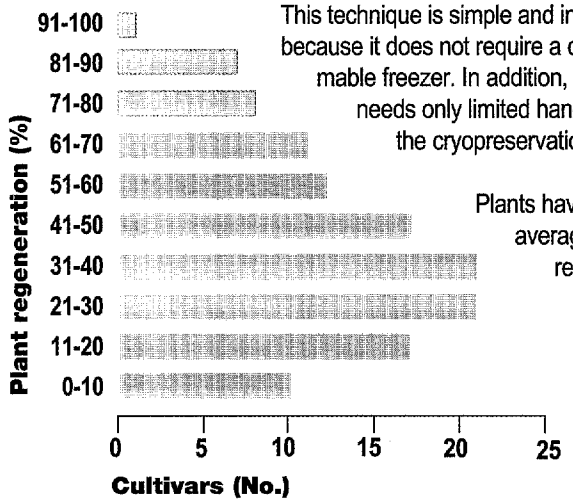
Text and figures based on material supplied by Hugh Pritchard, Paolo Espinosa and Claire Culshaw, RBG Kew, UK

## Cryopreservation of potato germplasm

Various cryopreservation protocols were published for potato in the 1980s but no simple technique which could be applied routinely in genebanks has since become available. A research project between DSMZ, FAL and IPGRI, funded by BMZ, was initiated in September 1991 to establish a simple cryopreservation technique for potato apices. The technique developed was then tested on a large scale in the German collection of old potato varieties held by FAL.

Apices are collected from healthy *in vitro* plantlets, kept overnight in liquid culture medium, then treated with 10% DMSO for 2 hours to condition them for freezing. The apices are then placed in droplets of cryoprotective medium and frozen almost instantaneously by direct immersion in liquid nitrogen (see photo right). After storage, apices are rewarmed rapidly and transferred on to recovery medium for regrowth. This technique is simple and inexpensive because it does not require a costly programmable freezer. In addition, the plant material needs only limited handling throughout the cryopreservation procedure.

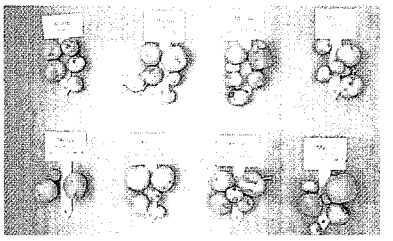





Distribution of cultivars according to range of plant regeneration.

Plants have been regenerated from apices of all 150 varieties tested, with an average regeneration rate of 40% (see figure left). Depending on the recovery rate, 200 to 360 apices per variety are cryopreserved. By the end of 1995, a total of 40 000 apices had been stored for the long term in liquid nitrogen.

The phenotypes of plants and tubers regenerated from cryopreserved apices of 78 varieties and those of plants of 28 varieties produced from replanted tubers compared well with the control phenotypes (see photo right). Tests did not show any changes in genetic stability, such as alterations in ploidy level or banding pattern, in any of the 161 samples from the 20 different varieties analyzed.



Cryopreservation thus represents a safe option for the long-term conservation of potato genetic resources. This project is an advanced application of the technique of cryopreservation to conserving plant genetic resources.

Photographs provided by Dr Angelika Schäfer-Menuhr and Dr Martin Schumacher, DSMZ, Braunschweig, Germany

pines. Two undergraduate students spent about 2 months each as interns in the GMU Group assisting staff in a number of germplasm health activities.

A project to develop reagents to detect *Allium* viruses started with AVRDC in Taiwan and Biologische Bundesanstalt in Braunschweig, Germany. Several potyviruses, carlaviruses and mite-borne filamentous viruses occur in *Allium*. Detecting them with serological methods is not always reliable because of their diversity. Nucleotide sequence analysis of the genomic RNA of three geographically and pathogenically distinct isolates of leek yellow stripe potyvirus showed that their coat protein is nearly identical in size and that amino acid sequences are 83-95% identical. Moreover, their 3'-NTR regions share identities ranging from 89 to 96%, suggesting that they are strains of the same virus. These results will be used to design suitable oligonucleotide primers for specific and universal detection of *Allium* potyviruses by PCR.

## Germplasm management

Secure, sustainable *ex situ* germplasm conservation depends not only on using appropriate conservation technologies, but also on managing a collection in a rational and cost-efficient way. Much technical information exists on techniques and procedures for germplasm conservation, but little is readily available on the management aspects of conserving a collection. Experience and expertise in managing genebanks lies with individual curators around the world. This information needs to be synthesized, analyzed and produced in a form that can help guide new and existing conservation programmes. With a view to addressing this need, staff in the GMU Group engaged in a number of activities to assess the issues underlying practical, cost-efficient approaches to germplasm management. Involvement with the ICPPGR process and the preparation of country reports for the Conference provided significant insights and information on constraints in germplasm management, as did a workshop on field genebank management held in Puerto Rico.

Field genebanks are costly, and the risks of losing the germplasm high, but increasingly there are opportunities for the complementary use of *in vitro* methods for the conservation of crops normally held in the field. Therefore, there is a need to develop strategies and procedures for managing clonal crops that integrate the use of field and *in vitro* methods in a practical, economic but scientifically sound way. Although there are fewer maintenance problems with orthodox seed species, their periodic regeneration presents problems of cost and genetic erosion or change. The FAO Commission has drawn attention to the need to improve standards in germplasm management. One of the activities of the CGIAR System-wide Genetic Resources Programme, assigned to IPGRI during the year, was to organize technical consultations on regenerating seed germplasm and on the management of field and *in vitro* genebanks. GMU was heavily involved in the organization of the consultations. The approach taken was to assemble a wide range of curators from international and national genebanks. They shared their practices and experiences and identified collectively the principal scientific, practical and organizational considerations underlying curator decision-making on managing and carrying out regeneration. They also considered establishing, maintaining and using field and *in vitro* genebanks. The consultation meeting on regenerating seed germplasm was held at ICRISAT and produced the framework for a decision-making guide to regeneration that could be applied to the many and difffering requirements of accessions and circumstances of genebanks. The meeting is more fully reported on pp. 87-88. The consultation on field and *in vitro* genebank management was planned for January 1996, to be held at CIAT.

Work continued through a project with RBG Kew on developing a computer programme to aid the design of seedbanks. Matching facilities to realistic predictions of needs for drying and storage is critical to efficient genebank operations. A final version of the software and manual should be available in 1996.

# Conservation and sustainable management of genetic resources: CGIAR's role

**Ismail Serageldin, Chair, CGIAR**

**Extracts of a Statement to the Second Meeting of the Conference of Parties, Convention on Biological Diversity, held in Jakarta, Indonesia, on 14 November 1995**

With the human population continuing to increase at a rate of 90 million more people every year, there can be no room for complacency. CGIAR's research for the public good is thus even more relevant today than it was when it was founded 25 years ago.

The CGIAR reaffirms its commitment to the development of its work for genetic resources. Genetic resources for food and agriculture, including those which underpin global forest and aquatic harvests, lie at the heart of the poverty, food security and environment nexus. They contain the key to solving many of the most pressing issues confronting humanity today: population pressure, environmental degradation, persistent poverty and continuing hunger. The CGIAR will work with like-minded institutions to ensure that genetic resources are conserved to facilitate their sustainable use and to promote an equitable sharing of benefits. This undertaking is consistent with the record of the CGIAR in the conservation and sustainable use of genetic resources through the impact of plant breeding technologies and of programmes that specifically protect biodiversity.

## *Major CGIAR programmes*

The CGIAR, through its network of International Agricultural Research Centres, maintains the world's largest international *ex situ* collections of agrobiodiversity, comprising about half a million accessions. In February 1995, a Ministerial-Level Meeting was held in Lucerne, Switzerland to provide the CGIAR with guidance on its research orientation, structure, financing and role within the overall international development cooperation effort. The meeting adopted the Lucerne Declaration and Action Programme which *inter alia* urged the CGIAR to reinforce the series of actions it had already taken to protect genetic resources, namely:

- Placing the plant genetic resources collections of the CGIAR Centres under the auspices of the FAO Commission on Plant Genetic Resources;
- Creating a system-wide programme on genetic resources, and
- Establishing a policy committee to provide the CGIAR System with support and advice on all aspects of plant genetic resources policy.

The CGIAR was the first, (and so far the only), institution to place its germplasm collections under the auspices of an intergovernmental body, the FAO Commission. The germplasm accessions maintained by the CGIAR centres now form the backbone of the FAO International Network of *ex situ* collections. The CGIAR has strengthened its activities in genetic resources and is developing a System-wide Information Network on Genetic Resources (SINGER). When SINGER comes on line, in late 1996 or early 1997, data and information on all centres, as well as other CGIAR genetic resources databases, will become fully

available electronically and through other means, to the world community.

Through the International Plant Genetic Resources Institute (IPGRI), the CGIAR is playing an important role in helping FAO prepare its report on the *State of the World's Plant Genetic Resources* and a *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture.*

Because of their non-governmental status, CGIAR Centres are not signatories to the CBD. That does not dilute their adherence to the spirit and provisions of the Convention. The agreements signed between CGIAR Centres and FAO have reiterated the long-standing CGIAR policy that Centres 'shall not claim legal ownership over the designated germplasm, nor shall they seek any intellectual property rights over that germplasm or related information'. In addition the CGIAR is further developing its guiding principles on Intellectual Property Protection related to the distribution and use of enhanced germplasm and biotechnological products.

The CGIAR stands ready to assist the Conference of the Parties and the various bodies of the Convention in a variety of ways. For example, the SINGER initiative could be linked with the development of the Clearing-House Mechanism. The Centres will also continue to make available to the COP and in particular the Subsidiary Body on Scientific, Technical and Technological Advice, their scientific and technical expertise, in areas such as genetic resources conservation and sustainable use, biotechnology and biosafety, human resource development and the transfer of technology, with a view to facilitating the implementation of the Convention on Biological Diversity.

Recognizing the interdependence of nations with respect to genetic resources, IPGRI has, at the request of the FAO Commission on Plant Genetic Resources, initiated a technical study to explore the feasibility of various options for resolving some of the outstanding issues related to access to genetic resources and the fair and equitable sharing of benefits arising from their use. Multilateral as well as bilateral options are being investigated in an attempt to identify possible systems that are compatible with the Convention on Biological Diversity, analyzed in terms of their efficiency, practicality and cost-effectiveness. For ultimately, whether national legislative or intergovernmental agreements, they must all be made compatible with the principles enshrined in the Convention, which like a constitution provides the guidelines for geographic and sectional actions of its signatory members. The study, which should be completed in early 1996 will, if so desired, be made available to the Parties to the Convention.

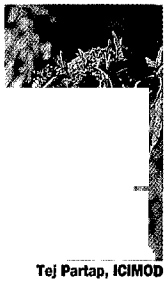
## Monographs on underutilized and neglected crops

(in preparation up to the end of December 1995)

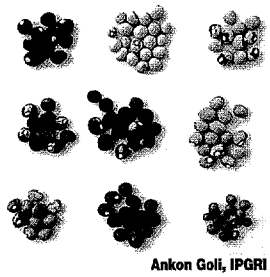
| Common name | Scientific name |
|---|---|
| Tef | *Eragrostis tef* |
| Hulled wheats | *Triticum* spp. |
| Quinoa, lamb's quarters | *Chenopodium* spp. |
| Buckwheat | *Fagopyrum esculentum* |
| Taro | *Colocasia esculenta* |
| Yam bean | *Pachyrhizus* spp. |
| Physic nut | *Jatropha curcas* |
| Bambara groundnut | *Vigna subterranea* |
| Chayote | *Sechium edule* |
| Sapotaceae (sapodilla, canistel, mamey sapote, caimito) | (*Manilkara zapota*, *Pouteria* spp., *Chrysophyllum* spp.) |
| Pili nut | *Canarium ovatum* |

Clayton Campbell, Kade Research Ltd.

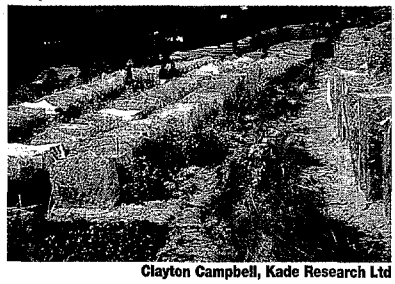
**Above: Buckwheat harvest in Nepal. Below, from left to right: *Chenopodium* almost ready for harvest; Bambara groundnut diversity; buckwheat being evaluated at Kabra Research Station, Nepal.**



Tej Partap, ICIMOD



Ankon Goli, IPGRI



Clayton Campbell, Kade Research Ltd

## Underutilized and neglected crops

In 1993, IPGRI and IPK in Germany, with financial support from BMZ/GTZ initiated a 3-year project entitled 'Genetic resources of neglected crops with good development potential: their conservation, use and breeding status'. The major objective of the project was to publish 25 crop monographs with a strong focus on the conservation and use of genetic resources. During 1995 the list of species was revised to include jackfruit/breadfruit (*Artocarpus* spp.), pili nut (*Canarium ovatum*) and bush mango (*Irvingia gabonensis*).

The project also supported network activities among genetic resources scientists on the following: farro (hulled wheats), traditional vegetables in Africa and grasspea (*Lathyrus sativus*). The coordinator organized with the Department of Research and Specialist Services, Zimbabwe a workshop entitled 'Conservation and improvement of Bambara groundnut (*Vigna subterranea*)' in Harare. The 31 participants from 12 countries decided to establish the International Bambara Groundnut Network and agreed on concrete activities which will not require additional financial support. These include exchanging information on conserving and utilizing genetic resources of bambara groundnut in different countries, identifying constraints, encouraging collaboration among scientists, and developing a plan of action for Africa for the conservation and use of Bambara groundnut.

## Policies and strategies for germplasm conservation and use

GMU staff continued their close involvement with the Crucible Group (see pp. 87-88 of IPGRI's 1994 Annual Report) by taking part in meetings that contributed significantly to a better understanding of the complex issue of intellectual property. Staff also participated in electronic discussions on developing *sui generis* approaches to intellectual property with respect to plant varieties.

Staff assisted COGENT to draft legal agreements to establish and operate regional coconut genebanks, and worked closely with INIBAP in developing agreements for the safety duplication of *Musa* germplasm.

Work started on a study entitled 'Intellectual property rights and plant genetic resources: towards a *sui generis* system'. The objective is to develop and evaluate options for *sui generis* systems of intellectual property rights for plant varieties which conform to the GATT-TRIPS agreement. German scientists and legal experts studied the legal obligations posed by the TRIPS Agreement, as well as other international treaties. The elements that were developed and evaluated included potential subject matter for protection (e.g. landraces, indigenous knowledge, traditional resource rights), protection requirements (e.g. distinctness and use value), and the scope and method of protection (e.g. plant variety protection seal). Special attention was given to the possible protection of traditional resource rights in a *sui generis* system. The study concluded that such rights might be much better realized through other legal instruments. However, some elements can be linked to the protection of plant varieties and related indigenous knowledge in a *sui generis* system. The study also suggested options for the regulation of the interface between the *sui generis* legislation and other intellectual property rights.

The Centres of the CGIAR signed an agreement with FAO in October 1994 to place the germplasm they hold in trust under the auspices of FAO, as part of the International Network of *Ex Situ* Collections. In one of the articles of that agreement, the Centres accepted the responsibility to ensure that any recipient of germplasm covered by the Agreement is bound by the same conditions as the Centres themselves. In particular, recipients undertake not to claim ownership over that germplasm nor to seek intellectual property rights over the material or related information. IPGRI, on behalf of CGIAR, developed with the other Centres an interim arrangement for the exchange of designated germplasm. This was discussed and endorsed during the Sixth Session of the FAO Commission on Plant Genetic Resources. The Centres inform their collaborators of this *modus operandi* by sending a Notice Letter with a Standard Order Form.

A workshop on '*In situ* conservation and sustainable use of plant genetic resources for food and agriculture in developing countries' successfully identified key areas for collaborative initiatives in the future. Some of these areas were complementary conservation strategies, the role of home gardens in genetic resources conservation, legal and economic issues pertaining to the conservation and use of the resources, as well as forest and fodder genetic resources. The meeting discussed *in situ* conservation methods (including on-farm conservation), the integration of *in situ* and *ex situ* conservation strategies, and helped lay the foundation for increased cooperation between IPGRI and German scientific institutions. The workshop was jointly organized by ATSAF, DSE and IPGRI, through a grant provided by the German Federal Ministry of Economic Cooperation and Development.

## UNCED follow-up

IPGRI established a project entitled 'UNCED follow-up activities' in response to global developments resulting from UNCED, particularly Agenda 21, the Convention on Biological Diversity and the revision of the FAO Undertaking on Plant Genetic Resources. The project coordinates the Institute's technical and scientific input with that of the other CGIAR Centres to contribute to the relevant inter- and non-governmental fora and mechanisms, such as the CBD's Subsidiary Body on Scientific Technical and Technological Advice and the FAO Commission on Genetic Resources. In 1995, the project improved links to the major groups within the CBD fora, including the NGO community, and disseminated information on post-UNCED activities. This work made significant contributions to institutional initiatives and conceptual discussions within the CGIAR.

IPGRI participated in a number of international meetings, such as the Meeting of the FAO Commission, the first session of the Subsidiary Body and the Second Session of the Conference of the Parties to the CBD. The chairman of the CGIAR attended part of the latter meeting and delivered a statement on behalf of the CGIAR (see pp. 64-65).

**Sui generis: of its own kind, unique**
The term is used to qualify specific legislation tailored to a particular situation, for example the protection of intellectual property rights of biological materials or plant varieties.

# Documentation, Information and Training

The year saw significant progress on several fronts within the general theme of communications that unites the work of the Group. IPGRI was one of the first Centres of the CGIAR to connect to the System's Integrated Voice and Data Network, which provides an infrastructure for Centres to communicate more effectively (and supports the development of initiatives such as SINGER, see p. 86) and with the Internet at large. The Group organized a workshop to acquaint IPGRI staff with the opportunities offered by the Internet such as World Wide Web pages, and to train them in preparing such material. Draft Web pages were demonstrated at International Centres' Week. The final version was to be launched in early 1996 (http://www.cgiar.org/ipgri). A record output of over 60 published items included two medal winners in the Agricultural Communicators in Education critique and awards programme: the IPGRI calendar and the Guidebook for Genetic Resources Documentation. Among the public awareness activities undertaken during the year were two media initiatives: a radio broadcast series to Africa and development of a series of eight broadcast videos. These should make significant contributions to keeping genetic resources conservation in the public eye and on policy agendas, to sustain political commitment to continued support to the area. A major initiative on developing training materials began, with the launching of a project to develop a core curriculum on the conservation and use of plant genetic resources, and to design training-support materials for modules within the curriculum. This project made a significant contribution to IPGRI's efforts to build capacity among partners to meet their own training needs.

# Selected project activities

## Germplasm documentation

### Genetic resources information services

IPGRI maintains a number of databases in support of the information services on plant genetic resources that the Institute provides to the international community. During the year a large amount of new and updated information was included in the databases and about 100 enquires were satisfied. By the end of the year, the database on germplasm holdings contained summary information on more than 5 million germplasm accessions held in *ex situ* collections world-wide. IPGRI seeks to stimulate the use of plant genetic resources by disseminating this information. One way it does this is by producing Directories of Germplasm Collections. In 1995, data preparation for electronic directories of root and tuber crops and oilcrops continued. This treatment will allow users to access the information in a much more flexible manner compared with the more traditional, and expensive, hard copy publication.

### Documentation training

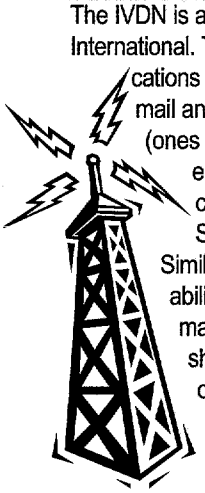
The *Guidebook for Genetic Resources Documentation*, which provides a self-teaching approach to developing an understanding of genetic resources documentation and documentation systems, remained in high demand and was reprinted. In July 1995, a new version of the Genebank Management System (GMS version 1.1) software was released. This software is often used as a training tool together with the Guidebook. The system can be customized to a high degree, which also provides opportunities to use it as an entry-level documentation system. In addition to the new version of the GMS, a utility was released that allows users to convert GMS data files to dBase format and *vice versa*, to increase the possibilities for data exchange between GMS and other systems.

### Development of standards for germplasm documentation

The development of crop descriptor lists is one of the activities of IPGRI's documentation work. The descriptor lists provide guidelines to allow a standardized and unambiguous description of plant germplasm. So far, 75 descriptor lists for various crops have been produced. In 1995 descriptors for *Capsicum* (jointly with CATIE and AVRDC), avocado and black pepper were published. Descriptor

**The Integrated Voice and Data Network**

The IVDN is an electronic communications system among the CGIAR Centres managed by CGNET Services International. The IVDN serves as an internal telephone network for the CGIAR and a network for data communications that is incorporated seamlessly into the Internet. It integrates voice communications with electronic mail and other digital information. It transports digitized information, i.e. in the form of binary digits, or bits (ones and zeros), regardless of whether they represent part of voice conversations or data, such as images, electronic mail, or software. Bits from different sources are transported together (multiplexed) over the same communications links. The system serves as a platform for CGIAR information applications (databases, e.g. SINGER, electronic publications), helping make CGIAR information resources and services globally available. Similarly, it provides Centre staff with access to global information resources and enhances Centres' ability to work together. It is expected to have a significant impact on the way research is organized, managed and executed in the CGIAR and should establish a worthwhile model for cooperation at the national level.

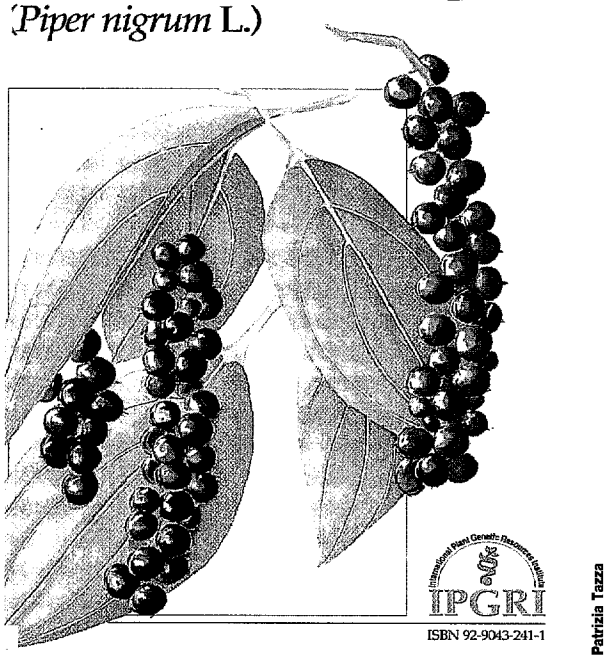


(adapted from text by Paul O'Nolan, ISNAR, used with thanks)

Descriptores para

# pimienta negra

(*Piper nigrum* L.)




ISBN 92-9043-241-1

Patrizia Tazza

**Cover illustration of the Spanish half of the bilingual Descriptors for Black Pepper/ Descriptores para pimienta negra (*Piper nigrum* L.), IPGRI, 1995.**

lists for *Beta* and coconut were reprinted to meet demand for these publications. Work was started on descriptor lists for coffee, tomato, banana and rocket.

## Development of new methodologies and applications

At the University of Naples, Italy, an IPGRI project continued to examine the application of digital image processing in the documentation of plant genetic resources. A prototype genebank management system was under development that illustrates how digitization of images can assist in the documentation of germplasm. The application has an open, modular structure. It will be developed further into a pilot database for beans. IPGRI completed its contribution to the IDRC-funded multimedia electronic atlas, ELADA 21 (see Annual Report 1994, p. 67) by finalizing the compilation of the genetic resources scenario for the information prototype.

## System-wide documentation initiatives

In October 1995, IPGRI participated in the meeting of the System-wide Information Network for Genetic Resources which took place at CIMMYT. The SINGER project (see pp. 86-87) aims to improve access to germplasm data held by the Centres of the CGIAR. At the meeting the Centres agreed upon the data types, data model and data delivery system. Common access to the basic genetic resources data of the Centres should be achieved by 1997. IPGRI participates in the SINGER project by providing information on its germplasm collecting activities (see also INIBAP, p. 80 *et seq.*). Also, during the first phase of the SINGER project, members of the Documentation, Information and Training Group, along with representatives of other Groups, participated actively in the SINGER Task Force, contributing to the development of questionnaires, providing specialist advice and assisting in the planning of project activities.

