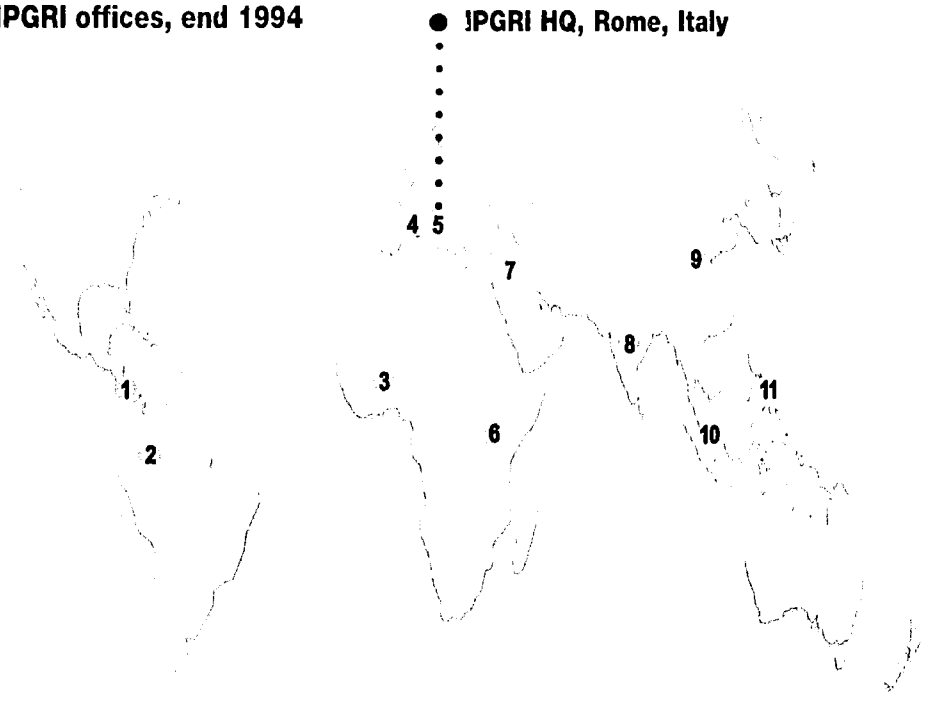
Annual Report 1994

International Plant Genetic Resources Institute

IPGRI

The **International Plant Genetic Resources Institute** (IPGRI) is an autonomous international scientific organization operating under the aegis of the Consultative Group on International Agricultural Research (CGIAR). IPGRI's mandate is to advance the conservation and use of plant genetic resources for the benefit of present and future generations. IPGRI works in partnership with other organizations, undertaking research, training, and the provision of scientific and technical advice and information. IPGRI retains the strong programme link of its predecessor, the International Board for Plant Genetic Resources (IBPGR), with the Food and Agriculture Organization of the United Nations

Location of IPGRI offices, end 1994



6 Regional Office for Sub-Saharan Africa, Nairobi, Kenya
  3 Office for West Africa, Niamey, Niger
7 Regional Office for West Asia and North Africa, Aleppo, Syria
10 Regional Office for Asia, the Pacific and Oceania, Singapore
  8 Office for South Asia, New Delhi, India
  9 Office for East Asia, Beijing, China
2 Regional Office for the Americas, Cali, Colombia
5 Regional Office for Europe, Rome, Italy
4 INIBAP HQ, Montpellier, France
  1 INIBAP regional office for Latin America and the Caribbean, San Jose, Costa Rica
  11 INIBAP regional office for Asia and the Pacific, Los Baños, the Philippines

Annual Report **1994**

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Notes

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IPGRI. 1995. Annual Report 1994. International Plant Genetic Resources Institute, Rome.

ISBN 92-9043-232-2

IPGRI Headquarters, Via delle Sette Chiese 142, 00145, Rome, Italy

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This publication was designed and laid out by IPGRI staff in