## Library and information services

In 1995, the Library satisfied over one thousand document requests from inside and outside IPGRI. As part of IPGRI's World Wide Web Page development activities, library staff developed prototype pages including a Web version of the *Library Bulletin*.

## Assistance to the plant genetic resources community

IPGRI continues to sponsor subscriptions to *Plant Genetic Resources Abstracts*, a quarterly abstracts journal which has been produced in collaboration with CAB International since 1992. Responses to a readership survey carried out in late 1994 to evaluate its impact and usefulness were analyzed. The majority of recipients classified the abstracts journal as an 'essential information resource'. IPGRI is a member of AGRIS, the International Information System for the Agricultural Sciences and Technology, which is a world-wide cooperative bibliographic information system for agriculture coordinated by FAO. In 1995, IPGRI prepared 109 bibliographic records for input into AGRIS.

Information support such as providing basic text books of plant genetic resources and/or PLANTGENECD has again been included in appropriate IPGRI projects. For example, the University of the Philippines at Los Baños and the University of Zambia received such support to assist in their collaborative efforts with IPGRI to develop advanced plant genetic resources training capacity (see p. 69).

Together with ODI and CPRO-DLO, an annotated bibliography on local crop development was finalized and will be published in 1996 (see Genetic Diversity section). A bibliography on the literature of African leafy green vegetables was in preparation in response to a Workshop on Genetic Resources

of Traditional Vegetables in Africa held in Nairobi, August 1995.

## Editorial and publications

Capitalizing on infrastructural improvements begun in the previous year, the Editorial and Publications Management unit gathered momentum during 1995 and by the end of the year had produced over 60 individual publications, posters, leaflets, reports and reprints, which are listed on pp. 78-79.

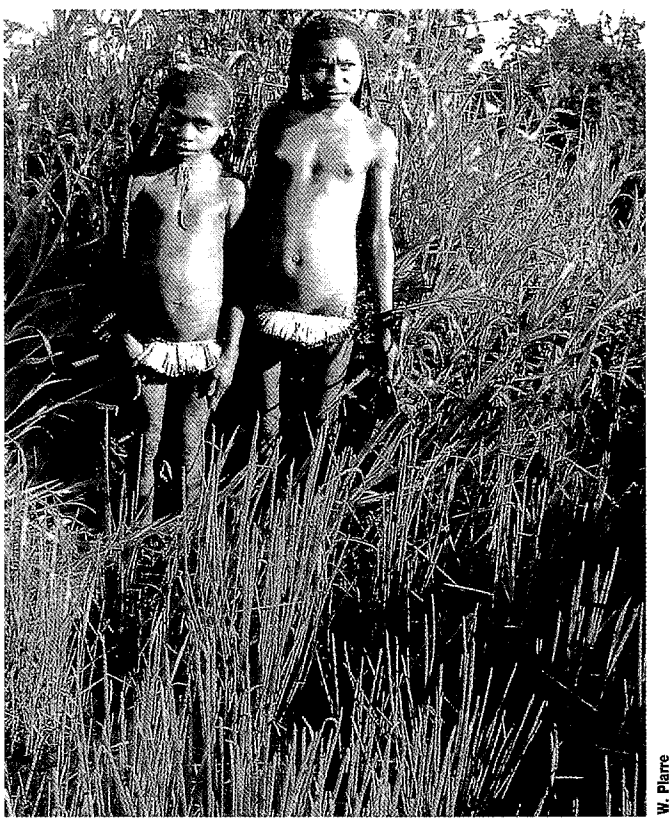
The Board of Trustees considered IPGRI's policy on distributing publications and reaffirmed the Institute's commitment to free dissemination of material. The Board reasoned that free distribution was the most efficient way to deliver information on plant genetic resources to those audiences that need it most but would not be able to pay for it. Print runs were reduced by continual revision and using more stringent selection criteria in developing mailing lists. Over 100 000 individual copies of new IPGRI material were disseminated from HQ and regional offices. Almost 3700 copies of previously published publications were distributed in response to the 600 requests received.

### *Plant Genetic Resources Newsletter*

Contributions for publication in the *Plant Genetic Resources Newsletter* continued to arrive in abundance, maintaining the steady rise in submissions every year since 1992. A readership survey was included in the December 1994 issue, provoking an acceptable 10% response rate during 1995. Of those who replied, 54% indicated that they were researchers - the next closest category was teachers, at 18%; 41% worked for a research organization, 21% for an educational institute. Responses to the question of usefulness of the *Newsletter* ran as follows: 32%, essential; 36%, valuable; 27%, useful; 5%, marginal. In the area of multiple readership, responses indicated that the Newsletter would have a minimum readership of 10 000, with a potential audience of 47 000. These figures suggest that the *Newsletter* continues to meet the needs of its target audiences. A section on Internet addresses relevant to plant genetic resources was added to issue no. 105 and will be a regular feature in future issues. FAO Library staff began to prepare a comprehensive index of the first 100 issues of the *Newsletter*.

### Reviews in the *Plant Genetic Resources Newsletter*

The Newsletter published a series of reviews during 1995, an innovation that provoked very positive comment from readers. In September 1995, 13 pages were devoted to the cultivation of crops in the highlands of Irian Jaya under Neolithic conditions*. The conclusion was that the highlands in the western part of the country contain significant genetic diversity, especially in vegetative crops. The photograph here shows two young girls standing in front of a plot of reed grass, *Eleocharis dulcis*. This wild species is grown attached to small sticks that hold the tillers in an erect position; this produces better tiller quality for preparing grass aprons.



W. Plarre

*Plarre, W. 1995. Evolution and variability of special cultivated crops in the highlands of west New Guinea (Irian Jaya) under the present Neolithic conditions. *Plant Genetic Resources Newsletter*. 103, 1-13.

### Publications Committee

During the year, the Publications Committee experimented with 'virtual meetings', by disseminating an agenda of discussion points by Email to all members. Comments were then collated and a list of proposals re-sent to members. Such a process obviates the need for lengthy meetings and allows staff in the region to make equal contributions to discussions.

### Meeting information needs

Work in this area concentrated on facilitating the work of Regional Offices, which are generating more and more regionally focused publications themselves. Information flows into IPGRI at various points and much of it needs to be distributed throughout the Institute, and also to IPGRI's partners. The Editorial and Publications Manager visited the WANA Regional Office in Aleppo, and the Singapore, New Delhi and Beijing Offices in the APO region, to develop staff skills in the writing, design, layout and printing of the Regional Newsletters. He and the Public Awareness Officer were also members of a 2-day review session of *Diversity* magazine to recommend action to ensure its continued appearance.

### Training in science communication

The Editorial and Publications Manager continued his involvement in training activities by teaching on a 2-week workshop on science writing and communication techniques, organized by WARDA and SAFGRAD with sponsorship from CTA at Yamoussoukro in Côte d'Ivoire. The workshop marked the publication of *Scientific Writing for Agricultural Research Scientists*, a training reference manual published by WARDA and CTA and authored by the regular resource persons of these workshops from material developed from the content of the course.

## Training

An underlying theme of all of the training work carried out by IPGRI in 1995 was to build capacity among partners to meet their own training needs. This is the only way to satisfy the long-term needs of countries and regions for training in plant genetic resources. Thus, as well as significant activity in the traditional areas of individual and group training, the year saw emphasis being given to extending the reach and effectiveness of IPGRI's training activities. Training trainers is one such mechanism; during 1995, over 60 trainers from developing countries received tuition in IPGRI courses and workshops. A similar number participated in the courses as trainers themselves. Another approach to increasing IPGRI's training impact was given particular attention during 1995, namely, developing a core curriculum on the conservation and use of plant genetic resources, with the development of associated materials to support training. In these efforts, as in all of IPGRI's training activities, a highly collaborative approach was taken, drawing widely upon the experience, expertise and resources of the Institute's own staff and many partners.

### Individual training

IPGRI's Italian-funded Individual Training Scheme (see Annual Report 1994, p. 71) entered its third year with five developing country scientists benefiting from training opportunities in Italian institutions. Dr Levi Akundabweni from Kenya completed a Research Fellowship at the University of Naples, in which he studied environmental stress resistance in cowpea. Ms Mary Api Ngu from Cameroon also completed her Research Fellowship at the Germplasm Institute, Bari. Ms Api Ngu covered a broad range of subjects within her fellowship, ranging from germplasm collecting to cytogenetics (see box). A third Research Fellow, Ms Laura Pfluger from Argentina, commenced training at the University of Tuscia, Viterbo. Ms Pfluger's research built upon that initiated by a previous trainee (Dr M. Tahir of Pakistan - see Annual Report 1994, p. 71) and involved the analysis of wheat protein content as an indicator of bread-making quality.

Two trainees entered the scheme in 1995 to undertake short-term 'special skills' training, Dr Imuetinyan Igbinnosa from Nigeria and Mr Alpha B. Jalloh from Sierra Leone. Dr Igbinnosa studied the screening of plant

germplasm for pest resistance at the University of Naples, Portici. Mr Jalloh studied germplasm exploration, conservation, evaluation and information management at two locations, Portici and Bari. During 1995, arrangements were initiated to bring an additional Special Skills Trainee from Myanmar to train in Bari and one from China to train at the Fruit Tree Research Station, Ciampino. The latter location was added during the year to the list of Italian institutions collaborating in the training scheme.

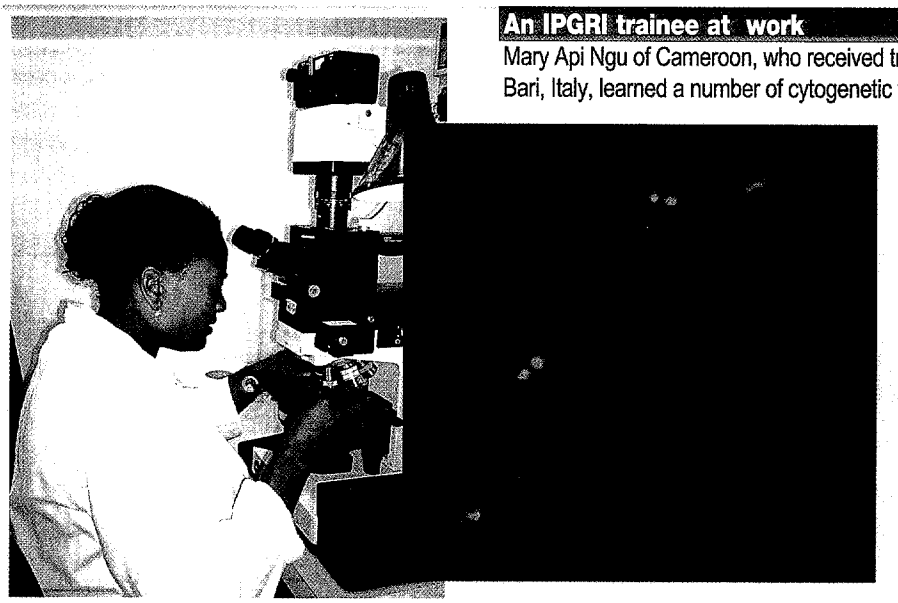
During 1995, two other individual training activities took place in Italy. Mr Frank Laubert from Germany undertook an internship at the GMU offices in Rome on aspects of germplasm health. Ms Sedighe Bahraei from Iran completed a two-year Research Fellowship studying genetic diversity of *Triticum* at the University of Tuscia, Viterbo. Other individual training activities in various regional locations are detailed in the respective Regional Group reports and on pp. 74-75.

## Vavilov-Frankel Fellowships

Robin Pistorius and Igor Loskutov, 1993 Vavilov-Frankel Fellows, completed their research into the history of plant genetic resources. Awegechew Teshome, the 1994 Fellow, completed his studies on sorghum landrace diversity in Ethiopia (see Annual Report 1994, p. 73). Two Fellowships were awarded in 1995. One went to Dr Satish Paul of the Tea Experimental Station, Palampur, India, to carry out research on genetic variation within and between populations of tea using PCR-based molecular markers. This Fellowship, focusing on the three main varieties of tea (Assam, Cambod and China), was undertaken at the Scottish Crop Research Institute, UK. The second 1995 Fellowship was awarded to Maria Luisa Ugarte, from Programma de Investigacion de la Papa, Bolivia, to study the systematic and morphological diversity of the wild potato (*Solanum brevicaule* complex). This work was undertaken at the United States Genebank at the University of Wisconsin, USA and included molecular analyses which provided information on taxonomic relationships in the complex.

## MSc courses

IPGRI staff participated once more in the MSc course on Conservation and Utilization of Plant Genetic Resources at the University of Birmingham, UK. A survey was completed to assess the demand for an MSc programme on plant genetic resources planned by the University of the Philippines in Los Baños. This provided invaluable information on the



Lyndsey Withers

**An IPGRI trainee at work**

Mary Api Ngu of Cameroon, who received training at the Germplasm Institute, Bari, Italy, learned a number of cytogenetic techniques including *in situ* hybridization. This technique uses fluorescent probes to locate particular DNA sequences on a chromosome and thereby construct a physical map of the chromosome and also to understand the function and evolution of portions of the chromosome. The micrograph shows the complementary use of digoxigenin (green) and rodamine (red) labelled probes to identify different portions of chromosomes of *Vicia benghalensis*.

## Training Summary - 1995

Short courses (the numbers on the map refer to the numbered lists opposite), Individual training schemes and Vavilov-Frankel Fellowships. See also Group reports. Countries of origin of all trainees are highlighted in colour*


*In general, applications to IPGRI for training support are considered in the first instance by IPGRI's Regional Groups; refer to contact addresses on the back cover of this report.

### Individual training

| Place | Subject | Participant |
|---|---|---|
| Ethiopia | documentation | Sudan |
| IPGRI, Rome | germplasm health | Germany |
| Italy | germplasm evaluation for environmental stress resistance in cowpea | Kenya |
| Italy | survey, exploration and collecting | Cameroon |
| Italy | analysis of wheat germplasm | Argentina |
| Italy | screening of plant germplasm for natural resistance to gram pod borer | Nigeria |
| Italy | germplasm information management; survey, exploration and collecting | Sierra Leone |
| Italy | studies on genetic diversity of *Triticum* | Iran |
| Lesotho | germplasm collecting and handling | Lesotho (5) |
| Jordan and Syria | genetic diversity of wild wheat | Jordan |
| Syria | documentation | Cyprus |
| UK and Mauritius | genetic diversity of coffee | Mauritius |

### Vavilov-Frankel Fellowships

| Year | Place | Subject | Participant |
|---|---|---|---|
| 1993 | Netherlands | history of plant genetic resources | Netherlands |
| 1993 | Russia | history of plant genetic resources | Russia |
| 1994 | Canada | studies on sorghum landrace diversity in Ethiopia | Ethiopia |
| 1995 | UK | genetic variation of tea | India |
| 1995 | USA | genetic diversity in potato | Bolivia |

## Short Courses

1 **Costa Rica**
IPGRI/CATIE/FAO - Plant Biotechnology and its Application in the Conservation and Use of Genetic Resources
15 participants from: Argentina (1), Colombia (1), Costa Rica (4), Cuba (1), Dominican Republic (2), El Salvador (3), Guatemala (1), Honduras (1), Venezuela (1)

2 **Colombia**
Universidad Nacional, Colombia/IPGRI/CIAT - Documentation of Plant Genetic Resources
16 participants from: Bolivia (1), Colombia (14), Ecuador (1)

3 **Zambia**
Darwin Initiative for the Survival of Species/ IPGRI/SPGRC/UNEP/University of Birmingham/ UNZA - Germplasm Collecting
19 participants from: Angola (2), Ethiopia (2), Kenya (1), Lesotho (1), Malawi (2), South Africa (2), Swaziland (2), Tanzania (1), Uganda (1), Zambia (4), Zimbabwe (1)

4 **Guatemala**
IPGRI/USAC/IDB - Documentation of Plant Genetic Resources
14 participants from: Costa Rica (3), Guatemala (6), Honduras (2), Mexico (1), Nicaragua (2)

5 **Colombia**
IPGRI/CORPOICA/IDB - Training Workshop for *Passiflora* Collectors
19 participants from Colombia (13), Venezuela (3), Ecudaor (2), Peru (1)

6 **Honduras**
IPGRI/DICTA-SRN/IDB - Training Workshop on Taxonomy, Collecting and Maintenance of Sapotaceae Genetic Resources
19 participants from Guatemala (2) , Honduras (9), Nicaragua (2), Costa Rica (5), Panama (1)

7 **Philippines**
IPGRI/FAO/PCARRD/IPB-UPLB/NPGRL-UPLB - Conservation and Use of Vegetatively Propagated Crops
18 participants from: Bangladesh (1), Cambodia (1), China (1), Fiji Islands (1), India (1), Indonesia (1), Korea (1), Malaysia (1), Maldives (1), Myanmar (1), Nepal (1), Papua New Guinea (1), Philippines (2), Sri Lanka (1), Taiwan (1), Thailand (1), Vietnam (1)

8 **Puerto Rico**
IPGRI/UNEP/CATIE/FAO Training Workshop - Field Genebank Management: Problems and Potential Solutions
23 participants from: Antigua (1), Barbados (1), Belize (1), Brazil (1), Colombia (2), Ecuador (1), Grenada (1), Guyana (2), Haiti (1), Jamaica (1), Puerto Rico (5), Saint Vincent and the Grenadines (1), Saint Kitts (1), Saint Lucia (2), Suriname (1), Trinidad and Tobago (1)

9 **Jordan**
UNEP/ICARDA/IPGRI/ACSAD - Collection and Conservation of Drylands Genetic Resources
14 participants from: Israel (2), Iran (1), Iraq (2), Jordan (3), Lebanon (1), Turkey (2), Syria (3)

10 **Indonesia**
COGENT/IPGRI/CIRAD/AARD - Trainers' Course on Coconut Germplasm Database Development and Breeding Research Techniques
14 participants from: India (1), Indonesia (5), Malaysia (1), Papua New Guinea (1), Philippines (1), Sri Lanka (1), Thailand (1), Vanuatu (1), Vietnam (1), Western Samoa (1)

11 **Malaysia**
Agriculture Research Centre, Sarawak/IPGRI - Training on Genebank Management System Software Version 1.1
12 participants from Malaysia

12 **Malaysia**
MARDI/IPGRI - Training on Genebank Managment System Software Version 1.1
13 participants from Malaysia

high level of demand for advanced training in the potential catchment area of the proposed course (see Annual Report 1994, p. 73; for further details see p. 27). Visual aids, text books and computers were provided in support of plant genetic resources training activities at UPLB.

IPGRI has been collaborating in training with the University of Zambia, Lusaka, for a number of years. In 1995, IPGRI involved the university in a short course on collecting held in Zambia that had a particular focus on training trainers (further details are given below). Momentum was maintained in developing masters-level courses in West Africa and West Asia in the context of a UNEP-funded project. Training workshops were held at the University of Côte d'Ivoire in Abidjan and the Lebanese University, Beirut, Lebanon. These workshops brought together regionally based trainers to explore the potential for mounting courses. Detailed discussions covered curriculum development, training materials, budgeting and the coordination of collaborative training inputs from partners within and outside the respective regions.

### Short courses

IPGRI collaborated in organizing 12 short courses or training workshops during 1995. These took place in Colombia (2), Costa Rica, Guatemala, Honduras, Indonesia, Jordan, Philippines, Puerto Rico, Malaysia (2) and Zambia. In all, 196 scientists from 64 countries were trained. IPGRI was fortunate to receive sponsorship from a number of partners for these courses. Details are given on pp. 74-75 and in the reports of the Regional Groups.

IPGRI again contributed lectures and materials to training courses organized by other institutes and assisted in matching trainees to training opportunities elsewhere. IPGRI's beneficial collaboration with DSE in Germany (see Annual Report 1994, p. 73) continued with Institute involvement in three of DSE's 1995 courses.

### Curriculum and training materials development

In 1995 the development of a core curriculum and associated training materials was initiated with the benefit of support by UNEP and generous inputs in kind from many partners in developed and developing countries. The curriculum, developed with wide consultation among trainers, researchers and genebank scientists in all regions, was designed in a modular format such that it can be presented as one or more related modules in a specialized short technical course or taught as an entire, integrated course, e.g. at MSc level. So far, the curriculum has been translated from the original English into French, Spanish and Portuguese. Training materials for modules on *Planning Collecting Missions, Introduction to Collecting, Ecogeographic Surveys* and *Measuring Genetic Variation* were developed. Others were in preparation. Advantage was taken of the short course on germplasm collecting held in Zambia to interact with trainers and trainees to gain an insight into their respective needs and thereby formulate an appropriate approach. Training materials were also a major topic of discussion in the Spain/Latin America Cooperative workshop detailed on p. 36.

In the course of developing training materials, different delivery mechanisms have been considered. As well as the obvious approach of producing printed materials (lecture notes, tests, discussion guides, etc.) and visual aids such as slides and transparencies, the possibility of dissemination in electronic format on diskette and through the Internet has been explored. Just as variety in language will extend the accessibility and flexibility of the materials, so will variety in delivery mechanisms.

## Public awareness

IPGRI produces public awareness materials in various languages and disseminates them to key target audiences. In 1995, these included the seventh annual issue of the Institute's award-winning magazine *Geneflow*, which focused on the APO region, regional brochures covering the Institute's activities in WANA and APO and the ever-popular IPGRI calendar.

A brochure on the special role of women in the management and use of plant genetic resources was prepared on behalf of SGRP. Funded by DANIDA and the CGIAR Gender Programme, the brochure was produced in five languages and distributed at the 4th World Congress on Women in Beijing, China. A paper on women as custodians and users of plant genetic resources was prepared in collaboration with Genetic Diversity Group staff for presentation at the Emphasis Day on Rural Women, organized by FAO and held just prior to the Beijing Congress. Also on behalf of SGRP, IPGRI's Public Awareness Office provided significant inputs to ICPPGR. Among other things, this included support for five press briefings held in conjunction with ICPPGR-sponsored regional and subregional meetings, the production of five posters and a set of fact sheets relating to key issues on the agenda of the upcoming Conference. During the year, IPGRI entered into a collaborative agreement with the World Radio for Environment and Natural Resources to produce 12 monthly features on plant genetic resources and broadcast them to countries in Sub-Saharan Africa. Plans also neared completion for an 8-part video series on plant genetic resources- *Wealth or Wilderness*.

Supported by funding from PARC and SGRP, IPGRI and partner organizations Television Trust for the Environment and Acacia Productions developed shooting scripts and commenced fund-raising for the series.

IPGRI coordinated an initiative to raise public awareness of international agricultural research in Germany in 1995 on behalf of the Public Awareness Association of the CGIAR. For the second year running, IPGRI mounted displays on behalf of the CGIAR at the meeting of the Conference of the Parties to the Convention on Biological Diversity. The displays examined the role of women in the conservation and use of genetic resources, and described the work of the SGRP. A European regional strategy on public awareness was developed in consultation with the Europe Group. The IPGRI audiovisual show was translated and produced in Italian, Arabic, French and Spanish.

## Impact assessment

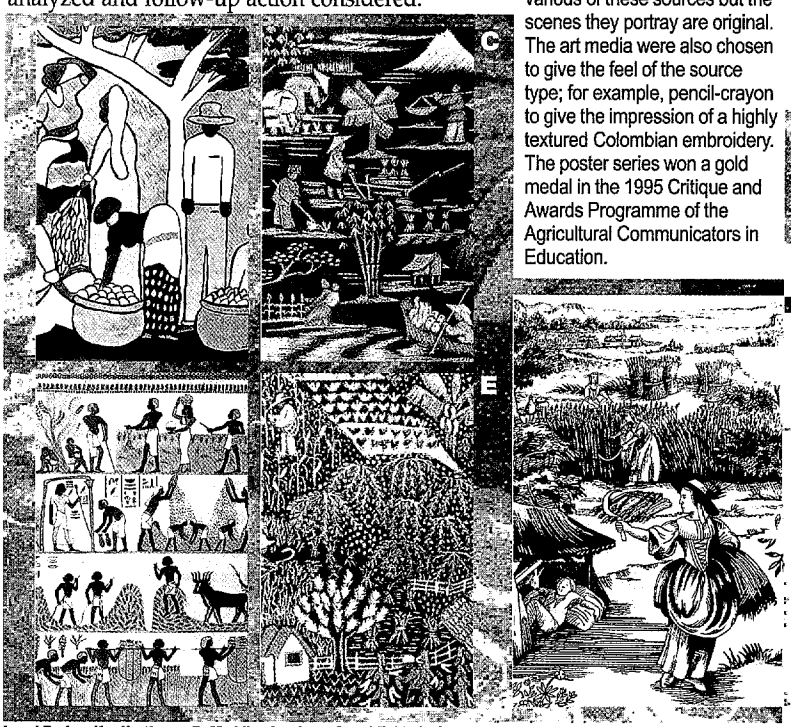
IPGRI's programme produces outputs that are largely measurable in terms of conservation and institution building. They are not readily translated into economic terms. IPGRI's Impact Assessment project explored ways of evaluating the impact of the Institute's activities. During 1995 this challenge was addressed by exploring the potential for economic valuation of IPGRI's work while seeking to develop mechanisms for recording and evaluating the non-economic elements of the Institute's impact.

Some understanding of the scope and limitations of economic impact assessment was gained through interaction with international experts on economic valuation of genetic resources and through the participation of IPGRI staff in a CGIAR Technical Consultation on 'Economic and policy research for genetic resources conservation and use' held at IFPRI headquarters in Washington, DC. This meeting covered two particularly pertinent areas. The first involved valuing the conservation of genetic resources and assessing the benefits to agricultural production and environmental protection. The second area considered costs and benefits of *in situ* and *ex situ* conservation.

Specific studies carried out within the framework of the INTAGRES project (see p. 90) also made inputs into IPGRI's understanding of the assessment of economic impact. IPGRI's impact on institution building in the broad sense, including aspects of training, development of technologies and strategies, information provision, raising of public awareness, etc., was assessed by three main approaches. First, information on institutional impact assessment was compiled, noting mechanisms available for identifying impact indicators. Second, the IPGRI project set was examined with a view to advising project coordinators on impact indicators that could be built into the management of projects in the future. The third avenue pursued was the design of a questionnaire for completion by IPGRI's partners. This questionnaire invited comment on all areas of the Institute's programme, linking the questions asked to IPGRI's four strategic objectives. An initial version of the questionnaire was sent to 31 individuals in different sectors of the plant genetic resources community in 13 countries, covering all regions. The responses were to be analyzed and follow-up action considered.

## IPGRI posters

Illustrations from a series of five posters produced in 1995 to highlight the work of IPGRI in particular regions. So that the posters would really give the 'feel' of the regions, the artists were asked to base the illustrations on a type of artwork indigenous to each area. They used a 17th century English woodcut as the basis for the Europe poster (A), a batik from Kenya for Sub-Saharan Africa (B), silk embroidery from China for Asia, the Pacific and Oceania (C), an Egyptian papyrus drawing for West Asia and North Africa (D) and a Colombian embroidery/applique for Latin America (E). The illustrations were inspired by elements from various of these sources but the scenes they portray are original. The art media were also chosen to give the feel of the source type; for example, pencil-crayon to give the impression of a highly textured Colombian embroidery. The poster series won a gold medal in the 1995 Critique and Awards Programme of the Agricultural Communicators in Education.




A and D, Jennifer Northway; B, Maddine Insalaco; C and E, Linda Cairns

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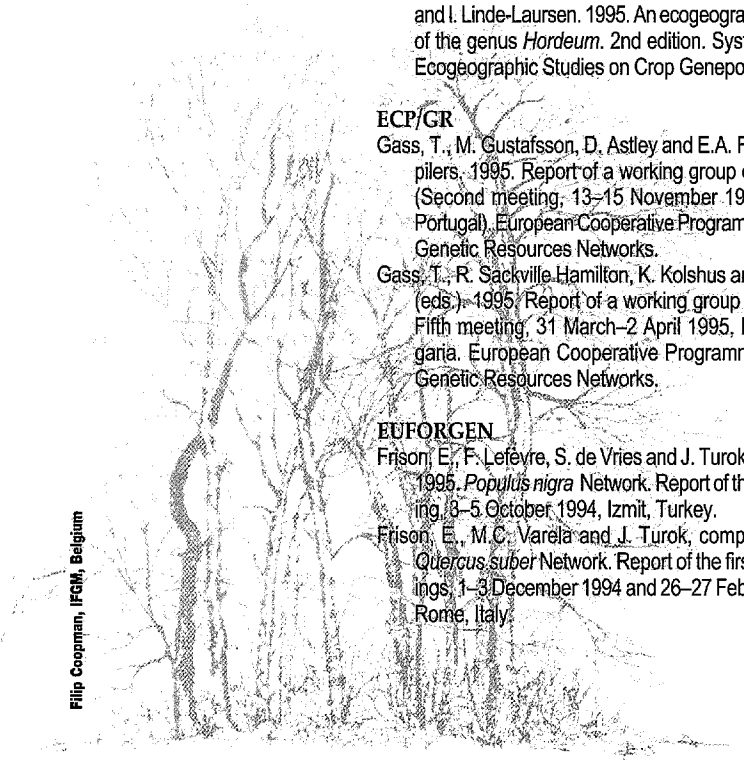

Filip Coopman, IFGM, Belgium

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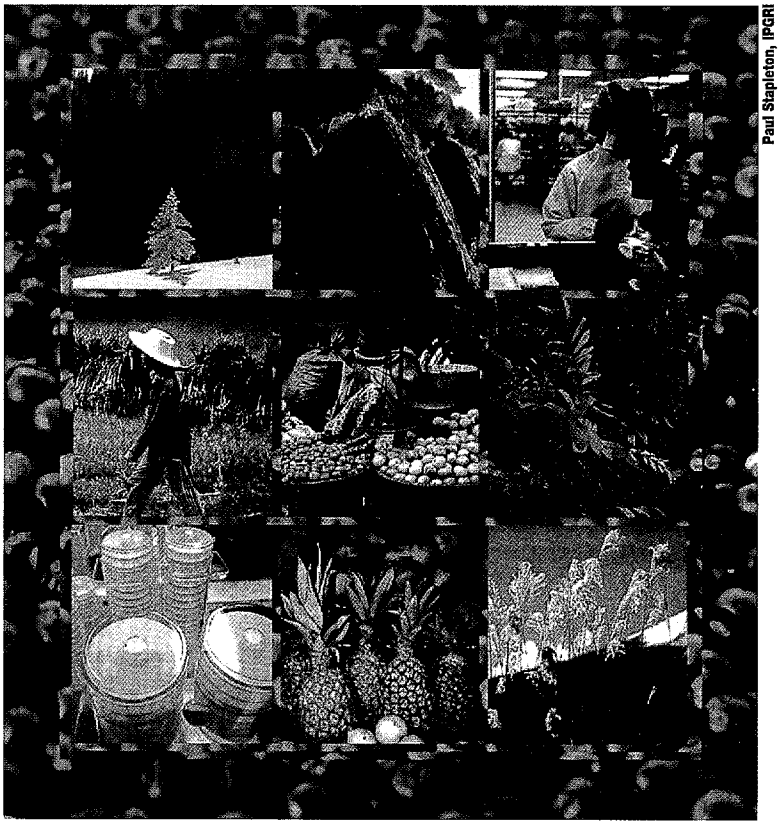

Paul Stapleton, IPGRI

**The cover illustration for 'Engels, J.M.M. (ed.). 1995. *In situ* conservation and sustainable use of plant genetic resources for food and agriculture in developing countries', a joint publication of IPGRI and DSE, Feldafing, Germany.**

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# INIBAP

The work of the International Network for the Improvement of Banana and Plantain on conserving *Musa* germplasm was scrutinized in 1995 by an external review team, which highlighted the cost-effectiveness and the high degree of use of the *Musa* collection maintained at the INIBAP Transit Centre at KUL, Leuven, Belgium. New *Technical Guidelines for the Safe Movement of* Musa *Germplasm* were developed during the year. These increase the capacity of the Virus Indexing Centres of INIBAP. Significant progress was made in Phase II of the IMTP, which distributed 27 accessions to 19 countries for evaluation at 37 different sites. Collaboration among breeders and nematologists was strengthened through a meeting in Kuala Lumpur which reviewed the state of the art of breeding for nematode resistance and developed technical guidelines for the evaluation of nematode resistance. Research at KUL on genetic transformation of banana produced several stable transformed banana plants in the greenhouse. Traditional breeding at FHIA, Honduras produced several plantain-like hybrids with resistance to black Sigatoka disease, the main threat to *Musa*, which will be made available for international evaluation. The IDRC-sponsored project to develop a *Musa* Germplasm Information System made considerable progress in 1995 by implementing a morphotaxonomic study of standard varieties in nine field collections, the finalization of a new descriptor list for *Musa* and the design of the information system architecture.

INIBAP promotes regional research efforts to deal with region-specific problems and encourages collaboration among partners in regional networks. Within the framework of these networks, national evaluation of improved hybrids selected through Phase I of the IMTP was taking place in over 45 countries by the end of 1995.

# Selected project activities

## *Musa* germplasm management

### *Musa* germplasm collecting

Despite its location within the centre of genetic diversity of *Musa*, Vietnam's wealth of *Musa* genetic resources had never been fully assessed and harnessed. INIBAP and the Regional Office for APO supported a project submitted by INSA to collect, characterize, evaluate and conserve *Musa* germplasm of Vietnam, partly through a UNDP grant. A total of 107 accessions was collected and established in two field genebanks in north and south Vietnam. These collections serve as centres for characterization and evaluation of the collected material and act as a reservoir to establish an *in vitro* collection at the Biotechnology Department, INSA, and a duplicate of Vietnam's banana germplasm at the INIBAP genebank.

### *Musa* germplasm conservation

The INIBAP Transit Centre at the Katholieke Universiteit Leuven, Belgium, pursues the secure *in vitro* conservation of the largest *Musa* genebank in the world and the continuous availability of virus-tested tissue cultures to users. In 1995, the ITC collection was supplemented with 18 new introductions from six different origins in Australia, Europe and Latin America. At the end of 1995, the genebank comprised 1056 *Musa* accessions and 4 *Ensete* clones. Forty percent of the genebank is held *in vitro* as safety-duplicates at the Taiwan Banana Research Institute, Taiwan. Draft agreements were made with CATIE, Costa Rica and IITA, Nigeria for the safety-duplication of the remaining part of the genebank.

### INIBAP: a Programme within IPGRI

For INIBAP, 1995 was a year of transition. After the merger with IPGRI in 1994, arrangements were put in place for INIBAP to operate as a Programme within the structure of IPGRI. This allows INIBAP to retain its identity and visibility, while maximizing the programme level synergy resulting from the merger. 1995 also saw a change in management of INIBAP, with a firm commitment to further strengthening the INIBAP programme within the IPGRI framework.
At its meeting in September 1995, the Board of Trustees decided to proceed with the construction of a building for the INIBAP headquarters in the Parc Scientifique Agropolis in Montpellier, France. The INIBAP building, which is largely financed by special grants from the French Government and the District of Montpellier, is expected to be completed by mid-September 1996.

INIBAP supports the development of cryopreservation protocols at KUL for long-term storage of *Musa* germplasm. In 1995, a new user-friendly cryopreservation technique for *in vitro* proliferating *Musa* meristems was successfully applied to over 15 genotypes.

### *Musa* germplasm distribution

By the end of 1995, 456 accessions were virus-tested in the INIBAP Virus Indexing Centres located at CIRAD in France and QDPI in Australia. No virus pathogens were detected in 87% of the tested accessions. During 1995, 54 shipments sent 362 accessions to 42 different organizations in 36 countries worldwide.

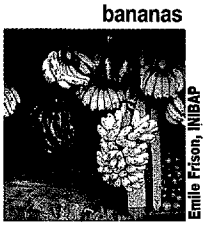
### Genebank review

The INIBAP genebank operation was reviewed by an ICWG-GR-commissioned panel of experts in December 1995 (see p. 87). The reviewers considered the operation of the collection exemplary for any genebank dealing with vegetatively propagated crops and one of the most cost-effective in its operation. As stated in the final report, "the panel was impressed by the close and productive links between the Katholieke Universiteit Leuven, Belgium and INIBAP" and "commended INIBAP/KUL for their close collaboration with the three virus-indexing centres located in France, Australia and Taiwan."

### Methods to detect banana streak virus in *Musa*

Both immunological and PCR-mediated amplification methods were developed for BSV detection at the Department of Plant

**Genetic diversity in Indonesian bananas**



Emile Frison, INIBAP

## Revision of the 'Technical Guidelines for the Safe Movement of *Musa* Germplasm'

An FAO-IPGRI-INIBAP meeting was held at IPGRI HQ in Rome to discuss new technical guidelines for the safe movement of *Musa* germplasm. New recommendations were made on some procedures, which closely follow protocols used at INIBAP's Virus Indexing Centres, but some modifications of procedures will be necessary as a result of decisions made.

The five plantlets dispatched from the Transit Centre to VICs for virus indexing should be selected from seven, and not twenty, cultures derived from the original shoot-tip, as this would lessen the risk of test plants being unrepresentative of the health status of the original accession. The remaining two cultures will be multiplied to obtain the twenty cultures for maintenance under slow growth conditions at the Transit Centre.

The indexing period at VICs should be reduced from 9-12 months to 6 months and indexing should take place after 3 and 6 months growth, because of increased confidence in the reliability of tests to detect viral pathogens. Accessions, even those coming from countries with banana bunchy-top disease, will be indexed at one VIC only, and not two as previously recommended. This is because of increased confidence in the reliability of BBTV indexing tests.

New antisera for banana bract mosaic virus will be routinely utilized at VICs in the near future, together with a wide spectrum antiserum for detecting banana streak virus by immunosorbent electron microscopy. Partially purified leaf sap will still need to be examined by electron microscopy to detect particles of uncharacterized viruses.

Germplasm will be tested for all viruses according to the protocols specified in the new guidelines. However, the guidelines foresee that in some instances, tests may be waived if there is strong, reliable evidence that particular viruses are not present in the country of origin of the germplasm.

Claudine Picq, INIBAP

**Carrying bananas in Burundi**

Pathology, University of Minnesota, St Paul. Polyclonal rabbit antisera prepared against a mixture of serologically distinct banana streak virus isolates were able to detect all tested isolates of the virus by immunosorbent electron microscopy. Although this method is sensitive and reliable, it is not suited to indexing large numbers of samples. It should be reserved for corroborative testing of small numbers of critical samples. To overcome this limitation, additional polyclonal antisera were prepared in mice and chickens and a triple-antibody sandwich ELISA protocol developed.

Banana streak virus in *Musa* has not been reliably detected with PCR protocols that use total extracted DNA as a template. It was found that the virus-related DNA was integrated into the *Musa* genome, giving a PCR product with banana streak virus-specific primers whether or not virions were present, as determined by immunosorbent electron microscopy.

### Identification and characterization of viruses associated with BBTV

Research activities carried out during 1995 at the Laboratoire de Pathologie Végétale, Universitaire des Sciences Agronomiques, Gembloux, Belgium focused on improving the sensitivity and reliability of BBTV diagnostic tests, on characterizing BBTV isolates and on evaluating banana reference genotypes for resistance or tolerance to BBTV.

Immunocapture PCR was found to be the most sensitive assay for detecting BBTV particles. This technique is recommended for use in assessing the elimination of BBTV in protocols for virus-free plant production. PCR analysis of BBTV-infected plants received from different countries around the world demonstrated the presence of BBTV DNA component 1 and component 3 in all isolates of BBTV maintained in the laboratory. It was found that a PCR assay using primer B-GA is a convenient tool for assigning BBTV isolates to the Asian group of isolates.

In collaboration with the INIBAP Transit Centre, the collection of banana reference genotypes, including both cultivated and wild bananas, was evaluated for resistance/tolerance to BBTV. Preliminary results showed some variability between genotypes in two parameters: the infection rate and the number of leaves to emerge before the observation of the first symptoms in infected plants. Although these parameters need to be further validated

in field experiments, the approach will permit the definition of categories of banana genotypes exhibiting different levels of tolerance to BBTV.

### *Musa* improvement project

INIBAP has been supporting strategic research since 1992 by several partners in advanced laboratories and breeding programmes.

### Embryogenic cell suspension

There are several obstacles to obtaining embryogenic cell suspensions. A survey of 20 varieties belonging to different genome groups showed that most needed several cycles on a proliferation medium with a cytokinin content 10 times higher (100 µM) than the routinely used proliferation medium (see photo below). Suspensions could be made from all the tested varieties, but the response to liquid and semi-solid medium depended on the variety.

### Genetic transformation

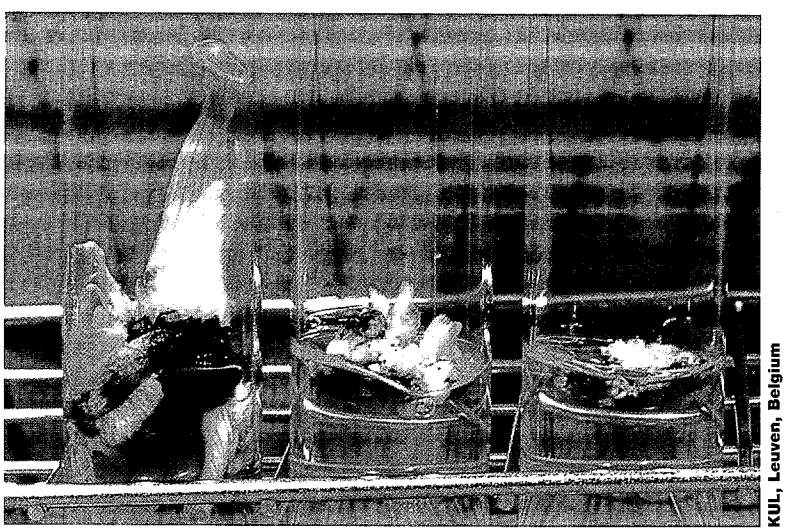
The genetic transformation protocol developed at KUL is based on introducing foreign genes into an embryonic cell suspension via particle bombardment. Several marker genes have been tested for their efficiency to select transgenic banana cultures. Several heterologous promoters were compared using the *gusA* reporter gene as a marker for transformation efficiency. Results indicated that the maize polyubiquitin promoter is the most efficient to drive high gene expression in banana cells. The first stable transformed bananas are in the greenhouse at KUL.

### Support to FHIA breeding programme

FHIA-03, FHIA-18 and FHIA-21 hybrids are milestones in the FHIA breeding programme. They are the first bred hybrids (along with FHIA-01® which was released in 1995 to the Australian banana farmers under the name 'Goldfinger') to be planted commercially because of their superiority, in terms of both productivity and disease resistance, when compared with the traditional, natural varieties. FHIA-03 is the first bred cooking banana which has several qualities superior to those of the natural ABB cultivars. In Cuba, for example, 700 ha of this hybrid have been planted. FHIA-18, a sweet-acid dessert banana, is also receiving ready acceptance. This hybrid is fast to flower and has a high level of resistance to black Sigatoka. The FHIA-21 plantain-like hybrid resistant to black Sigatoka was evaluated in Honduras. Production was twice that obtained with the traditional AAB-'Horn' plantain and many farmers wanted to convert immediately to FHIA-21. However, this promising material is not yet available from INIBAP because of the detection of bacilliform particles in the first sample received at ITC.

### INIBAP *Musa* genebank under the auspices of FAO

The *Musa* germplasm maintained in the INIBAP genebank at ITC-KUL has been assembled through donations from other genebanks, through collaborative collecting expeditions with national programmes, from breeders and individuals. This material was donated to INIBAP for the purpose of conservation and for the benefit of the partners within the network. As such, INIBAP acts as a trustee of this germplasm. In October 1994, through the agreement signed between FAO and IPGRI, the genebank has come under the intergovernmental auspices of FAO. The materials covered by the Agreement are listed as 'designated germplasm'. This material continues to be available to all, on the understanding that it will remain in the public domain. INIBAP developed new procedures for the distribution of germplasm, which applied from November 1995. Each shipment of material is subject to the signature of an Order Form by the ordering institute, corporation or person, accepting a list of conditions to guarantee the maintenance of the germplasm in the public domain and to share the information acquired after the acquisition of the material.



**Increased proliferation rate of 'Grand Naine' (AAA) induced by increased cytokinin in the medium. The left and centre tubes contain proliferation medium with 100 µM cytokinin (4-7 cycles). The tube on the right has the same medium with 10 µM cytokinin.**

KUL, Leuven, Belgium

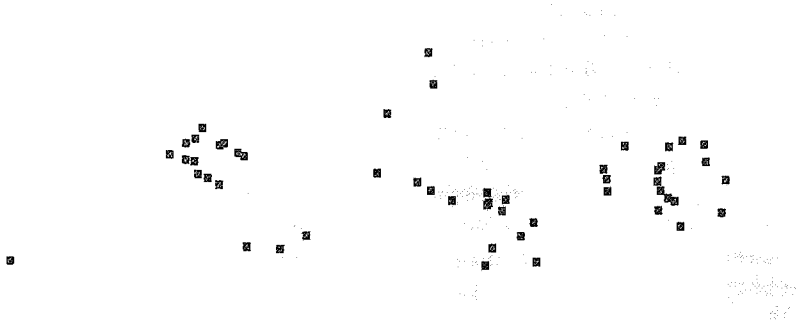
## Breeders' network

Breeding for nematode resistance was identified as the third goal for global *Musa* improvement, following Sigatoka diseases and Panama disease. A workshop organized by MARDI and INIBAP brought together nematode specialists and *Musa* breeders from 14 countries, as well as several Malaysian *Musa* researchers. A consensus was reached on the need to identify new sources of resistance to the major nematodes affecting bananas, especially in fertile diploid types for incorporation into breeding programmes. Screening protocols were proposed and resistant and susceptible reference varieties suggested to establish a common evaluation procedure for breeding lines and improved varieties. The need to develop reliable screening protocols for use in the glasshouse was also highlighted. Finally, the participants agreed that both conventional (hybridization) and non-conventional (biotechnology) methods of genetic improvement are complementary.

## International *Musa* Testing Programme

Phase I of the IMTP (1990-1993) very successfully targeted black Sigatoka, eventually recommending three FHIA hybrids for further distribution and evaluation at national level. These varieties are now being evaluated in 49 different countries. The target diseases of phase II are black Sigatoka, yellow Sigatoka and Fusarium wilt. After multiplication, ITC distributed more than 10 000 *in vitro* plantlets to collaborators from 19 countries for evaluation in 37 test sites. Several breeding programmes contributed new and promising pest/disease-resistant germplasm for future evaluation in 1997. Disease-resistant germplasm should decrease the use of pesticides, with environmental benefits and increase in yields and returns for smallholders.

Distribution of IMTP Phase I hybrids by ITC since 1993



## Regional activities

### Sub-Saharan Africa

Virus-indexed germplasm was sent to the region, directly from ITC or through CRBP, who act as an intermediate centre for multiplication and dissemination of selected germplasm under the auspices of INIBAP. In 1995, ITC sent 61 accessions to eight different organizations in seven countries. CRBP supplied 2214 *in vitro* plantlets of 26 different varieties to four development agencies in Guinea, Chad and Gabon.

IITA in Nigeria, NARO-KARI in Uganda and CRBP in the Cameroon participated actively in IMTP and MGIS activities. Shipments to the IMTP trial sites were completed in 1995 by supplying NARO-KARI with the 32 varieties needed for evaluation for resistance to black leaf streak/black Sigatoka and Fusarium wilt. The first batch of 13 reference varieties was sent to the three MGIS partners.

### Latin America and the Caribbean

In 1995, CORPOICA and INIBAP signed a memorandum of understanding aimed at strengthening national efforts in germplasm characterization of main food crops, including natural and improved germplasm of *Musa*. INIBAP supported the visit of an expert in black Sigatoka to the most disease-affected areas of Venezuela to develop a plan to control the pathogen. Dr Benjamin Dadzie from NRI completed successfully a collaborative project with FHIA, INIBAP and ODA on postharvest cooking banana and plantain characterization. Besides the scientific findings, Dr Dadzie prepared reference manuals on the postharvest characteristics of the FHIA hybrids, which will be published by INIBAP.


Nicolas Roux

**Cultivation of coffee in association with plantain in the Department of Quindío, Colombia. 56% of Colombian plantain comes from the coffee-production area ('Zona cafetera')**

LACNET organized with CATIE and CIRAD a 'Hands-on workshop on genetic transformation' in Costa Rica. LACNET and IDRC funded the attendance of four participants at a short course on 'Technological update on plantain production' organized by CORPOICA.

### Asia and the Pacific

In 1995, material collected in earlier missions in Vietnam was established in two field collections in Vietnam for characterization. A project funded by ODA on the rescue and conservation of the Southeast Asian banana germplasm collection in Davao, Philippines revealed that all germplasm transferred *in vitro* in 1989-91 was free from banana bunchy top virus. The duplicate *in vitro* collection of Asia/Pacific *Musa* germplasm at TBRI was completed in 1995. TBRI initiated its virus-indexing activities during the second quarter of 1995, becoming the third INIBAP Virus-Indexing Centre. ASPNET received a grant from Taiwan to implement the Regional Information System for Banana and Plantain in Asia and the Pacific. ASPNET, with strong support from co-sponsors, conducted a training course on 'Damage assessment methods and integrated pest management approaches for banana weevil and nematodes' in Thailand. Twenty participants came from China, Indonesia, Malaysia, the Philippines, Tonga, Vietnam and the host country, Thailand. ASPNET also sponsored individual training courses on banana tissue culture and virus-indexing, and technology of banana germplasm conservation *in vitro* at TBRI, Taiwan; and banana classification at Davao and Los Baños, Philippines.

Following discussion with the ASPNET Regional Coordinator, the Philippines representative to CGIAR announced an annual grant of US$20 000 to INIBAP at the CGIAR Centres Week meeting in Washington, DC.

## Information and documentation/ communications

### INIBAP databases

In 1995, *MUSA*LIT, the INIBAP trilingual bibliographic database of abstracts, expanded to 3824 bibliographic records. These records were published in *Musarama*, the international bibliographic abstract journal on bananas and plantains. Three issues of *Musarama* and an index were produced during the year.

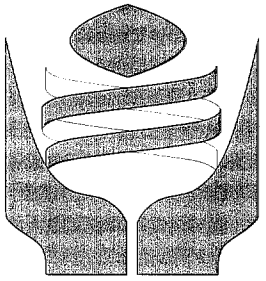
### *Musa* Germplasm Information System

As the first stage of a morphotaxonomic study of standard cultivars, a set of standard cultivars was sent to collaborators, along with protocols in the users' manual for morphotaxonomic descriptors. Work continued on preparing a *Musa*logue catalogue on accessions collected in Papua New Guinea in 1988-89 by IBPGR and QDPI and evaluated at QDPI, South Johnstone Research Station. The *Musa* Germplasm Information Database also made significant progress in developing its structure.

### Publications

The Information/Documentation Unit at INIBAP HQ handled 370 requests for information during 1995. The number of requests at HQ since the beginning of the service grows regularly; the main clients being researchers from Africa, followed by Latin America and the Caribbean and Asia and the Pacific. The *1994 Annual Report*, one global and one regional publication, two fact sheets on diseases (each in three languages) two issues of INFO*MUSA* and three of *Musarama* were published in 1995. Over 16 000 copies of INIBAP titles were distributed world-wide during the year.

# CGIAR System-wide Genetic Resources Programme



1995 was the first full year of operation of the SGRP, allowing the Programme to determine the aims, strategies, policies and procedures for its activities. SGRP was launched at the CGIAR Mid-Term Meeting in New Delhi in May 1994, to comprise all genetic resources programmes and related activities of individual CGIAR Centres under independent Centre management, with IPGRI as the Programme's Convening Centre and the Inter-Centre Working Group on Genetic Resources as its Steering Committee. The Programme aims to provide an effective vehicle to move the CGIAR forward to meet the challenges posed by the CBD and Agenda 21, and those likely to result from the Global Plan of Action of the International Technical Conference.

The ICWG-GR comprises a representative from all the participating CGIAR Centres, with as *ex officio* members, a representative of FAO, the Director General of IPGRI in his capacity as SGRP Programme Leader, and the Programme Coordinator. Currently, 15 of the 16 CGIAR Centres participate in the Programme, which encompasses livestock, aquatic, forestry and crop genetic resources. In addition to the independent Centre elements, the Programme includes components for coordination (the ICWG-GR and a Secretariat) and specific collaborative activities. The CGIAR assigns an additional allocation of funds for these coordination and collaborative elements. In 1995, US$960 000 were available, with an additional US$1.6 million for the project to develop the System-wide Information Network for Genetic Resources (SINGER - see below), over the period 1994-1996.

IPGRI as Convening Centre has overall responsibility for coordinating the Programme and for catalyzing its development. The Programme's guiding principles are collaboration to achieve synergy in efforts, ensuring coherence in policies and strategies, and enhancing partnerships. The ICWG-GR and the Secretariat (led by a Programme Coordinator and hosted by IPGRI) have special roles in coordinating and promoting the efforts of the Programme. An Interim Coordinator was nominated in February 1995 and a full-time Coordinator was appointed in November 1995.

## 5th ICWG-GR annual meeting

In January 1995, the ICWG-GR met in ICARDA, Aleppo, Syria and agreed on the parameters for the function of the Group and Secretariat, and on action to develop and implement the programme. The activities carried out in 1995 were primarily focused on examining the current status of Centre genetic resources work and how to move forward, in particular in areas relatively new to genetic resources work in the CGIAR, such as *in situ* conservation, policy and socioeconomic issues, and aquatic and animal genetic resources.

## SINGER

The development of the System-wide Information Network for Genetic Resources was the primary activity in 1995 in inter-Centre collaboration. Initial design work started in 1994. With funds from Switzerland and Sweden and the appointment of a Project Leader in March 1995, full development of SINGER got underway. Information exchange and dissemination is pivotal to the SGRP and its working relationships with NARS and other collaborators. SINGER aims to achieve compatibility of genetic resources information System-wide and to ensure its availability within and outside the System. The types of data to be included in SINGER, and mechanisms by which to access it, were discussed

and developed through consultation with the Centres involved and NARS partners. A planning meeting decided on the initial scope of the data to be included and the design of the delivery system. Data items include passport, collecting, characterization and distribution information. The data delivery mechanism preserves the autonomy of existing Centre databases and replicates the data at a central node that can be accessed through the Internet. Data will also be provided on CD-ROM, diskette or as printed output. With project funding, the Centres began to prepare their databases for linking into SINGER.

## External review of CGIAR genebank operations

SGRP commissioned an external review of CGIAR's genebanks, led by Dr N.L. Innes and involving 20 experts from FAO and NARS, over a period of 6 months. The teams assessed the financial, scientific and technical aspects of Centre genebank operations and prepared reports on each of the 12 genebanks reviewed. The reports provide the status of the collections held in trust by the CGIAR and make recommendations for improving the quality of the operations of the individual genebanks. The review also produced a synthesis report with a number of overall recommendations for CGIAR genebank operations. This report will be published together with the ICWG-GR's commentary on the recommendations. Principal recommendations cover:

- completing safety-duplication of all collections under formal agreements;
- further assisting NARS with germplasm restoration and in the strengthening of national capacity, including training;
- enhancing advisory mechanisms by strengthening NARS and network linkages;
- assuring storage and management of collections meet international standards ;
- advancing research system-wide, on methods to estimate the coverage of collections and to improve the utilization and conservation of collections, and
- quantifying the costs and impact of germplasm conservation and utilization.

## Planning meetings

To examine the role, strategy and priorities for SGRP in areas where the CGIAR is expanding its involvement in genetic resources, planning meetings, involving relevant Centres, FAO and other collaborators, were held on *in situ* conservation, animal and aquatic genetic resources, and socioeconomic research on genetic resources. The outcomes of these consultations will provide the basis for further developing and implementing the Programme's strategy in 1996 and for a work-plan of follow-up and new activities. (Reports are available in the Annex to the Report of the 6th Meeting of the ICWG-GR, SGRP internal report, 1996.)

## Technical consultations

Also in 1995, the SGRP provided the context for addressing improved management of field and *in vitro* genebanks, and the regeneration of seed collections. IPGRI was assigned the responsibility to organize consultations to examine the scientific and practical aspects underlying cost-effective management of these operations with the aim of developing guidelines for genebank managers and identifying research needs. The FAO Commission on Genetic Resources has drawn attention to the need to improve standards for genebank operations. Consultations were organized under FAO's sponsorship as well as that of the SGRP, IPGRI and the hosting Centre. The consultation on the regeneration of germplasm of seed crops and their wild relatives was hosted by ICRISAT.

## Consultation on the regeneration of germplasm of seed crops and their wild relatives

The experiences and practices in seed germplasm regeneration in a range of national (12) and international (6) genebanks were discussed. The meeting determined the major decision steps, scientific and practical considerations and choice of options in carrying out regeneration. It produced a framework for a decision-making guide to cost-effective regeneration comprised of three strategies:

- minimizing the requirement for regeneration of the collection;
- minimizing the regeneration frequency of accessions in the collection, and
- minimizing genetic change to accessions during regeneration.

The value of providing curators with a guide to decision-making in choice of procedure rather than prescribing procedures, is that it allows the specific requirements of the accessions and circumstances of the genebank to be taken account in the decision-making. Three principles emerged in the design of the decision framework:

1. Managing the size and growth of collections through the application of policies on acquiring and conserving germplasm to ensure that collections conserved under a long-term commitment are rational and do not contain unnecessary duplicate accessions.
2. Managing collections at the individual accession level to take into account differences in their origin and conservation history. Knowledge of an accession's environment and population size at the time of collecting, during quarantine and subsequent regeneration cycles ('genetic bottlenecks'), its heterogeneity and how this has been managed by the farmer and subsequently in the genebank, is critical to cost-effective decisions on sample size and site for further regeneration and sample sizes for storage.
3. Managing by curators of the genebank holdings as base and active collections to ensure that the genetic integrity of part of each accession is kept as close to the original as possible. Ensuring cost-efficiency in the conservation of the active collection by matching storage conditions to required storage lives as dictated by demand on the accessions and the frequency of seed stock multiplication.

Further work is planned to fully develop the framework and use it as the basis for the production of guidelines. The meeting also identified information and research needs for better informed decision-making on regeneration and for improved regeneration practices.

## Representation and public awareness

In the area of representation, the SGRP made a significant effort on public awareness and information activities associated with preparations for the International Technical Conference in 1996. This included a contribution to the development of a video series, press and NGO seminars at five of the preparatory regional meetings and design of a series of five posters for the Conference. The Programme was also featured in public awareness representation at the Second Meeting of the Conference of the Parties to the Convention.

# Office of the Director General

During the course of the year, IPGRI staff, in close consultation with the Director General, contributed to activities of the Centre Director's Subcommittee on Intellectual Property Rights and to the CGIAR Genetic Resources Policy Committee. The CGIAR Guiding Principles on Intellectual Property and Genetic Resources were debated in both committees and revised to reflect the significant changes which have occurred that affect the exchange and use of genetic resources. These changes are largely due to the entrance into force of the Convention on Biological Diversity on 29 December 1993; the agreements signed on 26 October 1994 with FAO to bring the germplasm collections held at the CGIAR Centres under the auspices of FAO; and the Multilateral Trade Agreement, which came into force on 1 January 1995 and embodies provisions on Trade Related Intellectual Property. The major adjustments of the guiding principles which were agreed by the CGIAR in 1992 deal with questions related to access to genetic resources, ownership, as well as full and equitable benefit-sharing.

## IPGRI/IBPGR/INIBAP Trustees

Dr Marcio de Miranda Santos (Brazil) took up Board Membership as of April 1995, while the Board said farewell to Ing. Ricardo Sevilla-Panizo in March 1995. During the year Dr Hiroshi Fujimaki indicated that he was accepting a major assignment in Japan, so he would be stepping down as Trustee in March 1996. The Board, at its September 1995 meeting, selected Dr Masahiro Nakagahra (Japan) as Board Member-elect to take up his assignment in April 1996. Dr Wanda Collins continued as Board Chair in 1995, while Dr Joseph Menyonga was appointed as Board Vice-Chair until March 1996. The Board decided to operate with a small Executive Committee consisting of the Board Chair, the Director General and Prof. Gelia Castillo. The IPGRI Board and various Standing Committees met in Montpellier, France, 27-31 March 1995 and the Board met again in Aleppo, Syria, 16-20 September 1995.

Although the administrative separation of IBPGR from FAO was completed in June 1994, some issues were still outstanding. For this reason the IBPGR Board continued to be needed. The 24th meeting of the IBPGR Board was held in Montpellier, France, on 31 March. At that time, the Board expressed its satisfaction that the administrative separation from FAO had been fully completed and that the functions of the IBPGR Board had been taken over by the Board of Trustees of IPGRI. The IBPGR Board therefore adopted a resolution to dissolve itself as of 31 March 1995.

The INIBAP Board (which has the same composition as the IPGRI Board) met in Montpellier on 31 March 1995 and convened an extraordinary meeting in Aleppo on 18 September 1995. During the latter meeting, the final decision was taken to construct an office building for the INIBAP programme in Montpellier.

## IPGRI's Establishment Agreement

During 1995, only one other country signed the IPGRI Establishment Agreement, namely the Republic of Guinea, on 7 April, bringing the total number of signatory countries to 43. Also during 1995, the IPGRI Constitution, which is an integral part of the IPGRI Establishment Agreement, was changed to bring it in line with the provisions of the Convention on Biological Diversity. After wide consultations with donor and signatory countries, the Board, at its September 1995 meeting, unanimously

approved the changes to the Constitution, which were subsequently endorsed by the CGIAR on 2 December 1995.

### INTAGRES

INTAGRES is a project funded by Italy to improve the public awareness of European countries on international agricultural research, in particular of the CGIAR. At the request of Italy it is administered by IPGRI. During 1995, INTAGRES organized a number of seminars on safeguarding/utilization of agricultural and forest genetic resources, agrifood quality, biodiversity and intellectual property rights, and the role of the CGIAR Centres in germplasm use in chickpea breeding and cultivation. Various television broadcasts and press articles were released and INTAGRES also continued liaison with relevant Italian Ministries, universities and other research institutions.

# Collaboration with FAO

Two programme planning meetings were held between FAO and IPGRI. Details of the year's various collaborative activities are described in this Report, in particular the joint development and publication of *FAO/IPGRI Technical Guidelines for the Safe Movement of Germplasm*, the joint *Plant Genetic Resources Newsletter* and training activities.

During 1995, IPGRI staff made substantial contributions to the preparations for the FAO International Conference and Programme on Plant Genetic Resources, through a range of collaborative activities, both formal and informal. IPGRI staff from all Regional Groups were involved in preparing a substantial proportion of the country and subregional synthesis report. IPGRI played a major role in planning, organizing and participating in all regional and subregional meetings. IPGRI also organized two technical consultation meetings, one on the regeneration of seed germplasm, and the other dealing with field genebanks and *in vitro* management. In addition IPGRI contributed to raising awareness of ICPPGR and on a daily basis interacted with the ICPPGR Secretariat in developing the State of the World Report and the Global Plan of Action.

The Director General, in his address to the Sixth Session of the FAO Commission on Plant Genetic Resources (June 1995), outlined various approaches to facilitating access to plant genetic resources and promoting the equitable sharing of benefits from their commercial exploitation. Based on this presentation, the FAO Commission requested IPGRI to prepare an in-depth study, for the consideration of the Commission, of various possible systems which would be compatible with the Convention on Biological Diversity, analyzed in terms of their likely efficiency, practicality and cost-effectiveness. A Task Force was set up to deal with the preparations of such a paper, consisting of four consultants (Dr Marcio de Miranda Santos, Mr Wolfgang Siebeck, Dr Graham Jenkins and Ms Kerry ten Kate) and a number of IPGRI staff. By the end of the year, the report had reached an advanced draft stage. The final report: *Access to Plant Genetic Resources and the Equitable Sharing of Benefits: options for a new system for the exchange of germplasm'* was to be presented to the FAO Commission on Plant Genetic Resources in 1996.

# Board of Trustees in 1995

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*as of 1 April 1995
**completed second term on 31 March 1995

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(to the end of 1995)

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Mr C.D. Thurlow**
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* Joined during 1995
** Left during 1995
*** Moved groups during 1995

# Staff publications and presentations in 1995

## Staff participation in the international peer review process

**Marlene Diekmann**
Reviewer for *Seed Science and Technology*

**Toby Hodgkin**
Editorial Board member of *Genetic Resources and Crop Evolution*

**Lyndsey Withers**
Editorial Board member of *Cryo-Letters*

**Florent Engelmann**
Referee for *Cryo-Letters, Plant Cell Tissue and Organ Culture, Plant Science, Annals of Botany* and *Seed Science and Technology.*

**Jan Engels**
Editorial Consultant - CAB International

**Emile Frison**
Reviewer for *Genetic Resources and Crop Evolution*

## Publications

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**19th century bookmaking - this plate shows the process of pressing and binding the volumes. (Detail from a book of hand-coloured plates published in Italy in 1878)**

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# Financial report*

## IPGRI and SGRP-Support Programmes

### Statements of grant revenue

For the year ended 31 December 1995, in US Dollars ('000)

**Research Agenda Programme - Unrestricted**

| Donors | Grant | Donors | Grant |
|---|---|---|---|
| Australia | 224 | Korea | 50 |
| Austria | 50 | Mexico | 30 |
| Belgium | 254 | Netherlands | 943 |
| Canada | 363 | Norway | 355 |
| China | 90 | Spain | 50 |
| Denmark | 1 009 | Sweden | 490 |
| France | 167 | Switzerland | 642 |
| Germany | 348 | UK | 877 |
| India | 50 | USA | 650 |
| Italy | 500 | WorldBank | 879 |
| Japan | 1 553 | **Total** | **9 574** |

**Research Agenda Programme - Restricted**

| Donors | Grant |
|---|---|
| ADB | 407 |
| France | 92 |
| IDRC | 56 |
| Italy | 110 |
| Sweden | 69 |
| Switzerland | 1 724 |
| UK/ODA | 12 |
| **Total** | **2 470** |

**Non-Agenda Programme**

| | | |
|---|---|---|
| **Total** | **4 152** | (details on pages 108-109) |

**Total Grants** **16 196**

## INIBAP Programme

### Statements of grant revenue

For the year ended 31 December 1995, in US Dollars 000s

**Research Agenda Programme - Unrestricted**

| Donors | Grant | Donors | Grant |
|---|---|---|---|
| Australia | 232 | Netherlands | 94 |
| Belgium | 254 | Spain | 50 |
| Canada | 231 | USA | 50 |
| France | 620 | World Bank | 171 |
| India | 25 | **Total** | **1 727** |

**Research Agenda Programme - Restricted**

| Donors | Grant |
|---|---|
| Belgium | 167 |
| France | 51 |
| IDRC | 5 |
| UNDP | 280 |
| **Total** | **503** |

**Non-Agenda Programme**

| | | |
|---|---|---|
| **Total** | **1 317** | (details on pages 108-109) |

**Total Grants** **3 547**

*Audited financial statements for the year ended 31 December 1995, providing further information, are available from the Office of the Director General, IPGRI.

### Operating expenses

| | |
|---|---|
| Research Programmes | 9 357 |
| Conferences and training | 998 |
| Information Services | 2 486 |
| General Administration | 1 645 |
| General Operations | 1 972 |
| **Total** | **16 458** |

### Summary total of grants

| | |
|---|---|
| Research Agenda Programme unrestricted | 9 574 |
| Research Agenda Programme restricted | 2 470 |
| Non-Agenda | 4 152 |

### Operating expenses

| | |
|---|---|
| Research Programmes | 1 797 |
| Conferences and training | 350 |
| Information Services | 453 |
| General Administration | 307 |
| General Operations | 208 |
| **Total** | **3 115** |

### Summary total of grants

| | |
|---|---|
| Research Agenda Programme unrestricted | 1 327 |
| Research Agenda Programme restricted | 503 |
| Non-Agenda | 1 317 |
| Special grant for INIBAP building | 400 |

# Centre expenditure by region

**(IPGRI, SGRP support and INIBAP programmes combined)**
(by percentage)

| Research Agenda Programme only | | |
|---|---|---|
| **Region** | **Actual** | **Target** |
| Asia | 27 | 26 |
| Americas | 25 | 22 |
| SSA | 25 | 26 |
| WANA | 18 | 22 |
| Europe | 5 | 4 |

| Non-Agenda | |
|---|---|
| **Region** | **Actual** |
| Asia | 23 |
| Americas | 23 |
| SSA | 23 |
| WANA | 9 |
| Europe | 22 |

# CGIAR Programme/Activity distribution 1995

**Research Agenda Programme activities**
**(IPGRI, SGRP Support and INIBAP programmes combined)**
(by percentage)

| A. Centre Programmes | | |
|---|---|---|
| Theme I | Increasing Productivity | 12 |
| Theme II | Protecting the Environment | 5 |
| Theme III | Saving Biodiversity | 27 |
| Theme IV | Improving Policies | 11 |
| Theme V | Strengthening NARS | 33 |
| **B. System-wide Programmes** | | |
| Genetic Resources | | 13 |
| **Total all Centre activities** | | **100** |

# Non-Agenda activities

In addition to funding for the Research Agenda Programme (previously termed 'core'), a number of Non-Agenda activities within the IPGRI Project Set are supported through special project funding (previously termed 'complementary'). This section lists, in alphabetical order by donors, the Non-Agenda Programme activities for which funds were received and used in 1995 (income equals 1995 expenditure).

## IPGRI and SGRP-Support programmes

| Activity | Donor | Income US$ |
|---|---|---|
| *Eucalyptus* Technical Guidelines | Australia (ACIAR) | 19 000 |
| Studies on breeding systems: *Phaseolus lunatus* | Belgium (BADC) | 107 000 |
| Study of diversity in *Colletotrichum* and its host *Stylosanthes* | Belgium (BADC) | 133 000 |
| CGIAR Genetic Resources Policy Committee | CGIAR | 26 000 |
| Video series on genetic resources | CGIAR | 9 000 |
| Gender brochure | CGIAR | 10 000 |
| Proceedings of 1992 CTA/IBPGR/KARI/UNEP Seminar | CTA | 10 000 |
| Gender brochure | Denmark (DANIDA) | 34 000 |
| ECP/GR Phase V | European countries | 300 000 |
| EUFORGEN | European countries | 144 000 |
| European Union - Cocoa project | EU | 6 000 |
| ICPPGR - country studies and regional meetings | FAO | 616 000 |
| Plant Genetic Resources Newsletter | FAO | 28 000 |
| Guidelines for Safe Movement of Germplasm | FAO | 37 000 |
| Training activities | FAO | 11 000 |
| Refinement of cryopreservation techniques for potato | Germany(BMZ/GTZ) | 162 000 |
| Effective pollination control methods in the regeneration of germplasm | Germany (BMZ/GTZ) | 6 000 |
| Spatial and temporal distribution of genetic diversity in wild forage species under stress conditions | Germany (BMZ/GTZ) | 68 000 |
| Genetic resources of neglected crops with good development potential: their conservation, use and breeding status | Germany (BMZ/GTZ) | 315 000 |
| Diversity, conservation and sustainable use of native fruit tree germplasm of tropical America | IDB | 199 000 |
| Strengthening of the national plant genetic resources programme of Vietnam | IDRC | 12 000 |
| Genetic resources component in IDRC's electronic atlas of Agenda 21 (ELADA) | IDRC | 22 000 |
| Conservation and use of genetic resources of underutilized Mediterranean species | Italy | 171 000 |
| Genetic diversity of the world collection of some *Triticum* and *Aegilops* species | Italy | 6 000 |

| Activity | Donor | Income US$ |
|---|---|---|
| Documentation of genetic resources utilizing image processing | Italy | 27 000 |
| Impact assessment of IPGRI activities on plant genetic resources conservation and use | Italy | 135 000 |
| European Information Service (INTAGRES) | Italy | 229 000 |
| Collecting vegetables, legumes and cereals in CIS and Vietnam | Japan | 161 000 |
| Conservation and use of bamboo and rattan | Japan | 300 000 |
| Crucible Project Phase 2 | Netherlands (DGIS) | 38 000 |
| Investigation of an ultradry seed packaging method | Spain (INIA) | 16 950 |
| Spain/Latin America Scientific Workshop | Spain (INIA) | 18 000 |
| Multilateral study on plant genetic resources | Sweden (SIDA) | 6 000 |
| Associate experts | Switzerland (SDC) | 44 000 |
| Strengthening the scientific basis of *in situ* conservation | Switzerland (SDC) | 130 000 |
| The use of RAPD to detect off-types of banana and plantain generated in *vitro* (Holdback Funding) | UK (ODA) | 87 000 |
| Support to the eastern Europe initiative (VIR and other countries in eastern Europe) | UNDP | 25 000 |
| Capacity-building in less-developed countries | UNEP | 204 000 |
| Eastern Europe Initiative/Vavilov Institute | USAID | 253 000 |

# INIBAP programme

| Activity | Donor Income | US$ |
|---|---|---|
| IMTP - Asia and trial sites | Australia (ACIAR) | 27 000 |
| Nematode conference | Australia (ACIAR) | 8 000 |
| BBTV studies at Gembloux | Belgium (BADC) | 100 000 |
| *Musa* research at KUL | Belgium (BADC) | 314 000 |
| Database services for publications | CIRAD (France) | 67 000 |
| Info*Musa* and *Musa*rama publications | CTA | 38 000 |
| *Musa* Germplasm Information System | IDRC | 24 000 |
| Technology transfer in Latin America and the Caribbean | IDRC | 21 000 |
| *Musa* taxonomy linguistics | Netherlands (DGIS) | 7 000 |
| Asian collection rescue | UK (ODA) | 7 000 |
| Post-harvest NRI/FHIA | UK (ODA) | 268 000 |
| *Musa* evaluation, NARO, Uganda | UK (ODA) | 89 000 |
| IMTP- Phase II | UNDP | 330 000 |

# Highlights of 1995

During 1995, the International Plant Genetic Resources Institute (IPGRI) pursued its strategic objectives through 40 projects grouped into three programme elements: the IPGRI Plant Genetic Resources Programme; the International Network on Banana and Plantain (INIBAP) Programme, and support to the System-wide Genetic Resources Programme (SGRP). IPGRI's programme activities are based on partnerships. IPGRI has no research facilities of its own. IPGRI's scientific and technical staff, however, are fully active in all phases of the research process: identifying and prioritizing problems; formulating research designs; mobilizing resources; carrying out research; evaluating and applying research results. Much of IPGRI's research programme is carried out through contracts with partner institutions, south and north, within and outside the Consultative Group on International Agricultural Research (CGIAR). Through such a mode of operating, IPGRI maintains flexibility and cost-effectiveness to carry out activities across a broad range of species (both crop and forest), disciplines and geographic regions. During the year, IPGRI staff and management re-examined the Institute's strategy and direction, with the aim of consolidating the programme structure and streamlining the project system. The changes were to be implemented in 1996 and 1997.

The whole of IPGRI, in particular the Regional Groups, played an extremely active role in preparations for the International Technical Conference on Plant Genetic Resources, organized by the Food and Agriculture Organization of the United Nations. Main activities centered on assisting with the preparation of country and subregional reports, organizing meetings and technical consultations and providing public awareness support. Another Institute-wide activity was a feasibility study on possible systems for the exchange of plant genetic resources for food and agriculture and the equitable sharing of their benefits. The study described a number of options and their implications, to inform international negotiations concerning the revision of the International Undertaking on Plant Genetic Resources.

## Sub-Saharan Africa

The Group assisted national programmes to intensify their germplasm regeneration and multiplication activities, in particular in Kenya, Namibia, Somalia, Tanzania and Zambia. IPGRI funded in Côte d'Ivoire the regeneration of valuable okra genetic resources. A study revealed very narrow genetic diversity within cultivated okra in India. Data on the spatial and temporal distribution of forage genetic diversity in Niger allowed the development of options for *in situ* conservation that would fit in with traditional subsistence and pastoral practices. Ethnobotanical work on local tree species revealed some locally acceptable ways of rehabilitating and conserving the environment, including intensifying agriculture through home gardens, and stimulating regeneration through pasture enclosures and re-afforestation.

## West Asia and North Africa

The new building for the Regional Group's offices was inaugurated at the International Centre for Agricultural Research in Dry Areas in Aleppo, Syria in September 1995. Three more national programmes joined regional efforts to survey, collect, document and use the genetic resources of fruit trees. National programmes in Egypt, Tunisia and Turkey collaborated in surveying and collecting landraces of almonds. The Iranian national programme collected *Prunus* species from East Azarbaijan. The Jordanian national programme collected additional landraces of *Prunus*. An *in vitro* almond collection was developed in Jordan. Pistachios were collected from Jordan and evaluated for morphological traits and isozyme polymorphism.

## Asia, the Pacific and Oceania

Working with regional national programmes, the Regional Office developed a data interchange protocol to facilitate data and information exchange between genebanks. A project on the conservation and sustainable use of tropical fruits identified *in vitro* media for tissue culture and slow growth for *Citrus*. A survey of over 100 genebanks showed that most of the regeneration carried out by genebank

managers was intended to maintain seed stock, rather than to maintain seed viability. Regional activities on underutilized crops gained momentum with the publication of a buckwheat directory, and priorities for *Lathyrus* conservation were identified. A workshop held in Mongolia resulted in increased awareness and activities on plant genetic resources in that country, while training on complementary conservation methods for vegetatively propagated crops strengthened the skills of genebank managers across the region. The Coconut Genetic Resources Network was active in developing a database of worldwide accessions, in collecting new material, in training and in expanding the Network to 30 members. Activities in the Biodiversity Working Group of the International Network for Bamboo and Rattan gained momentum.

## Americas

Unprecedented technical and political actions associated with the Food and Agriculture Organization's International Technical Conference both ratified and modified IPGRI's agenda in the Americas. New funding approved for Amazonian and Mesoamerican Plant Genetic Resources Networks represented an important step for the networks. A capacity-building workshop on field genebank management defined common problems and sought solutions through international cooperation. A joint mission gathered the first indigenous peanut landraces in the Ecuadorian Amazon, greatly increasing the known diversity and distribution of a rare botanical variety. Significant advances were made in implementing the project 'Biodiversity, conservation and sustainable use of native fruit germplasm of tropical America'. National institutions in Costa Rica, Guatemala, Honduras and Nicaragua completed half of their inventories of the economically important species of the Sapotaceae family using agromorphological traits and ethnobotanical information for *in situ* characterization. A descriptor list of Sapotaceae germplasm was produced. In the Andean Region, national institutions collected species of *Passiflora*. Other collaboration on *Passiflora* resulted in experimental methods to elucidate the taxonomy of the genus.

## Europe

Membership of the European Cooperative Programme for Crop Genetic Resources Networks rose to 30 countries in 1995. A new structure was established, made up of ten broadly focused networks. The European Forest Genetic Resources Programme became fully operational and 24 countries agreed to collaborate in conserving forest genetic resources in this new Programme. Four pilot networks inventory genetic resources and identify long-term conservation strategies for national gene reserve forests. Essential equipment needed by the N.I. Vavilov Institute of Plant Industry was delivered during the year. A new edition of the *Directory of European Institutions Holding Germplasm Collections* was published listing more than 500 institutions in 37 European countries, with contact details and information on germplasm collections.

## Genetic Diversity

The Group established a programme of work on ethnobotanical and socioeconomic aspects of conservation, and developed a global project on *in situ* conservation of agrobiodiversity. Work on conserving forest genetic resources made substantial progress in developing methods of locating diversity, particularly on bamboo and rattan with INBAR, estimating genetic erosion of commercially valuable species in Thailand, and exploring the impact of disturbance on intraspecific diversity of important species in Malaysia, Thailand and India. A study on the major indicators of genetic erosion evolved methods that could help locate areas of maximum genetic diversity and quantify genetic erosion. IPGRI revised its collecting form to ensure that ethnobotanical information is recorded, and to increase the use and accessibility of genetic resources held in genebanks. Work progressed to establish a sesame core collection. A final core of about 10% of 4200 accessions will represent all diversity in the collection. A Group staff member represented IPGRI at the Fourth World Conference on Women, in Beijing, China, as part of a special panel on rural women, describing the important roles that women play as custodians and developers of crop genetic resources. IPGRI also produced a brochure on the special role of women in managing and using plant genetic resources.

## Germplasm Maintenance and Use

A new series of technical bulletins was developed to assist in managing germplasm collections and to guide the implementation of conservation techniques and experimental procedures adapted to local operating conditions and target species. A protocol was developed to assist in determining the storage behaviour of seed. Through a related activity, a compendium of information on seed storage behaviour was compiled for over 7000 species. A 5-year global seed experiment on the use of very low seed moisture content in long-term seed storage showed no measurable deterioration in seeds equilibrated to relative humidity (RH) of 50% and stored at 20°C or 35°C, or in those equilibrated to 8% RH and stored at 50°C. Encapsulating embryos emerged as a viable technique to cryopreserve some recalcitrant species. Technical guidelines for the safe movement of germplasm of small grain temperate cereals were published. Studies on the conservation and use of 11 neglected crop species were finalized. Work started on developing options compatible with the Trade-Related Intellectual Property agreements under the General Agreement on Tariffs and Trade, for *sui generis* legislation on intellectual property rights for plant varieties.

## Documentation, Information and Training

A large amount of new and updated information was added to the IPGRI databases which now contain information on over 5 million accessions in *ex situ* collections world-wide. Information was disseminated from the databases through print and electronic directories and responses to enquiries. A new version of the Genebank Management System software was released along with software to assist in data exchange with other systems. The IPGRI Library met over 1000 document requests. Sponsorship of subscriptions to *Plant Genetic Resources Abstracts* continued. Analysis of a readership survey indicated the high impact and usefulness of the journal. Bibliographies were prepared on local crop development and African leafy green vegetables. Over 60 individual publications, posters, etc. were produced, including two Agricultural Communicators in Education medal winners; over 100 000 copies of publications were distributed. IPGRI trained 60 trainers and 150 other scientists and collaborated with universities to develop regional Masters' level courses. A major initiative began to develop a core curriculum on plant genetic resources with associated training materials. A range of public awareness materials were produced including *Geneflow*, regional brochures and a calendar. Press briefings were organized and posters and fact sheets produced as inputs to the International Technical Conference. Methods were explored for assessing the impact of IPGRI's work in economic terms and through promoting conservation and institution-building.

## International Network for the Improvement of Banana and Plantain

INIBAP's work on conserving *Musa* germplasm was very positively scrutinized in 1995 by an external review team, which highlighted the cost-effectiveness and the high degree of use of the *Musa* collection maintained at the INIBAP Transit Centre in Leuven, Belgium. Research on genetic transformation of banana produced several stable transformed banana plants in the greenhouse. Traditional breeding in Honduras produced several plantain-like hybrids with resistance to black Sigatoka disease, the main threat to *Musa*, which will be made available for international evaluation. A project to develop a *Musa* Germplasm Information System implemented a morphotaxonomic study of standard varieties in nine field collections, finalized a new descriptor list and designed the system's architecture. Significant progress was made in Phase II of the International *Musa* Testing Programme. Evaluation of improved hybrids began in over 45 countries.

## CGIAR System-wide Genetic Resources Programme

1995 was the first full year of operation of the SGRP. The Programme comprises the independently managed genetic resources programmes and activities of individual CGIAR Centres. IPGRI is the Programme's Convening Centre. Activities in 1995 were primarily focused on assessing the current status of Centre genetic resources work and examining how to move forward, in particular in areas relatively new to genetic resources work in the CGIAR, such as *in situ* conservation, policy and socioeconomic issues, and aquatic and animal genetic resources. Significant progress was made in the development of the System-wide Information Network for Genetic Resources (SINGER). In linking the genetic resources databases of CGIAR Centres, this network aims to ensure access to basic information on the genetic resources held at CGIAR Centres.

تحسين مهارات مديرى بنوك الجينات فى هذا الاقليم. وعملت شبكة الموارد الوراثية لجوز الهند بنشاط على وضع قاعدة بيانات للعينات الموجودة فى جميع أنحاء العالم، وجمع موارد جديدة، وتدريب أعضاء الشبكة وزيادتهم الى ٣٠ عضوا. واكتسبت أنشطة جماعة العمل المعنية بالتنوع البيولوجى فى الشبكة الدولية للخيزران والروطان قوة دفع جديدة.

**الأمريكتان**

أسفرت الأعمال الفنية والسياسية التى لم يسبق لها مثيل، والتى ارتبطت بانعقاد المؤتمر الدولى الفنى الذى نظمته منظمة الأغذية والزراعة للأمم المتحدة، عن التصديق على جدول أعمال المعهد فى الأمريكتين وادخال بعض التعديلات عليه. كما أن الموافقة على تمويل جديد لشبكتى الموارد الوراثية النباتية فى الأمازون وأمريكا الوسطى، كانت خطوة مهمة بالنسبة لهاتين الشبكتين. وأسفرت ورشة العمل التى عقدت لبناء القدرات عند مديرى بنوك الجينات عن تحديد بعض المشكلات المشتركة والسعى لحلها من خلال التعاون الدولى. وقامت بعثة مشتركة بجمع أول أصول برية أصلية للفول السودانى فى المناطق المطلة على نهر الأمازون من اكوادور، لتضيف بذلك زيادة كبيرة فى معرفتنا بتنوع وتوزيع صنف نباتى نادر. ولوحظ تقدم ملموس فى تنفيذ مشروع "تنوع المادة الوراثية للفاكهة المحلية فى أمريكا الاستوائية، وصيانتها واستخدامها المستدام". واستكملت المؤسسات القطرية فى كوستاريكا وغواتيمالا وهندوراس ونيكاراغوا، نصف قوائم الأصناف ذات الأهمية الاقتصادية من عائلة السبوتيات (Sapotaceae) باستخدام الصفات الزراعية الخارجية والمعلومات عن السلالات النباتية فى توصيفها داخل المختبرات. وأسفر ذلك عن وضع قائمة بواصفات المادة الوراثية للسبوتيات. كما قامت المؤسسات القطرية فى منطقة الانديز بجمع أصناف زهرة الآلام (Passiflora). وأسفرت أوجه التعاون الأخرى حول زهرة الآلام عن عدة طرق تجريبية لتوضيح تقسيم هذا الجنس.

**أوروبا**

زادت عضوية برنامج التعاون الأوروبى لشبكات الموارد الوراثية للمحاصيل الى ٣٠ بلدا فى عام ١٩٩٥. ووضع تنظيم جديد لهذا البرنامج، يضم ١٠ شبكات لها تركيزها الواسع. وبدأ العمل فى تنفيذ البرنامج الأوروبى للموارد الوراثية الحرجية بالكامل، ووافقت ٢٤ دولة على التعاون فى صيانة الموارد الوراثية الحرجية فى هذا البرنامج الجديد. وهناك أربع شبكات تجريبية تجرد الموارد الوراثية وتحدد استراتيجيات طويلة الأجل لصيانة الغابات القطرية التى تعتبر مستودعا للجينات. وتم هذا العام توريد المعدات الضرورية التى يحتاجها معهد فافيلوف لصناعة النباتات. كما نشرت طبعة جديدة من "دليل المؤسسات الأوروبية التى تحتفظ بمجموعات من المادة الوراثية"، الذى يحتوى على أكثر من ٥٠٠ مؤسسة فى ٣٧ بلدا أوروبيا، مع تفصيلات عن كيفية الاتصال بها ومعلومات عن المجموعات الموجودة لديها.

**التنوع الوراثى**

وضعت المجموعة برنامج عمل للجوانب المتعلقة بالسلالات النباتية والجوانب الاجتماعية - الاقتصادية للصيانة، كما وضعت مشروعا عالميا لصيانة التنوع البيولوجى الزراعى فى المواقع الطبيعية. وحقق العمل فى مجال صيانة الموارد الوراثية الحرجية تقدما كبيرا باتجاه استنباط طرق لمعرفة أماكن التنوع، وعلى الأخص فيما يتعلق بالخيزران والروطان مع الشبكة الدولية للخيزران والروطان، وتقدير التآكل الوراثى للأصناف ذات القيمة التجارية فى تايلند، واستكشاف تأثير الاضطرابات على التنوع داخل الصنف الواحد بالنسبة للأصناف التى لها أهميتها فى ماليزيا وتايلند والهند. وأسفرت الدراسة التى أجريت على أهم مؤشرات التآكل الوراثى عن استنباط طرق يمكن أن تساعد فى تحديد المناطق التى يتوافر بها أكبر قدر من التنوع الوراثى، وتحديد مدى التآكل الوراثى بالتالى. وقام المعهد بمراجعة استمارة الجمع الخاصة به ليتأكد من تسجيل المعلومات الخاصة بالسلالة النباتية فيها، وليزيد من استخدام الموارد الوراثية الموجودة فى بنوك الجينات وتيسير الحصول عليها. واستمر العمل فى تكوين مجموعة أساسية من بذور السمسم. وستمثل المجموعة الأساسية النهائية ١٠ فى المائة تقريبا من ٢٠٠ ٤ عينة - وهى كل التنوع الموجود فى المجموعة. وقامت مجموعة من العاملين فى المعهد بتمثيل المعهد فى المؤتمر العالمى الرابع للمرأة فى بكين بالصين، كجزء من مجموعة العمل الخاصة بالمرأة الريفية، حيث قامت المجموعة بشرح الأدوار المهمة التى تلعبها المرأة كوصية على الموارد الوراثية المحصولية ومسؤولة عن تنميتها. كما أصدر المعهد كتيبا عن الدور الخاص الذى تقوم به المرأة فى ادارة الموارد الوراثية النباتية واستخدامها.

# أبرز معالم عام ١٩٩٥

واصل المعهد الدولى للموارد الوراثية النباتية فى عام ١٩٩٥ تنفيذ أهدافه الاستراتيجية من خلال ٤٠ مشروعا موزعة على ثلاثة عناصر برامجية، هى: برنامج المعهد للموارد الوراثية النباتية، وبرنامج الشبكة الدولية للموز والموز الأفريقى، ودعم برنامج الموارد الوراثية للشبكات التابعة للجماعة الاستشارية للبحوث الزراعية الدولية. وتقوم الأنشطة البرامجية للمعهد على أساس المشاركة. فالمعهد لايملك مرافق للبحوث ومع ذلك فان العاملين العلميين والفنيين فى المعهد يعملون بكامل طاقاتهم فى جميع مراحل العملية البحثية: فهم يحددون المشكلات وأولوياتها، ويصممون خطط البحوث، ويعبؤون الموارد، وينفذون البحوث، ويقيمون نتائجها ويطبقونها. وتتم أغلب البرامج البحثية التى ينفذها المعهد عن طريق عقود مع مؤسسات شريكة - فى الشمال والجنوب، داخل المجموعة الاستشارية للبحوث الزراعية الدولية وخارجها. وبهذه الطريقة، يحقق المعهد مرونة واقتصادا للقيام بأعماله المتعلقة بمجموعة كبيرة من الأصناف (المحصولية والحرجية على حد سواء) وفروعها العلمية، والمناطق الجغرافية. وقد قام العاملون فى المعهد وادارته أثناء هذه السنة باعادة النظر فى استراتيجية المعهد وتوجهاته، بهدف تدعيم الهيكل البرامجى وتيسير نظام المشروعات. وستنفذ التغييرات المقترحة فى عامى ١٩٩٦ و١٩٩٧.

ولعب المعهد ككل - والمجموعات الاقليمية على الأخص - دورا بالغ الأهمية فى التحضير للمؤتمر الدولى الفنى للموارد الوراثية النباتية الذى عقدته منظمة الأغذية والزراعة للأمم المتحدة. وتركزت أنشطة المعهد حول المساعدة فى اعداد التقارير القطرية وشبه الاقليمية، وتنظيم اللقاءات والمشاورات الفنية، وتقديم المساندة فى مجال التوعية العامة. ومن بين الأعمال الأخرى التى ساهم بها المعهد بأكمله، دراسة جدوى عن النظم الممكنة لتبادل الموارد الوراثية النباتية للأغذية والزراعة والاقتسام المنصف لمكاسبها. وقد وصفت الدراسة عددا من الخيارات والآثار التى قد تنجم عنها، لعرضها على المفاوضات الدولية بشأن مراجعة التعهد الدولى للموارد الوراثية النباتية.

### افريقيا جنوب الصحراء الكبرى

ساعدت هذه المجموعة البرامج القطرية فى تكثيف أنشطة تجديد المواد الوراثية واكثارها، وعلى الأخص فى كينيا وناميبيا والصومال وتنزانيا وزامبيا. وقد مول المعهد عملية تجديد الموارد الوراثية الثمينة لنبات البامية فى كوت ديفوار. وتبين من احدى الدراسات أن هناك تنوع وراثى ضئيل للغاية بينها وبين البامية المزروعة فى الهند. وسمحت البيانات التى تم جمعها عن التوزيع الزمانى والمكانى للتنوع الوراثى للأعلاف الخضراء فى النيجر بظهور خيارات للصيانة فى المواقع الطبيعية، تتناسب مع الأساليب التقليدية لزراعة الكفاف والرعى. وأسفرت البحوث التى أجريت على أصناف الأشجار المحلية عن بعض الطرق المقبولة محليا لاصلاح البيئة وصيانتها، مثل تكثيف الزراعة عن طريق الحدائق المنزلية، وتحفيز عمليات التجديد باغلاق المراعى، واعادة غرس الأشجار.

### غرب آسيا وشمال افريقيا

تم افتتاح المبنى الجديد لمكاتب الجماعة الاقليمية فى المركز الدولى للبحوث الزراعية فى المناطق الجافة فى حلب بسورية فى شهر سبتمبر/ أيلول ١٩٩٥. وانضمت الى الجهود الاقليمية ثلاثة برامج قطرية جديدة لحصر الموارد الوراثية لأشجار الفاكهة وجمعها وتوثيقها واستخدامها. كما تعاونت البرامج القطرية من مصر وتونس وتركيا فى حصر الأصناف ذات الأصول البرية لأشجار اللوز وجمعها. وجمع البرنامج القطرى الايرانى أصناف اللوز البلدى من شرقى أذربيجان. كما قام البرنامج القطرى الأردنى بجمع أصناف أخرى ذات أصول برية من اللوز. وبدأت فى الأردن عملية جمع إكثار اللوز فى المختبرات. وجمعت أنواع الفستق البرى من الأردن، وتم تقييم الصفات الخارجية، وتعدد أشكال الانزيمات.

### آسيا والمحيط الهادى وأسيانيا

قام المكتب الاقليمى - بالتعاون مع البرامج القطرية فى الاقليم - بوضع برتوكول لتبادل البيانات تيسيرا لتبادل هذه البيانات والمعلومات فيما بين بنوك الجينات. وتوصل أحد مشروعات صيانة الفاكهة الاستوائية واستخدامها المستدام الى طريقة لزراعة أنسجة الحمضيات ونموها ببطء فى المختبرات. وتبين من عملية مسح أجريت على أكثر من ١٠٠ بنك من بنوك الجينات أن أغلب عمليات التجديد التى يقوم بها مديرو هذه البنوك تهدف الى المحافظة على مخزونات البذور، أكثر من المحافظة على تنوعها. واكتسبت أعمال تجديد المحاصيل غير المستغلة استغلالا كاملا قوة دفع جديدة بنشر دليل عن القمح الأسود، كما تحددت أولويات جديدة لصيانة الجلبان. وأسفرت ورشة العمل التى عقدت فى منغوليا عن زيادة الوعى بالموارد الوراثية النباتية فى هذا البلد وزيادة الأنشطة المتعلقة بها، فى الوقت الذى أسفرت فيه عمليات التدريب على طرق الصيانة التكميلية للمحاصيل التى تتكاثر خضريا عن

# 1995年活动概述

1995年国际植物遗传资源研究所(IPGRI)通过40个项目的实施来落实其战略目标。这些项目分别归属于三个组成部分,即IPGRI植物遗传资源专题、国际香蕉和芭蕉改良协作网(INIBAP)专题和国际农业研究中心全系统遗传资源专题(SGRP)。IPGRI的研究工作是在合作基础上进行的。IPGRI本身不设置试验设施。但是,IPGRI的科研人员参与研究工作各个阶段的全部工作,包括确定研究重点、设计试验方案、合理配备人力物力资源、实施研究计划以及评估和推广研究成果等。IPGRI的大多数研究项目是通过与合作单位签订合同的形式来完成的,合作对象包括发展中国家和发达国家及国际农业研究磋商小组(CGIAR)内外的研究机构。通过这种合作方式,IPGRI在进行跨地区、跨学科和跨植物种(包括作物和森林)的研究工作中保持着较大的灵活性和经费的有效利用。在本年度,IPGRI工作人员和领导层重新审定了本研究所的战略方针,使项目结构更加合理化。更改后的战略将于1996-1997年实施。

IPGRI各部门,特别是各地区办事处积极参与了联合国粮农组织召开的国际植物遗传资源技术大会的准备工作,其主要内容是协助撰写地区和国家报告、组织会议、担当技术顾问以及进行公关宣传。另一项在全所广泛开展的工作是研究建立一种可行的植物遗传资源交换系统,从而使提供者和利用者能够平等地分享利用资源所获得的利益。目前已向参加《国际植物遗传资源公约》修订工作的国际磋商会议提供了若干方案。

## 非洲撒哈拉以南地区

该项目组特别帮助肯尼亚、纳米比亚、索马里、坦桑尼亚和赞比亚等国家加强种质繁殖工作的国家项目。IPGRI资助科特迪瓦繁殖宝贵的秋葵科植物遗传资源。一项研究结果表明,印度的栽培秋葵遗传多样性非常狭窄。有关尼日尔的饲料遗传资源多样性的空间和时间分布的资料表明,适于利用当地农民的传统生活方式和耕作方法开展原生境保存。通过对地方树种的民族生物学研究,找出了适于当地条件的保护和恢复环境的方法,包括通过发展庭园种植业加强农业生产,通过围栏牧场和再造林刺激资源的繁殖。

## 西亚和北非地区

该地区项目组的新办公楼于1995年9月在位于叙利亚阿勒波的国际干旱地区农业研究中心落成。新增的三个国家项目促进了该地区的果树遗传资源的考察、收集、编目和利用工作。埃及、突尼斯和土耳其的国家级研究所合作开展了有关扁桃地方品种的考察和收集工作。在伊朗进行的国家项目收集到了来自东阿塞拜疆地区的李属资源。在约旦进行的国家项目收集了更多的李属物种的地方品种。同时在约旦开展了离体保存扁桃资源的工作。在约旦还收集了阿月浑子并对其进行了形态特征鉴定和同工酶多态性的鉴定。

## 亚洲、太平洋及大洋洲地区

该地区办事处与地区和国家项目合作开发了一种能促进基因库之间数据和信息交流的数据转换方案。在实施保存和可持续性利用热带果树资源的项目过程中,筛选出适于柑桔组织培养和延缓柑桔生长的培养基。对100多个基因库进行的调查结果显示,大多数基因库繁种

的目的是保持种子量，而不是为了保持种子生活力。有关未被充分利用作物的地区项目出版了《荞麦名录》和制定了山黧豆资源保存工作重点。在蒙古举行了一个旨在提高该国公众对植物遗传资源的认识和促进该国植物遗传资源工作的会议。举办了无性繁殖作物保存方法培训班，其目的是提高本地区各基因库管理人员有关无性繁殖作物保存的技术水平。椰子遗传资源协作网在过去一年中为建立全球范围的椰子种质数据库作出了积极的努力，收集了新资料、举办培训班并将协作网扩展至30个成员国。国际竹子和黄藤协作网的生物多样性工作组也取得了显著的成绩。

## 美洲地区

联合国粮农组织召开的国际技术大会导致了空前的技术和政治行动，这些行动促使IPGRI制定和修订在美洲的工作日程。IPGRI向亚马逊河流域和中美洲地区植物遗传资源协作网提供了新的资金，使协作网的工作进入了一个新阶段。在今年举行的田间基因库管理研讨会上，代表们讨论了田间基因库普遍存在的问题以及通过国际合作解决这些问题的可能性。在一次联合考察中，首次发现了原产于厄瓜多尔亚马逊流域的花生地方品种，这个发现极大地丰富了有关生物多样性和稀有种分布的知识。IPGRI在该地区进行的"美洲热带水果资源多样性及其保存和可持续性利用"项目也取得了显著成果。哥斯达黎加、危地马拉、洪都拉斯和尼加拉瓜的国家级研究所开展了对重要的经济作物一山榄科植物的农艺性状鉴定、原地保存的民族生物学资料的收集和编目，以上工作目前已完成了预定任务的一半。编制了山榄科植物种质的性状描述符表。安第斯山脉地区的国家级研究所对西番莲属植物资源进行了收集。另一项合作项目的成果是制定了西番莲属植物分类的实验方法。

## 欧洲地区

1995年作物遗传资源协作网欧洲合作项目的成员国增加为30个国家。新的协作网框架由内容广泛的10个协作网组成。欧洲森林遗传资源计划已开始全面实施。24个国家同意按照这个新计划进行有关保护森林资源的合作。4个重点协作网在进行森林遗传资源的编目工作和制定保护国家森林基因库的长期战略。今年向N. I. 瓦维洛夫植物研究所提供了一些基础设备。新编的《欧洲植物遗传资源保存单位名录》业已出版，其中包括37个欧洲国家的500多个研究所的详细地址及其保存的资源信息。

## 遗传多样性

这个项目组制定了一个关于在保存过程中开展民族植物学和社会经济学工作的计划，并且设置了一个全球农业生物多样性原生境保存的课题。森林遗传资源保存工作在研究确定多样性位置的方法方面取得了实质性进展，特别是国际竹子和黄藤协作网(INBAR)开展的有关竹子和黄藤的研究工作，在泰国开展的有关评估具有商业价值的物种资源的流失工作，在泰国、马来西亚和印度进行的重要物种种内多样性失衡的影响调查等方面都取得了很大的进展。一项关于遗传资源流失的主要鉴定指标方法的研究，有助于确定遗传多样性最丰富的地区和遗传资源流失定量测定。IPGRI修订了它的收集记录表，以确保民族植物学信息能够得到记载，促进人们对保存在基因库内的遗传资源的获取和利用。有关芝麻核心收集研究也取得了进展，4200份样品中的10%将被选做最终的核心样品来代表收集品中的全部多样性。本项目组的一名成员代表IPGRI参加了在中国北京召开的第四次世界妇女代表大会，作为乡村妇女特别小组的一部分，论述了妇女在作物遗传资源的保存和发展中所发挥的重要作用。IPGRI还编撰了一本有关妇女在植物遗传资源管理和利用中的特殊作用的小册子。

## 种质保存和利用

新出版的技术手册系列丛书有助于种质收集品的管理，并指导人们根据当地的保存条件和保存目标选择正确的保存技术和实验方法。一本有关种子储藏特性的专

著已编写出版，它能帮助人们对种子储藏特性作出正确的判断。一部涉及7000多个种的种子储藏特性资料已经汇编成册。为期5年的全球种子超低水分储藏试验研究正在进行。目前的试验结果表明，在20℃和35℃储藏条件下，种子含水量与50%的相对湿度(RH)相平衡的种子的活力没有明显下降。在50℃储藏条件下，种子含水量与8%RH相平衡的种子的活力也没有明显下降。种胚包束技术可用于一些顽拗型种子的超低温保存。出版了有关温带小粒谷物种质安全交换的技术手册。有关11种未被利用的作物资源的保存和利用研究已经完成。争取在关贸总协定条约下设立相应的保护植物品种知识产权条款的工作正在进行。

## 文献、信息和培训

IPGRI数据库增加了大量新的和修订的信息资料。目前已储存了有关全世界500多万份异生境保存的种子的信息资料，并通过印刷品和电子目录向咨询者提供信息。新版本基因库管理系统软件已分发到世界各地的基因库使用，从而促进了基因库系统之间的信息交流。IPGRI图书馆接待了1000多次的查询检索，并继续主编《植物遗传资源文摘》。对读者进行的跟踪调查表明，读者反响强烈，并认为该杂志有很高的参考价值。图书馆备有地方作物发展和非洲绿叶蔬菜的文献目录供读者检索。出版了60多种读物和宣传画等，其中两种读物获得了农业传播教育奖。1995年向全世界分发了10万多本读物，培训教师60多人，科学家150多人，并与一些大学合作开办了硕士课程。今年开展的一项新工作是编写植物遗传资源专业课教程。大量公共宣传材料已出版、分发，其中包括《基因流动》、介绍各地区情况的小册子和日历。组织召开了新闻发布会。为国际技术大会制作墙报和简介。研究有关评价IPGRI工作的经济效益及其在促进资源保存和研究所的建设等方面的作用的方法。

## 国际香蕉和大蕉改良协作网(INIBAP)

1995年INIBAP的芭蕉属种质保存工作接受了外部评估组的严格审查，评估组对该协作网在保存和利用位于比利时勒芬的INIBAP中转中心的芭蕉种质的工作中，为提高经费利用率和种质利用率方面所作出的努力给予了高度评价。通过对香蕉遗传变异的研究，培育出几种能在温室里稳定生长变异香蕉植株。在洪都拉斯，研究人员采用传统育种方法培育出几种类似大蕉并且抗芭蕉的主要病害—黑Sigatoka病的杂交种。该杂交种即将投入国际评价。为了建立芭蕉种质信息系统，已对9个国家田间收集品的代表品种进行了形态和分类研究，编制了新的性状描述表并设计了系统结构。国际芭蕉试验计划的第二阶段工作取得了显著的成绩。在45个国家展开了改良杂交种的评价工作。

## CGIAR全系统遗传资源计划

1995年是实施全系统遗传资源计划的第一个完整的年度。计划包括独立管理遗传资源项目和CGIAR中心下属各个研究中心的工作。IPGRI是该计划的召集中心。1995年的基本任务是评价中心目前的遗传资源工作和制定发展方向。特别是确定CGIAR 遗传资源工作的新领域(如原生境保存、政策与社会经济问题、水生植物和动物资源等)的工作计划。全系统遗传资源信息协作网(SINGER)的开发工作取得了很大进展。协作网与CGIAR各个研究中心的遗传资源数据库联网，以便存取有关CGIAR各个中心所具有的遗传资源的基本数据。

# Faits saillants de 1995

En 1995, l'Institut international des ressources phytogénétiques (IPGRI) a poursuivi ses objectifs stratégiques par le biais de 40 projets regroupés en trois éléments de programme: le Programme de l'IPGRI sur les ressources phytogénétiques, le Programme du Réseau international pour l'amélioration de la banane et de la banane plantain (INIBAP); et l'appui au Programme global du CGIAR sur les ressources génétiques (SGRP). Les activités du programme de l'IPGRI reposent sur le partenariat. L'IPGRI ne dispose pas lui-même de moyens de recherche. Toutefois, son personnel scientifique et technique participe pleinement à toutes les phases du processus de recherche: identifier et classer les problèmes par ordre de priorité; formuler des plans de recherche; mobiliser des ressources; entreprendre les activités de recherche; évaluer et appliquer les résultats de la recherche. Une grande partie du programme de recherche de l'IPGRI est effectuée par le biais de contrats avec des institutions partenaires, au Sud et au Nord, au sein et hors du Groupe consultatif pour la recherche agricole internationale (CGIAR). Grâce à ce mode de fonctionnement, l'Institut assure la flexibilité et la rentabilité de ses activités qui portent sur un large éventail d'espèces (agricoles et forestières), de disciplines et de régions géographiques. Au cours de l'année, le personnel et la direction de l'IPGRI ont réexaminé la stratégie et l'orientation de l'Institut, dans le but de consolider la structure des programmes et de simplifier la gestion des projet. Les changements devaient être mis en oeuvre en 1996 et 1997.

Dans son ensemble, l'IPGRI, et en particulier ses groupes régionaux, a joué un rôle extrêmement actif dans les travaux préparatoires de la Conférence technique internationale sur les ressources phytogénétiques, organisée par l'Organisation des Nations Unies pour l'alimentation et l'agriculture. Les principales activités ont été axées sur l'aide à l'établissement de rapports nationaux et sous-régionaux, l'organisation de réunions et de consultations techniques et l'appui à la mobilisation de l'opinion publique. En outre, tout le personnel de l'Institut a participé à une étude de faisabilité sur les mécanismes à envisager pour l'échange des ressources phytogénétiques pour l'alimentation et l'agriculture et le partage équitable des bénéfices en découlant. L'étude décrit un certain nombre d'options et leurs conséquences, pour contribuer aux négociations internationales concernant la révision de l'Engagement international sur les ressources phytogénétiques.

## Afrique subsaharienne

Le Groupe a aidé les programmes nationaux à intensifier leurs activités de régénération et de multiplication de matériel génétique, en particulier au Kenya, en Namibie, en Somalie, en Tanzanie et en Zambie. L'IPGRI a financé en Côte d'Ivoire la régénération de ressources génétiques du gombo qui sont de grande valeur. Une étude a révélé une diversité génétique très étroite chez le gombo cultivé en Inde. Des données sur la répartition spatiale et temporelle de la diversité génétique des plantes fourragères au Niger ont permis d'élaborer des options pour la conservation *in situ* qui s'accorderaient avec les pratiques traditionnelles d'agriculture de subsistance et pastorale. Des études ethnobotaniques portant sur des espèces d'arbres indigènes ont révélé certains moyens acceptables au niveau local de réhabiliter et de conserver l'environnement, notamment en intensifiant l'agriculture par le biais de jardins familiaux, et en stimulant la régénération à l'aide de pâturages clôturés et du reboisement.

## Asie de l'Ouest et Afrique du Nord

Le nouveau bâtiment qui accueille les bureaux du Groupe régional a été inauguré au Centre international de recherche agricole dans les zones arides à

Alep, Syrie, en septembre 1995. Trois nouveaux programmes nationaux se sont joints aux initiatives régionales pour prospecter, collecter, documenter et utiliser les ressources génétiques d'arbres fruitiers. En Egypte, en Tunisie et en Turquie, les programmes nationaux ont collaboré pour prospecter et collecter des variétés locales d'amandier. Le programme national iranien a collecté des échantillons de *Prunus* dans l'est de l'Azerbaïdjan. Le programme national jordanien a collecté des variétés locales supplémentaires de *Prunus*. Une collection *in vitro* d'amandier a été constituée en Jordanie. Des pistachiers ont été collectés en Jordanie et leurs caractéristiques morphologiques et leur polymorphisme isoenzymatique ont été évalués.

### Asie, Pacifique et Océanie

En travaillant avec des programmes nationaux de la région, le Bureau régional a mis au point un protocole pour l'échange de données afin de faciliter l'échange de données et d'informations entre les banques de gènes. Un projet sur la conservation et l'utilisation durable des fruits tropicaux a identifié des milieux de culture par la multiplication et la conservation *in vitro* en croissance ralentie des *Citrus*. Une enquête réalisée sur plus de 100 banques de gènes a révélé que la grande partie de la régénération effectuée par les gestionnaires des banques de gènes avait pour but de conserver les stocks de semences, et non de maintenir la viabilité des semences. Les activités régionales sur les plantes cultivées sous-utilisées se sont développées avec la publication d'un répertoire sur le sarrasin et les priorités pour la conservation de *Lathyrus* ont été identifiées. Un atelier tenu en Mongolie a permis de renforcer les connaissances et les activités sur les ressources phytogénétiques dans ce pays, tandis qu'une formation à des méthodes de conservation complémentaires pour les plantes à multiplication végétative a amélioré le savoir-faire de gestionnaires de banques de gènes venant de toute la région. Le Réseau pour les ressources génétiques du cocotier a mis en place une base de données des accessions au niveau mondial, a collecté du matériel nouveau, a dispensé des formations et a étendu le réseau à 30 membres. Les activités du Groupe de travail sur la biodiversité du Réseau international sur le bambou et le rotin se sont accélérées.

### Amériques

Les initiatives techniques et politiques sans précédent prises durant la Conférence technique internationale de l'Organisation des Nations Unies pour l'alimentation et l'agriculture ont à la fois ratifié et modifié le programme de l'IPGRI dans les Amériques. Un nouveau financement approuvé pour les Réseaux de ressources phytogénétiques amazoniennes et méso-américaines a représenté un pas important pour ces réseaux. Un atelier pour le renforcement des capacités dans le domaine de la gestion des banques de gènes en champ a défini les problèmes communs et cherché des solutions basées sur la coopération internationale. Une mission conjointe a collecté les premières variétés locales d'arachide en Amazonie équatorienne, augmentant fortement la diversité et la répartition connues d'une variété botanique rare. Des progrès importants ont été faits concernant la mise en oeuvre du projet "Biodiversité, conservation et utilisation durable du matériel génétique d'espèces fruitières originaires d'Amérique tropicale". Des institutions nationales du Costa Rica, du Guatemala, du Honduras et du Nicaragua ont déjà effectué la moitié de leurs inventaires des espèces d'intérêt économique de la famille des sapotacées, en utilisant les caractéristiques agromorphologiques et les informations ethnobotaniques pour la caractérisation *in situ*. Une liste de descripteurs du matériel génétique des sapotacées a été établie. Dans la région andine, des institutions nationales ont récolté des espèces de *Passiflora*. Une autre collaboration sur les Passiflores a conduit à la mise au point de méthodes expérimentales qui permettront d'élucider la taxonomie du genre.

### Europe

En 1995, les pays membres du Programme coopératif européen pour les réseaux sur les

ressources génétiques des cultures sont devenus 30. Une nouvelle structure a été créée, constituée de dix réseaux à large champ d'action. Le Programme européen des ressources génétiques forestières est devenu pleinement opérationnel et 24 pays ont accepté de collaborer à la conservation des ressources génétiques forestières au titre de ce nouveau programme. Quatre réseaux pilotes font l'inventaire des ressources génétiques et identifient des stratégies de conservation à long terme pour les forêts nationales servant de conservatoires de gènes. L'équipement indispensable dont avait besoin le N.I. Vavilov Institute of Plant Industry a été livré cette année. Une nouvelle édition du *Directory of European Institutions Holding Germplasm Collections* a été publié. Il répertoire plus de 500 institutions de 37 pays européens avec leurs adresses détaillées et des informations sur les collections de matériel génétique.

## Diversité génétique

Le Groupe a élaboré un programme de travail sur les aspects ethnobotaniques et socio-économiques de la conservation, et mis au point un projet mondial sur la conservation *in situ* de la biodiversité agricole. Les travaux sur la conservation des ressources génétiques forestières ont considérablement progressé, grâce à la mise au point de méthodes de repérage de la diversité, particulièrement pour le bambou et le rotin avec l'INBAR, qui ont permis d'étudier l'érosion génétique d'espèces d'intérêt commercial en Thaïlande et d'étudier l'impact des perturbations sur la diversité intra-spécifique d'espèces importantes en Malaisie, en Thaïlande et en Inde. Une étude des principaux indicateurs de l'érosion génétique a permis de mettre au point des méthodes qui pourraient aider à localiser les zones à diversité génétique maximale et à quantifier l'érosion génétique. L'IPGRI a revu sa méthode de collecte pour assurer l'enregistrement des données ethnobotaniques et améliorer l'utilisation et l'accessibilité des ressources génétiques détenues dans les banques de gènes. Les travaux se sont poursuivis pour créer une collection noyau ("core collection") de sésame. Un noyau composé d'environ 10 % des 4 200 obtentions représentera toute la diversité présente dans la collection. Un membre du Groupe a représenté l'IPGRI à la quatrième Conférence mondiale sur les femmes à Beijing, Chine, comme partie intégrante d'un groupe spécial sur les femmes en milieu rural, décrivant les rôles importants joués par les femmes comme gardiennes et productrices de ressources génétiques de plantes cultivées. L'IPGRI a également publié une brochure sur le rôle spécial des femmes dans la gestion et l'utilisation des ressources phytogénétiques.

## Conservation et utilisation des ressources génétiques

Une nouvelle série de bulletins techniques a été créée pour aider à gérer les collections de matériel génétique et à orienter la mise en oeuvre de techniques de conservation et de procédures expérimentales adaptées aux conditions locales et aux espèces cibles. Un protocole a été établi pour aider à déterminer le comportement des semences à la conservation. Par le biais d'une activité complémentaire, un répertoire d'informations sur le comportement des semences à la conservation a été compilé pour plus de 7 000 espèces. Un essai global de 5 ans, réalisé au niveau mondial, concernant l'utilisation d'une teneur en humidité très basse des semences pour leur stockage à long terme n'a pas montré de détérioration mesurable dans les semences équilibrées à une humidité relative de 50 % et entreposées à 20°C ou 35°C ou dans celles équilibrées à une humidité relative de 8 % et entreposées à 50°C. L'encapsulation d'embryons s'est révélée une technique viable pour la cryoconservation de certaines espèces récalcitrantes. Des directives techniques pour le transfert du matériel génétique de céréales à petits grains des régions tempérées ont été publiés. Des études sur la conservation et l'utilisation de 11 espèces végétales négligées on été finalisées. Des études ont commencé pour définir des options compatibles avec les Accords relatifs aux droits de propriété intellectuelle liés au commerce dans le cadre de l'Accord général sur les tarifs douaniers et le commerce, pour la législation *sui generis* sur les droits de propriété intellectuelle pour les variétés de plantes cultivées.

## Documentation, information et formation

Une grande quantité d'informations nouvelles et actualisées a été ajoutée aux bases de données de l'IPGRI qui contiennent maintenant des informa-

tions sur plus de 5 millions d'accessions dans des collections *ex situ* dans le monde entier. L'information contenue dans les bases de données a été diffusée sur support papier, support électronique et par des réponses à des demandes. Une nouvelle version du logiciel "Système de gestion des banques de gènes" a été publiée ainsi qu'un logiciel pour faciliter l'échange de données avec d'autres systèmes. La Bibliothèque de l'IPGRI a répondu à plus d'un millier de demandes de documents. Le parrainage des abonnements aux *Plant Genetic Resources Abstracts* s'est poursuivi. L'analyse de l'éventail des lecteurs a indiqué le fort impact et la grande utilité de la revue. Des bibliographies ont été préparées sur le développement de plantes cultivées locales et les légumes verts africains. Plus de 60 publications, affiches, etc. ont été produites, et l'IPGRI s'est vu décerner deux médailles par l'"Agricultural Communicators in Education"; plus de 100 000 exemplaires de publications ont été distribués. L'IPGRI a formé 60 formateurs et 150 autres scientifiques et collaboré avec des universités à la mise au point de cours régionaux du niveau de la maîtrise. Une initiative importante a démarré pour l'élaboration d'un programme d'études sur les ressources phytogénétiques et du matériel pédagogique associé. Du matériel de vulgarisation très varié dont *Geneflow*, des brochures régionales et un calendrier, ont été publiés. Des entretiens avec la presse ont été organisés et des affiches et fiches descriptives ont été produites comme contributions à la Conférence technique internationale. Des méthodes ont été étudiées pour évaluer l'impact des activités de l'IPGRI en termes économiques et pour promouvoir la conservation et le renforcement des institutions.

## Réseau international pour l'amélioration de la banane et de la banane plantain

Les travaux du Réseau international pour l'amélioration de la banane et de la banane plantain (INIBAP) sur la conservation du matériel génétique de *Musa* ont été analysés très positivement en 1995 par un comité d'audit externe qui a souligné la rentabilité et le taux d'utilisation élevé de la collection de *Musa* que détient le Centre de transit de l'INIBAP à Leuven, Belgique. La recherche sur la transformation génétique du bananier a débouché sur la production de plusieurs plants de bananiers transformés et stables en serre. Par des méthodes traditionnelles d'amélioration, on a produit au Honduras plusieurs hybrides du type plantain résistants à la cercosporiose noire, principale menace pour les Musacées, qui fera l'objet d'une évaluation à l'échelle international. Dans le cadre d'un projet pour la mise en place d'un Système d'information sur le matériel génétique de *Musa*, une étude morphotaxonomique des variétés traditionnelles a été conduite dans neuf collections de terrain, la mise au point d'une nouvelle liste de descripteurs a été achevée, et l'architecture du système a été conçue. Des progrès importants ont été faits dans la phase II du Programme d'essais internationaux sur *Musa*. L'évaluation d'hybrides améliorés a commencé dans plus de 45 pays.

## Programme global du CGIAR sur les ressources génétiques

1995 a été la première année complète d'opération du Programme. Il englobe les programmes de ressources génétiques gérés de manière indépendante et les activités des différents centres du CGIAR. L'IPGRI est le Centre d'harmonisation du Programme. En 1995, les activités ont été axées principalement sur l'évaluation de l'état actuel des activités des Centres relatives aux ressources génétiques et sur l'examen des moyens de progresser, en particulier dans des domaines relativement nouveaux comme la conservation *in situ*, les questions politiques et socio-économiques et les ressources génétiques aquatiques et animales. Des progrès sensibles ont été accomplis dans la mise au point du Réseau global d'information sur les ressources génétiques (SINGER). En reliant les bases de données sur les ressources génétiques des centres du CGIAR, ce réseau vise à assurer l'accès à l'information de base sur les ressources génétiques détenues par les Centres du CGIAR.

# Die wichtigsten Ereignisse des Jahres 1995 im sberblick

Das Internationale Institut für Pflanzengenetische Ressourcen (IPGRI) hat im Laufe des Jahres 1995 seine strategischen Ziele anhand von 40 Projekten verfolgt. Diese Projekte verteilen sich auf drei Programme: IPGRI's Programm für Pflanzengenetische Ressourcen, das Internationale Netzwerk für die Verbesserung von Bananen und Kochbananen (INIBAP) und die Unterstützung des Systemweiten Programmes für Genetische Ressourcen (SGRP). Da IPGRI über keine eigenen Forschungseinrichtungen verfügt, beruhen die Programmaktivitäten auf Partnerschaften. IPGRI's wissenschaftliches und technisches Personal ist jedoch an allen Schritten der Forschungsprojekte umfassend beteiligt: von der Bestimmung und Einstufung von Problemen, über die Projektformulierung, Finanzierung, Durchführung bis zur Auswertung und Anwendung der Forschungsergebnisse. Ein Großteil des Forschungsprogrammes von IPGRI wird über Verträge mit Partnerinstitutionen im Süden wie im Norden durchgeführt, einschließlich der Institute der Beratungsgruppe Internationale Agrarforschung (CGIAR). Durch diesen *modus operandi* gewinnt IPGRI an Flexibilität und Kosteneffizienz, um mit seinen Tätigkeiten ein breites Spektrum an Kulturpflanzen in Land- und Forstwirtschaft, Forschungsdisziplinen und geographischen Regionen abzudecken. Im Laufe des Jahres haben die Mitarbeiter und das Management von IPGRI die Strategie und Zielsetzung des Instituts überprüft, um die Programmstruktur zu festigen und das Projektsystem zu rationalisieren. Die Änderungen sollen 1996 und 1997 eingeführt werden.

Das gesamte IPGRI, insbesondere seine Regionalgruppen, war aktiv beteiligt an der Vorbereitung der von der Organisation für Ernährung und Landwirtschaft der Vereinten Nationen (FAO) organisierten Internationalen Technischen Konferenz über Pflanzengenetische Ressourcen (International Technical Conference on Plant Genetic Resources). Schwerpunkte dabei waren die Unterstützung bei der Vorbereitung der nationalen und subregionalen Berichte, die Organisation von Tagungen und fachlichen Beratungsgesprächen und Öffentlichkeitsarbeit. Eine weitere institutsübergreifende Aktivität bestand in einer Durchführbarkeitsstudie, die mögliche Systeme zum Austausch pflanzengenetischer Ressourcen für Nahrung und Landwirtschaft und die gerechte Beteiligung an ihrer Nutzung zum Gegenstand hatte. In dieser Studie werden eine Reihe von Möglichkeiten und deren Auswirkungen aufgezeigt, um internationale Verhandlungen über die Überarbeitung des Internationalen Abkommens über Pflanzengenetische Ressourcen (International Undertaking on Plant Genetic Resources) zu informieren.

## Afrika südlich der Sahara

Die Gruppe unterstützte nationale Programme, insbesondere in Kenia, Namibia, Somalia, Tansania und Sambia, um die Vermehrung ihres genetischen Materials zu intensivieren. In der Republik Côte d'Ivoire finanzierte IPGRI die Regeneration von wertvollen Okramaterial. Eine Untersuchung des Okra-Anbaus in Indien ergab eine enge genetische Basis. Anhand des Datenmaterials über die zeitliche und räumliche Verteilung genetischer Diversität bei Futterpflanzen im Niger konnten verschiedene Strategien zur *in situ* Konservierung entwickelt werden, die mit den traditionellen Formen von Subsistenzanbau und der Weidewirtschaft im Einklang stehen. Ethnobotanische Arbeiten über einheimische Baumarten zeigten regional vertretbare Wege zur Rehabilitation und Bewahrung der Umwelt auf. Dazu gehört eine intensivere Bewirtschaftung über Nutzgärten und eine verstärkte Regeneration durch eingefriedete Weiden und Wiederaufforstung.

## Westasien und Nordafrika

Das neue Gebäude der Regionalgruppe wurde im September 1995 am Internationalen Zentrum für Agrarforschung in Trockengebieten

(ICARDA) in Aleppo, Syrien, eingeweiht. Drei weitere Nationale Programme verstärkten die regionalen Bemühungen zur Erfassung, Sammlung, Dokumentation und Nutzung von genetischen Ressourcen bei Obstbäumen. Nationale Programme in Ägypten, Tunesien und der Türkei unterstützten die Erfassung und Sammlung lokaler Mandelarten (*Prunus* spp.); das nationale Programm im Iran sammelte Prunussorten in Ost-Aserbaidschan; das jordanische Nationalprogramm sammelte weiteres Prunusmaterial. In Jordanien wurde ferner eine *in vitro* Sammlung von Mandelbaumarten eingerichtet. Pistazien wurden in Jordanien gesammelt und auf morphologische Merkmale und Polymorphismen bei Isoenzymen hin untersucht.

## Asien, Pazifik und Ozeanien

Das Regionalbüro entwickelte in Zusammenarbeit mit national Programmen ein Protokoll, das den Daten- und Informationsfluß zwischen Genbanken erleichtern soll. Bei einem Projekt zur Erhaltung und nachhaltigen Nutzung tropischer Obstarten wurden Medien für Gewebekulturen und langsames Wachstum (slow growth) von *Citrus* ermittelt. Aus einer Untersuchung von über 100 Genbanken ging hervor, daß die von den Verantwortlichen durchgeführten Regenerationsarbeiten eher der Erhaltung des Saatgutbestandes dienten, als dessen Lebensfähigkeit zu erhalten. Die regionalen Aktivitäten mit vernachlässigten Nutzpflanzen wurden durch die Veröffentlichung eines Verzeichnisses über Buchweizen neu angeregt, ferner wurden Prioritäten für die Erhaltung von *Lathyrus* (Platterbse) bestimmt. Ein in der Mongolei veranstaltetes Seminar verstärkte das Bewußtsein über pflanzengenetische Ressourcen in diesem Land und regte zu neuen Aktivitäten an. Die Manager von Genbanken aus der gesamten Region wurden in komplementären Konservierungsverfahren für vegetativ vermehrte Nutzpflanzen geschult. Das Netzwerk für Kokosnuß Genetische Ressourcen (COGENT) arbeitete an der Entwicklung einer weltweiten Datenbank für Muster in Genbanken, unterstützte das Sammeln von neuem Material, veranstaltete Kurse und erweiterte die Mitgliederzahl im Netzwerk auf 30. Neue Impulse erhielt auch die Arbeitsgruppe für Biodiversität des Internationalen Netzwerkes für Bambus und Rattan.

## Amerika

Technische und politische Maßnahmen in Verbindung mit der von der FAO veranstalteten Internationalen Technischen Konferenz, änderten IPGRI's Amerikaprogramm. Die das Amazonasgebiet und Mittelamerika betreffenden Netzwerke für pflanzengenetische Ressourcen kamen durch die Bewilligung neuer Finanzierungsmittel einen bedeutenden Schritt weiter. Anläßlich einer Fortbildungsveranstaltung zum Thema Management von Feldgenbanken wurden gemeinsame Probleme definiert und nach Lösungsansätzen im Wege internationaler Zusammenarbeit gesucht. Gemeinsam mit dem nationalen Programm wurden die ersten einheimischen Erdnuß-Landrassen im Amazonasgebiet von Ecuador gesammelt, was maßgeblich zur Erweiterung der Kenntnis über die Diversität und Verbreitung einer seltenen Art beitrug. Bedeutende Fortschritte wurden bei dem Projekt "Biodiversität, Erhaltung und nachhaltige Nutzung von genetischem Material einheimischer Obstarten des tropischen Amerikas" erzielt. Die nationalen Behörden in Costa Rica, Guatemala, Honduras und Nicaragua vervollständigten die Hälfte der Bestandslisten über wirtschaftlich bedeutende Arten der Sapotaceen-Familie, wofür agromorphologische Merkmale und ethnobotanische Informationen zur *in situ* Charakterisierung verwendet wurden. Über das genetische Material von Sapotaceae wurde eine Deskriptorenliste verfaßt. Im Andengebiet wurden von nationalen Behörden Passiflora-Arten gesammelt. In weiteren Gemeinschaftsarbeiten über Passionsblumen wurden Versuchsmethoden zur Aufklärung der Taxonomie dieser Gattung entwickelt.

## Europa

Die Mitgliederzahl des 'European Cooperative Programme for Crop Genetic Resources (ECP/GR)' stieg 1995 auf 30 Länder. Das Programm

wurde umstrukturiert und gliedert sich nun in zehn, ein breites Spektrum abdeckende Netzwerke. Das europäische Programm für forstgenetische Ressourcen nahm seine Arbeit in vollem Umfang auf. 24 Länder erklärten ihre Bereitschaft, innerhalb dieses neuen Programms bei der Konservierung von forstgenetischen Ressourcen zusammenzuarbeiten. Im Rahmen von Pilotprojekten führten vier Netzwerke genetische Bestandsaufnahmen durch und steckten langfristige Konservierungsstrategien für nationale Forstschutzgebiete ab. Die vom N.I.-Vavilov-Institut benötigte Ausrüstung wurde im Laufe des Jahres geliefert. Das 'Directory of European Institutions Holding Germplasm Collections' wurde neu aufgelegt. Aufgeführt werden über 500 Einrichtungen in 37 europäischen Ländern nebst hilfreichen Angaben zur Kontaktaufnahme und Informationen über Sammlungen von genetischem Material.

## Genetische Diversität

Die Gruppe erstellte ein Arbeitsprogramm für ethnobotanische und sozioökonomische Aspekte der Konservierung und entwickelte ein globales Projekt zur *in situ* Konservierung der Artenvielfalt bei Nutzpflanzen. Die Arbeiten zur Konservierung forstgenetischer Ressourcen verzeichnete entscheidende Fortschritte bei der Entwicklung von Methoden zur Lokalisation von Biodiversität - insbesondere in Hinsicht auf Bambus und Rattan in Zusammenarbeit mit dem INBAR -, bei der Untersuchung genetischer Erosion von wirtschaftlich wertvollen Arten in Thailand sowie bei der Erforschung der Auswirkungen von Störungen intra-spezifischer Diversität bei wichtigen Arten in Malaysia, Thailand und Indien. In einer Studie über Hauptindikatoren für genetische Erosion wurden Verfahren aufgezeigt, die bei der Bestimmung von Gebieten mit höchster genetischer Vielfalt und der Quantifizierung von genetischer Erosion behilflich sein können. IPGRI revidierte sein Sammlungsformular, um sicherzustellen, daß die entsprechenden ethnobotanischen Angaben vermerkt werden, und um die Nutzung und den Zugriff auf die in Genbanken gespeicherten genetischen Ressourcen zu erleichtern. Die Arbeiten zur Einrichtung einer Sesam-Kernsammlung ('core collection') wurden fortgesetzt. Zuletzt wird ein Kernbestand von 10% der 4200 Muster die gesamte Vielfalt der Sammlung abdecken. Ein Mitarbeiter des Teams vertrat IPGRI bei der Vierten Weltkonferenz der Frauen in Beijing, China, und beteiligte sich am Sonderausschuß zur Frau in der Landwirtschaft, der die herausragende Rolle der Frauen bei der Bewahrung und Entwicklung genetischer Ressourcen unterstrich. IPGRI veröffentlichte weiterhin eine Broschüre zur besonderen Aufgabe der Frauen bei der Pflege und Nutzung pflanzengenetischer Ressourcen.

## Erhaltung und Nutzung von genetischem Material

Eine neue Reihe von technischen Richtlinien wird veröffentlicht, die bei der Verwaltung von Sammlungen beraten und als Leitfaden bei der Durchführung von Konservierungstechniken und Versuchsverfahren dienlich sein soll, die auf die örtlichen Arbeitsbedingungen sowie auf die jeweilige Pflanzenart abgestimmt sind. Es wurde ein Protokoll zur Erfassung des Lagerverhaltens von Saatgut verfaßt. Einhergehend wurde auch ein Kompendium veröffentlicht, in dem das Lagerungsverhalten von 7000 Pflanzenarten dargestellt wird. Ein fünfjähriges weltweit durchgeführtes Experiment mit Saatgut, das unter äußerst niedrigen Feuchtigkeitsbedingungen langfristig gelagert wird, ergab keine meßbare Beeinträchtigung von Saatgut, das bei einer relativen Feuchtigkeit (RF) von 50% bis zum Gleichgewicht getrocknet und bei 20°C oder 35°C gelagert wird, bzw. bei 8% RF getrocknet und bei 50°C gelagert wird. Die Einkapselung von Embryonen stellte sich als eine gangbare Technik zur Kryokonservierung von problematischen Arten heraus. Für den Austausch von Getreidearten der gemäßigten Breiten wurden phytosanitäre Richtlinien veröffentlicht. Zum Abschluß kamen 11 Studien zur Bewahrung und Nutzung von vernachlässigten Nutzpflanzen. Im Hinblick auf eine besondere Gesetzgebung betreffend das Urheberrecht bei Pflanzensorten, begann man mit der Ausarbeitung von Vorschlägen, die mit den urheberrechtlichen, den Handel betreffenden Vereinbarungen im Rahmen des Allgemeinen Zoll- und Handelsabkommens (GATT) im Einklang stehen.

## Dokumentation, Information und Ausbildung

Die Datenbanken des IPGRI wurden mit umfassenden Informationen erweitert und aktualisiert und enthalten derzeit Angaben zu

mehr als 5 Millionen Mustern in weltweiten *ex situ* Sammlungen. Die in den Datenbanken enthaltenen Informationen wurden durch Ausdruck, Datenfernübertragung und Beantwortung von Anfragen verbreitet. Eine neue Version der Software 'Genebank Management System' wurde zusammen mit Hilfsprogrammen für den Datenaustausch mit anderen Systemen freigegeben. Die Bibliothek des IPGRI beantwortete über 1000 Anfragen nach Literatur. Die Unterstützung von Abonnements für die Publikation 'Plant Genetic Resources Abstracts' wurde fortgesetzt. Die Auswertung einer Umfrage bei der Leserschaft belegte den großen Nutzen dieser Zeitschrift. Zur örtlichen Entwicklung von Nutzpflanzen (local crop development) und Blattgemüse in Afrika wurden Bibliographien erstellt. Ferner wurden über 60 Einzelveröffentlichungen, Poster, usw. herausgegeben, wovon zwei im Wettbewerb 'Agricultural Communicators in Education' ausgezeichnet wurden. Insgesamt wurden über 100.000 Exemplare der Veröffentlichungen verteilt. IPGRI bildete 60 Ausbilder und 150 weitere Wissenschaftler aus und arbeitete mit Universitäten bei der Entwicklung regionaler, weiterführender Bildungsgänge mit Magisterabschluß zusammen. Es wurde eine umfassende Initiative zur Ausarbeitung eines Kern-Studienprogramms und des erforderlichen Ausbildungsmaterials für pflanzengenetische Ressourcen eingeleitet. Im Rahmen der Öffentlichkeitsarbeit wurde eine Reihe von Materialien veröffentlicht, darunter das Magazin 'Geneflow', regionale Broschüren und ein Kalender. Als Beitrag zur Internationalen Technischen Konferenz wurden Pressekonferenzen abgehalten und Poster sowie Merkblätter bereitgestellt. Zur Beurteilung der Auswirkungen von IPGRI's Arbeit in wirtschaftlicher Hinsicht und durch die Förderung der Konservierung und der Schaffung von Einrichtungen wurden Bewertungsmethoden geprüft.

### Internationales Netzwerk für die Verbesserung von Bananen und Kochbananen (INIBAP)

Die Arbeiten des INIBAP zur Konservierung von Musa genetischen Ressourcen wurde 1995 von einer externen Prüfungskommission äußerst positiv bewertet, wobei vor allen Dingen die Kosteneffizienz und der hohe Nutzungsgrad der Musa-Sammlung im INIBAP Transit Centre in Leuwen (Belgien) hervorgehoben wurde. Forschungen zur genetischen Transformation von Bananen ergaben einige stabil transformierte Bananenpflanzen im Gewächshaus. Die traditionelle Züchtung in Honduras brachte mehrere der Kochbanane ähnliche Hybriden hervor, die gegen den Befall von schwarzer Sigatoka resistent sind, der wohl stärksten Bedrohung für Bananen. Diese Hybriden sollen nun international evaluiert werden. Ein Projekt, das sich mit der Ausarbeitung eines Informationssystems für Musa-Material befaßt, führte eine morphotaxonomische Studie über Standardsorten in neun Feldsammlungen durch. Es konnte eine neue Deskriptorenliste erstellt und die Systemarchitektur entwickelt werden. Bedeutende Fortschritte wurden in der Phase II des internationalen Musa-Versuchsprogramms erzielt. In über 45 Ländern wurde die Evaluierung von verbesserten Hybriden aufgenommen.

### Systemweites Programm für Genetische Ressourcen (SGRP) der CGIAR

1995 war das SGRP erstmalig ganzjährig tätig. Dieses Programm umspannt die unabhängig verwalteten genetischen Ressourcen-Programme und Aktivitäten einzelner CGIAR-Zentren. IPGRI dient dabei als Koordinierungszentrum des Programms. Die Aktivitäten im Jahre 1995 zielten an erster Stelle auf die Erfassung des gegenwärtigen Stands der Arbeiten über genetische Ressourcen der Zentren und die Untersuchung von Vorgehensweisen, insbesondere in relativ neuen Bereichen der Arbeit über genetische Ressourcen der CGIAR, wie z.B. *in situ* Konservierung, politische und sozioökonomische Aspekte sowie aquatische wie zoologische genetische Ressourcen. Beim Systemweiten Informations-Netzwerk für Genetische Ressourcen (SINGER) ist man einen bedeutenden Schritt vorangekommen. Durch die Vernetzung der Datenbanken der einzelnen CGIAR-Zentren soll dieses Netzwerk den Zugriff auf grundlegende Informationen zu den von den CGIAR-Zentren verwalteten genetischen Ressourcen gewährleisten.

# Acontecimientos de 1995

Durante 1995, el Instituto Internacional de Recursos Fitogenéticos (IPGRI) continuó persiguiendo sus objetivos estratégicos mediante 40 proyectos agrupados en tres elementos programáticos: el Programa de Recursos Fitogenéticos del IPGRI; el Programa de la Red Internacional para el Mejoramiento del Banano y el Plátano (INIBAP); y el apoyo al Programa de Recursos Genéticos a nivel de todo el Sistema (SGRP). Las actividades de los programas del IPGRI se basan en colaboraciones. El Instituto no cuenta con instalaciones de investigación propias. Sin embargo, su personal científico y técnico participa de lleno en todas las fases del proceso de investigación: identificación de los problemas y su clasificación por prioridades; formulación de planes de investigación; movilización de recursos; realización de investigaciones; evaluación y aplicación de los resultados de la investigación. Gran parte del programa de investigaciones del Instituto se realiza mediante contratos con instituciones colaboradoras, del sur y del norte, en el seno del propio Grupo Consultivo sobre Investigación Agrícola Internacional (CGIAR) o fuera de él. Mediante esta forma de proceder, el Instituto mantiene una flexibilidad y rentabilidad para realizar actividades en toda una gama de especies (tanto de cultivos como forestales), de disciplinas y regiones geográficas. En el transcurso del año, el personal y la administración del Instituto volvió a examinar su estrategia y orientación, con la finalidad de consolidar la estructura de los programas y agilizar el sistema de proyectos. Estas innovaciones habrían de llevarse a cabo en 1996 y 1997.

Todo el IPGRI, pero sobre todo los Grupos Regionales desempeñaron una función sumamente activa en los preparativos de la Conferencia Técnica Internacional sobre Recursos Fitogenéticos, convocada por la Organización de las Naciones Unidas para la Agricultura y la Alimentación. Su actividad principal se centró en ayudar a preparar los informes subregionales y nacionales, organizando reuniones y consultas técnicas, y apoyando las actividades de sensibilización pública. Otra actividad a nivel de todo el Instituto consistió en un estudio de viabilidad sobre sistemas posibles para el intercambio de recursos fitogenéticos en los sectores alimentario y agrícola y sobre la forma de compartir equitativamente los beneficios que se obtuviesen. En dicho estudio se expusieron varias opciones y sus consecuencias, como material informativo para las negociaciones internacionales acerca de la revisión del Compromiso Internacional sobre Recursos Fitogenéticos.

## Africa Sub-sahariana

El Grupo colaboró con los programas nacionales para la intensificación de sus actividades de regeneración y multiplicación de germoplasma, especialmente en Kenya, Namibia, Somalia, Tanzanía y Zambia. El IPGRI financió en Côte d'Ivoire la regeneración de valiosos recursos genéticos de la ocra. Un estudio realizado reveló una reducida diversidad genética entre la ocra cultivada en la India. Los datos disponibles sobre la distribución espacial y temporal de la diversidad genética de los forrajes en Níger, permitió desarrollar opciones para la conservación *in situ* que se encuadrarían dentro de las prácticas tradicionales de subsistencia y pastoriles. Los trabajos etnobotánicos sobre especies arbóreas locales revelaron algunas formas localmente aceptables para rehabilitar y conservar el medio ambiente, en particular intensificando la agricultura mediante huertos familiares, y estimulando la regeneración en recintos de pastizales y repoblaciones forestales.

## Asia Occidental y Africa del Norte

En el Centro Internacional de Investigación Agrícola en las Zonas Secas, con sede en Aleppo, Siria, se inauguró en septiembre de 1995 el nuevo

edificio para las oficinas del Grupo Regional. Otros tres programas nacionales vinieron a sumarse a los esfuerzos regionales de estudio, recolección, documentación y utilización de los recursos genéticos de árboles frutales. Los programas nacionales que se desarrollan en Egipto, Túnez y Turquía colaboraron en el estudio y recolección de razas locales de almendras. El programa nacional de Irán recolectó especies de *Prunus* del Azerbaiyán oriental. El programa nacional jordano recolectó más razas locales de *Prunus*. En Jordania se creó una colección de almendras *in vitro*. Se recolectaron pistachos de Jordania y se evaluaron sus características morfológicas y su polimorfismo isoenzímico.

## Asia, el Pacífico y Oceanía

La Oficina Regional, en colaboración con los programas regionales y nacionales, elaboró un protocolo para el intercambio de datos con objeto de facilitar el canje de datos y de información entre bancos de germoplasma. Un proyecto sobre la conservación y la utilización sostenible de frutas tropicales identificó medios *in vitro* tanto para el cultivo de tejidos, como para el crecimiento lento del *Citrus*. De un estudio de más de 100 bancos de genes se desprendía que la mayoría de la regeneración llevada a cabo por los gestores de esos bancos tenía por finalidad mantener reservas de semilla, más bien que conservar su viabilidad. Las actividades regionales en materia de cultivos subutilizados se vieron impulsadas con la publicación de un directorio del alforfón y se identificaron prioridades para la conservación del *Lathyrus*. Un seminario celebrado en Mongolia tuvo como fruto el aumento de la sensibilización pública y el incremento de las actividades sobre recursos fitogenéticos en ese país, mientras que la capacitación en métodos complementarios de conservación para cultivos de propagación vegetativa mejoró los conocimientos de los gestores de bancos de germoplasma en toda la región. La Red Internacional de Recursos Genéticos del Coco se ocupó de crear una base de datos de accesiones de todo el mundo, de recolectar nuevo material, de la capacitación y de ampliar la Red, que llegó a los 30 miembros. Cobraron impulso las actividades del Grupo de Trabajo sobre Biodiversidad de la Red Internacional para el Bambú y la Rota.

## Las Américas

Las medidas técnicas y políticas sin precedentes relacionadas con la Conferencia Técnica Internacional convocada por la Organización para la Agricultura y la Alimentación (FAO) ratificaron y modificaron el programa del IPGRI en las Américas. La nueva financiación aprobada para las redes de recursos fitogenéticos del Amazonas y de Mesoamérica representaron un importante adelanto. En un taller de capacitación en materia de gestión de bancos de germoplasma en el campo, se definieron los problemas comunes y se buscaron soluciones por medio de la cooperación internacional. En una misión conjunta se recolectaron las primeras razas locales nativas de cacahuete (maní) en el Amazonas ecuatoriano, con lo que se incrementó considerablemente la diversidad y distribución conocidas de una variedad botánica rara. Se realizaron grandes avances en el desarrollo del proyecto "Biodiversidad, conservación y utilización sostenible del germoplasma de frutas autóctonas de América tropical". Las instituciones nacionales de Costa Rica, Guatemala, Honduras y Nicaragua completaron la mitad de sus inventarios de especies económicamente importantes de la familia de las Sapotáceas empleando rasgos agromorfológicos e información etnobotánica para la caracterización *in situ*. Se produjo una lista de descriptores del germoplasma de Sapotáceas. En la región andina, las instituciones nacionales recolectaron especies de *Passiflora*. Otras colaboraciones sobre esta planta dieron lugar a métodos experimentales para aclarar la taxonomía del género.

## Europa

El número de miembros del Programa Europeo Cooperativo para el desarrollo de Redes de Recursos Fitogenéticos llegó a ser de 30 países en 1995. Se estableció una nueva estructura, compuesta por diez redes de amplio espectro. El

Programa Europeo de Recursos Genéticos Forestales entró plenamente en funcionamiento y 24 países acordaron colaborar para conservar los recursos genéticos forestales en virtud de este nuevo Programa. Cuatro redes experimentales inventarían los recursos genéticos e identifican las estrategias de conservación a largo plazo para los bosques de reservas genéticas nacionales. Durante el año se entregó el equipo esencial que necesitaba el Instituto N.I. Vavilov. Se publicó una nueva edición del *Directory of European Institutions Holding Germplasm Collections*, en el que se enumeran más de 500 instituciones de 37 países europeos, con pormenores para los contactos e información sobre colecciones de germoplasma.

## Diversidad genética

El Grupo estableció un programa de trabajo sobre aspectos etnobotánicos y socioeconómicos de la conservación, y desarrolló un proyecto global de conservación *in situ* de agrobiodiversidad. Los trabajos sobre conservación de los recursos genéticos forestales hicieron grandes avances para desarrollar métodos de localización de la diversidad, especialmente por lo que se refiere al bambú y la rota con el INBAR, apreciando la erosión genética de especies comercialmente valiosas en Tailandia, y explorando el impacto de las perturbaciones de la diversidad intraespecífica de importantes especies en Malasia, Tailandia e India. Un estudio sobre los principales indicadores de la erosión genética produjo métodos que podrían contribuir a ubicar zonas de máxima diversidad genética y cuantificar la erosión genética. El IPGRI revisó su formulario de recolección para asegurar que se registre la información etnobotánica correspondiente, y para aumentar la utilización y la accesibilidad de los recursos genéticos que se mantienen en bancos de germoplasma. Avanzaron los trabajos para crear una colección central para el sésamo. Un núcleo final de un 10% de 4200 accesiones representará toda la diversidad de la colección. Un funcionario del Grupo representó al Instituto en la Cuarta Conferencia Mundial sobre la Mujer, que se celebró en Beijing, China, como parte de un grupo especial de discusión sobre las mujeres rurales, en el que se expusieron los cometidos importantes que desempeña la mujer como guardiana y promotora de recursos genéticos agrícolas. El Instituto publicó también un folleto sobre el cometido especial de la mujer por lo que se refiere a la administración y utilización de los recursos fitogenéticos.

## Mantenimiento y Utilización de Germoplasma

Se desarrolló una nueva serie de boletines técnicos para ayudar a administrar las colecciones de germoplasma y orientar la aplicación de técnicas de conservación y procedimientos experimentales adaptados a las condiciones operativas locales y las especies seleccionadas. Se desarrolló un protocolo para ayudar a determinar el comportamiento de las semillas almacenadas. Mediante una actividad conexa, se elaboró un compendio de información sobre comportamiento de las semillas almacenadas para más de 7000 especies. Un experimento global de cinco años de duración sobre el empleo del contenido de humedad muy bajo en semillas almacenadas a largo plazo, demostró que no se producía ningún deterioro apreciable en las semillas equilibradas a una humedad relativa (RH) del 50% y almacenadas a 20°C o 35°C, o en las equilibradas al 8% de RH y almacenadas a 50°C. El encapsulado de embriones apareció como una técnica viable para criopreservar algunas especies recalcitrantes. Se publicaron directrices para el transporte seguro de germoplasma de cereales pequeños de zonas templadas. Se ultimaron los estudios sobre la conservación y utilización de 11 especies agrícolas sub-aprovechadas. Se comenzó a trabajar en el desarrollo de acciones compatibles con los acuerdos de Propiedad Intelectual Relacionada con el Comercio en virtud del Acuerdo General sobre Aranceles Aduaneros y Comercio, para una legislación específica en materia de derechos de propiedad intelectual para las variedades vegetales.

## Documentación, Información y Capacitación

Se agregó un gran volumen de información nueva y actualizada a las bases de datos del IPGRI, que ahora contienen información sobre más de cinco millones de accesiones en colecciones *ex situ* de todo el mundo. Se divulgó información procedente de las bases de datos a través de impresiones, directorios electrónicos y respuestas a consultas. Se

dio a luz un nuevo texto sobre el Sistema de Gestión de Bancos de Germoplasma junto con programas informáticos para ayudar a intercambiar sus datos con otros sistemas. La Biblioteca del Instituto atendió a más de mil solicitudes de documentos. Continuó el patrocinio de las suscripciones *a Plant Genetic Resources Abstracts*. De un análisis de una encuesta de lectores resultaba el gran impacto y utilidad de su publicación. Se prepararon bibliografías sobre el desarrollo de cultivos locales y sobre verduras de hoja en Africa. Se produjeron más de 60 publicaciones individuales, carteles murales, etc., incluidas las dos premiadas por parte de los Comunicadores Agrícolas en la Educación; se distribuyeron más de 100 000 ejemplares de publicaciones. El Instituto formó a 60 instructores, además de 150 científicos, y colaboró con universidades para organizar cursillos regionales a nivel de máster. Se puso en marcha una gran iniciativa para crear un plan de estudios central sobre recursos fitogenéticos con materiales de capacitación afines. Se produjo toda una serie de materiales sobre sensibilización del público, incluido Geneflow, folletos regionales y un calendario. Se organizaron ruedas de prensa y se produjeron carteles murales y resúmenes analíticos, como aportaciones a la Conferencia Técnica Internacional. Se exploraron los métodos para evaluar el impacto de la labor del IPGRI en términos económicos y mediante la promoción de la conservación de recursos fitogenéticos y el desarrollo institucional.

## Red Internacional para el Mejoramiento del Banano y el Plátano

La labor de la INIBAP sobre conservación de germoplasma de *Musa* fue analizada muy positivamente en 1995 por un equipo de examinadores externo, que puso de relieve la rentabilidad y el alto grado de utilización de la colección de *Musa* que se mantiene en el Centro de Tránsito de la INIBAP, en Leuven, Bélgica. Las investigaciones sobre la transformación genética del banano produjeron varias plantas estables de bananos transformadas en invernadero. El mejoramiento tradicional llevado a cabo en Honduras produjo varios híbridos análogos al plátano con resistencia a la enfermedad de la Sigatoka negra, que es la amenaza principal de *Musa*, y que se facilitarán para su evaluación internacional. Dentro de un proyecto para desarrollar un Sistema de Información de Germoplasma de *Musa* se llevó a cabo un estudio morfotaxonómico sobre variedades uniformes en nueve colecciones de campo, se finalizó una nueva lista de descriptores y se trazó la arquitectura del sistema. Se hicieron grandes avances en la Fase II del Programa Internacional de Ensayo de *Musa*. En más de 45 países comenzó la evaluación de híbridos mejorados.

## Programa de Recursos Genéticos a nivel de todo el Sistema del CGIAR (SGRP)

Fue 1995 el primer año completo de funcionamiento del SGRP. El Programa abarca los programas de recursos genéticos de administración independiente así como las actividades de los distintos centros del CGIAR. El IPGRI es el Centro de Reunión del Programa. En 1995 las actividades se centraron primordialmente en la evaluación de la situación actual de la labor del Centro en materia de recursos genéticos y en el examen de cómo avanzar, sobre todo en áreas relativamente nuevas para la labor de recursos genéticos en el CGIAR, como la conservación *in situ*, las cuestiones de política y socioeconomía, y los recursos genéticos acuáticos y zoogenéticos. Se hicieron grandes avances en el desarrollo de la Red de Información sobre Recursos Fitogenéticos a nivel de todo el Sistema (SINGER). Con el enlace de las bases de datos sobre recursos genéticos entre todos los centros del CGIAR, esta Red pretende asegurar el acceso a la información básica sobre recursos genéticos que se poseen en esos centros.

# Abbreviations

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| AARD | Agency for Agricultural Research and Development, Indonesia |
| AAS | Academy of Agricultural Sciences, China |
| ACIAR | Australian Centre for International Agricultural Research, Australia |
| ACRN | African Coffee Research Network |
| ACSAD | Arab Centre for Studies in Arid Zones and Dry Lands, Syria |
| ADB | Asian Development Bank |
| AFLP | Amplified fragment length polymorphism |
| AFTSC | ASEAN Forest Tree Seed Centre, Thailand |
| APO | Asia, the Pacific and Oceania |
| ARC | Agriculture Research Council |
| ASEAN | Association of South East Asian Nations |
| ASPNET | Regional Network for Asia and the Pacific, INIBAP, Philippines |
| ASPT | American Society of Plant Taxonomists |
| AVRDC | Asian Vegetable Research and Development Centre, Taiwan |
| BADC | Belgian Administration for Development Cooperation, Belgium |
| BANBOARD | Banana Board of Jamaica |
| BARI | Bangladesh Agricultural Research Institute, Bangladesh |
| BBG | Beijing Botanical Garden, China |
| BDCP | Bioresources Development and Conservation Programme |
| BFRI | Bangladesh Forest Research Institute, Bangladesh |
| BRIS | Banana Research Information System, INIBAP |
| BMZ | Bundesministerium für Wirtschaftliche Zusammenarbeit, Germany |
| CAAS | Chinese Academy of Agricultural Sciences, China |
| CABI | CAB International, UK |
| CARDI | Caribbean Agricultural Research and Development Institute, Trinidad and Tobago |
| CATIE | Centro Agronómico Tropical de Investigación y Enseñanza, Costa Rica |
| CBD | Convention on Biological Diversity |
| CENARGEN | Centro Nacional de Pesquisa de Recursos Genéticos e Biotecnologia, Brazil |
| CGIAR | Consultative Group on International Agricultural Research |
| CGN | Centre for Genetic Resources the Netherlands |
| CIAT | Centro Internacional de Agricultura Tropical, Colombia - CGIAR |
| CIFOR | Center for International Forestry Research, Indonesia - CGIAR |
| CIMMYT | Centro Internacional de Mejoramiento de Maíz y Trig, Mexico - CGIAR |
| CIP | Centro Internacional de la Papa, Peru - CGIAR |
| CIRAD | Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France |
| CNIC | Centro Nacional de Investigaciones Científicas, Cuba |
| CNPMF | Centro Nacional de Pesquisa de Mandioca e Fruticultura (EMBRAPA), Brazil |
| CNR | Consiglio Nazionale delle Ricerche, Italy |
| COGENT | International Coconut Genetic Resources Network |
| CORPOICA | Corporación Colombiana para la Investigación en Agricultura, Colombia |
| COP | Conference of the Parties |
| CPGR | Commission on Plant Genetic Resources |
| CPRO-DLO | Centre for Plant Breeding and Reproduction Research, the Netherlands |
| CRBP | Centre régional bananiers et plantains, Cameroon |
| CSC | Commonwealth Science Council, UK |
| CSEGRIN | Caribbean Seed and Germplasm Resources Information Network |
| CSIRO | Commonwealth Scientific and Industrial Research Organization, Australia |
| CSSA | Crop Science Society of America |
| CTA | Technical Centre for Agricultural and Rural Cooperation, The Netherlands |
| DANIDA | Danish International Development Assistance |
| DAST | Department of Agricultural Science and Technology, Vietnam |
| DGIS | Directorate-General for International Cooperation, the Netherlands |
| DICTA-SRN | Dirección de Ciencia y Tecnología Agropecuaria - Secretaría de Recursos Naturales, Honduras |
| DIT | Documentation, Information and Training |
| DSMZ | Deutsche Sammlung von Mikroorganismen und Zellkulturen, Germany |
| EAP | Escuela Agrícola Panamericana, Honduras |
| EC | European Community |
| EEC | European Economic Community |
| ECOWAS | Economic Community of West African States |
| ECP/GR | European Cooperative Programme for Crop Genetic Resources Networks |
| ELADA | Electronic Atlas of Agenda 21, IDRC |
| EMBRAPA | Empresa Brasileira de Pesquisa Agropecuária, Brazil |
| ESTIA | Escuela Técnica Superior de Ingenieros Agrónomos, Spain |
| EUFORGEN | European Forest Genetic Resources Programme |
| FAL | Institut für Pflanzenbau und Pflanzenzüchtung der Bundesforschungsanstalt für Landwirtschaft, Germany |
| FAO | Food and Agriculture Organization of the United Nations, Italy |
| FHIA | Fundación Hondureña de Investigación Agrícola, Honduras |
| FLHOR | Département des productions fruitières et horticoles, CIRAD, France |
| FONAIAP | Fondo Nacional de Investigación Agropecuaria, Venezuela |
| FRIM | Forest Research Institute of Malaysia |
| GATT | General Agreement on Tariffs and Trade |
| GEF | Global Environment Fund |
| GEVES | Groupe d'Etude et de Contrôle des Variétés et des Semences, France |
| GMS | Genebank Management System |
| GMU | Germplasm Maintenance and Use |
| GRIN | Genetic Resources Information Network |
| GTZ | Deutsche Gesellschaft für Technische Zusammenarbeit, Germany |
| HIA | Higher Institute of Agriculture, Tirana, Albania |
| IBPGR | International Board for Plant Genetic Resources, now IPGRI |
| ICARDA | International Center for Agricultural Research in the Dry Areas, Syria - CGIAR |
| ICGR | Institute of Crop Germplasm Resources, China |
| ICPPGR | International Conference and Programme on Plant Genetic Resources |
| IGCCBD | Inter-Governmental Committee on the Convention on Biological Diversity |
| ICLARM | International Center for Living Aquatic Resources Management, the Phillipines - CGIAR |
| ICRAF | International Council for Research in Agroforestry, Kenya - CGIAR |
| ICRISAT | International Crops Research Institute for the Semi-Arid Tropics, India - CGIAR |
| ICW | International Centres Week - CGIAR |
| ICWG-GR | Inter-Centre Working Group on Genetic Resources - CGIAR |
| ICUC | International Centre for Underutilized Crops, UK |
| IDB | Inter-American Development Bank, USA |
| ICGR | Institute of Crop Germplasm Research, China |
| IDRC | International Development Research Centre, Canada |
| IFGM | Institute of Forestry and Game Management, Belgium |
| IFPRI | International Food Policy Research Institute, USA - CGIAR |
| IGER | Institute for Grasslands and Environmental Research, UK |
| IHAR | Plant Breeding and Acclimatization Institute, Radzikow, Poland |
| IICA | Instituto Interamericano de Cooperación para la Agricultura, Costa Rica |
| IIMI | International Irrigation Management Institute, Sri Lanka - CGIAR |

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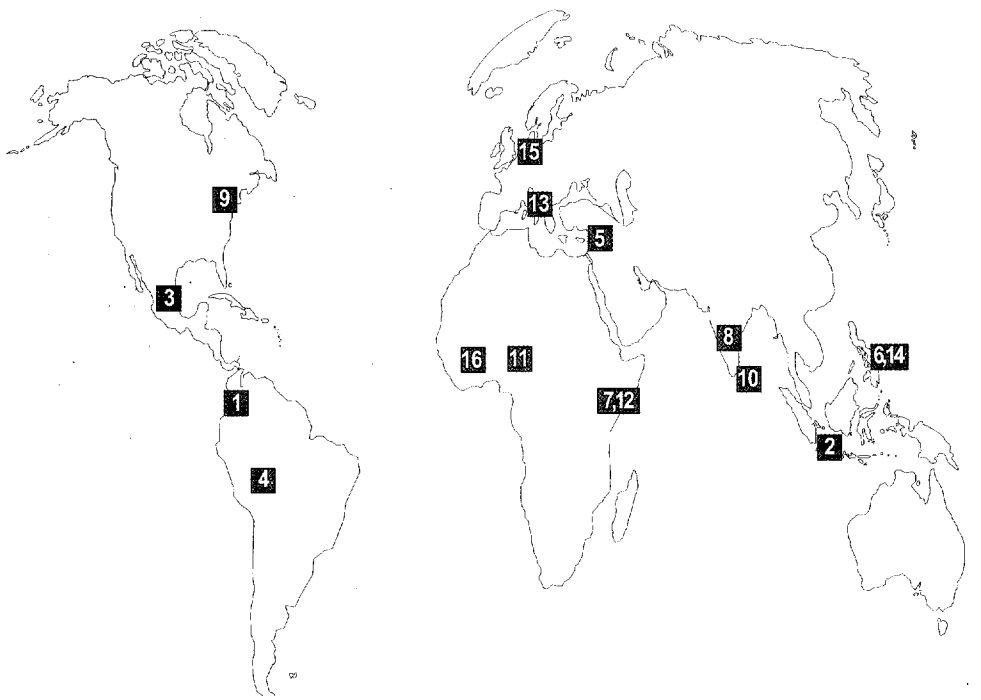
|---|---|
| IITA | International Institute of Tropical Agriculture, Nigeria - CGIAR |
| IMTP | International *Musa* Testing Programme |
| INBAR | International Network for Bamboo and Rattan |
| INCO-DC | European Commission Programme of Cooperation with Third Countries and International organizations, Part C: Science and Technology Cooperation with Developing Countries |
| INIA | Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, Spain *also* Instituto Nacional de Investigación Agropecuaria, Uruguay |
| INIAP | Instituto Nacional Autónomo de Investigaciones Agropecuarias, Ecuador |
| INIBAP | International Network for the Improvement of Banana and Plantain, Montpellier - IPGRI/CGIAR |
| INIFAT | Instituto de Investigaciones Fundamentales en Agricultural Tropical, Cuba |
| INTAGRES | International Agricultural Research - European Service, Italy - CGIAR |
| INSA | National Institute of Agricultural Sciences, Vietnam |
| IPB | Institute of Plant Breeding, Philippines |
| IPGRI | International Plant Genetic Resources Institute (formerly IBPGR), Italy - CGIAR |
| IPK | Institut für Pflanzengenetik und Kulturpflanzenforschung, Germany |
| IRAZ | Institut de recherches agronomique et zootechnique de la Communauté économique des pays des grands lacs, Burundi |
| IRRI | International Rice Research Institute, the Philippines - CGIAR |
| ISAR | Institut des Sciences Agronomiques du Rwanda |
| ISC | ICRISAT Sahelian Center, Niger |
| ISNAR | International Service for National Agricultural Research, the Netherlands - CGIAR |
| ITC | *Musa* Germplasm Transit Center, INIBAP |
| IUBS | International Union of Biological Sciences |
| IUFRO | International Union of Forest Research Organizations |
| IUCN | World Conservation Union |
| IVDN | Integrated Voice and Data Network - CGIAR/CGNET |
| KARI | Kawanda Agricultural Research Institute, NARO, Uganda *also* Kenya Agricultural Research Institute |
| KUL | Katholieke Universiteit Leuven, Belgium |
| LACNET | Regional Network for Latin America and Caribbean Network, INIBAP, Costa Rica |
| MAB | Man and the Biosphere Programme, Unesco |
| MAFF | Ministry of Agriculture, Fisheries and Forests, Japan |
| MARDI | Malaysian Agricultural Research and Development Institute |
| MUSAID | Computerized System for Banana Identification, CIRAD-FLHOR, France |
| MUSALIT | INIBAP Bibliographic Database |
| NARC | National Agricultural Research Centre |
| NARO | National Agricultural Research Organization, Uganda |
| NARS | National Agricultural Research System |
| NBPGR | National Board for Plant Genetic Resources, India |
| NBRI | National Botanical Research Institute of Namibia |
| NCARTT | National Center for Agricultural Research Training and Technology, Jordan |
| NEP | National Evaluation Programme, INIBAP |
| NGB | Nordic Gene Bank, Sweden |
| NGO | Non-governmental Organization |
| NIAR | National Institute for Agrobiological Research, Japan |
| NPGRL | National Plant Genetic Resources Laboratory, Philippines |
| NRS | Nigerian Research Service |
| NSSL | National Seed Storage Laboratory, USA |
| OCRI | Oil Crops Research Institute, China |
| ODA | Overseas Development Administration, UK |
| ORSTOM | Institut Français de Recherche Scientifique pour le Développement en Coopération, France |
| PARC | Public Awareness Resources Committee - CGIAR |
| pcGRIN | A version of the GRIN (Genetic Resources Information Network) database adapted for use on personal computers |
| PCR | Polymerase chain reaction |
| PGRC/E | Plant Genetic Resources Centre, Ethiopia |
| PGRI | Plant Genetic Resources Institute |
| PRAP | Pacific Regional Agricultural Programme, Western Samoa |
| PPRC | Programme Planning and Resources Committee |
| PROCI-TROPICOS | Programa Cooperativo de Investigación y Transferencia de Technología Agropecuaria para los Trópicos Suramericanos, Brazil |
| PROCISUR | Programa Cooperativo para el Desarrollo Tecnológico Agropecuario del Cono Sur, Argentina |
| PSARI | Plant Science Agricultural Research Institute, Mongolian National Agricultural University, Mongolia |
| QDPI | Queensland Department of Primary Industries, Australia |
| RAFI | Rural Advancement Foundation International |
| RAPD | Random amplified polymorphic DNA |
| RBG | Royal Botanic Gardens, UK |
| RECSEA | Regional Committee for Southeast Asia |
| REDARFIT | Andean Plant Genetic Resources Network |
| REGEN-UNA | Programa de Recursos Genéticos - Universidad Nacional Agraria, Nicaragua |
| REMERFI | Mesoamerican Plant Genetic Resources Network |
| RFD | Royal Forest Department, Thailand |
| RFLP | Restriction fragment length polymorphism |
| RIAH | Research Institute of Animal Husbandry, Mongolian National Agricultural University, Mongolia |
| RICP | Research Institute of Crop Production, Czech Republic |
| RVAU | Royal Veterinary and Agricultural University, Denmark |
| SADC | Southern African Development Community (formerly SADCC) |
| SAFGRAD | Consultative Advisory Committee on Semi-Arid Food Grain Research and Development, Nigeria |
| SALWA | Semi-arid Lowland West Africa |
| SARD | Scientific and Agricultural Research Directorate, Syria |
| SAREC | Swedish Agency for Research Cooperation with Developing Countries |
| SBSTTA | Subsidiary Body on Scientific Technical and Technological Advice |
| SDC | Swiss Agency for Development and Cooperation |
| SGRP | System-wide Genetic Resources Programme - CGIAR |
| SIDA | Swedish International Development Authority, Sweden |
| SINGER | System-wide Information Network for Genetic Resources - CGIAR |
| SNTC | Swaziland National Trust Commission, Swaziland |
| SPC | South Pacific Commission, Fiji |
| SPGRC | SADC Plant Genetic Resources Centre |
| SPII | Seed and Plant Improvement Institute, Iran |
| TAC | Technical Advisory Committee - CGIAR |
| TBRI | Taiwan Banana Research Institute |
| TCC | Technical Consultative Committee |
| TRIPS | Trade Related Intellectual Property |
| TROPIGEN | Amazonian Plant Genetic Resources Network |
| UCD | University of California at Davis, USA |
| UTFANET | Underutilized Fruits in Asia Network |
| UMS | Underutilized Mediterranean Species |
| UN | United Nations |
| UNCED | United Nations Conference on Environment and Development |
| UNDP | United Nations Development Programme |
| UNZA | University of Zambia |
| UNEP | United Nations Environment Programme |
| Unesco | United Nations Educational, Scientific and Cultural Organization |
| UPOV | International Union for the Protection of New Varieties of Plants, Geneva, Switzerland |
| UPTC | Universidad Pedagógica y Tecnológica de Colombia |
| USAC | Universidad de San Carlos, Guatemala |
| USAID | United States Agency for International Development |
| USDA | United States Department of Agriculture, USA |
| VIR | N.I. Vavilov Research Institute of Plant Industry, Russia |
| VASI | Vietnam Agricultural Science Institute |
| WANA | West Asia and North Africa |
| WANANET | WANA Plant Genetic Resources Network |
| WARDA | West Africa Rice Development Association, Côte d'Ivoire - CGIAR |

# The Consultative Group on International Agricultural Research

**CGIAR centres - geographical locations**




1 CIAT Centro Internacional de Agricultura Tropical, Cali, Colombia
2 CIFOR Center for International Forestry Research, Bogor, Indonesia
3 CIMMYT Centro Internacional de Mejoramiento de Maiz y Trigo, Mexico DF, Mexico
4 CIP Centro Internacional de la Papa, Lima, Peru
5 ICARDA International Center for Agricultural Research in the Dry Areas, Aleppo, Syria
6 ICLARM International Center for Living Aquatic Resources Management, Metro Manila, Philippines
7 ICRAF International Centre for Research in Agroforestry, Nairobi, Kenya
8 ICRISAT International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India
9 IFPRI International Food Policy Research Institute, Washington DC, USA
10 IIMI International Irrigation Management Institute, Colombo, Sri Lanka
11 IITA International Institute of Tropical Agriculture, Ibadan, Nigeria
12 ILRI International Livestock Research Institute, Nairobi, Kenya
13 IPGRI International Plant Genetic Resources Institute, Rome, Italy
14 IRRI International Rice Research Institute, Los Baños, Philippines
15 ISNAR International Service for National Agricultural Research, The Hague, The Netherlands
16 WARDA West Africa Rice Development Association, Bouaké, Côte d'Ivoire

IPGRI is an institute of the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is a decentralized structure made up of 16 international agricultural research centres, located in 12 developing and 3 developed countries. CGIAR's mission is to promote sustainable agriculture for food security in developing countries. Centres work in close collaboration with partners in national research systems, to develop resource-efficient technologies that contribute to sustainable improvements in the productivity of agriculture, forestry and fisheries, thereby enhancing the nutrition and well-being of the poor. They also conduct research into agriculture-related policy and assist in capacity-building.
Fifty-two members provide funds that support the CGIAR, which is jointly sponsored by the World Bank, the Food and Agriculture Organization of the United Nations, the United Nations Development Programme, and the United Nations Environment Programme.

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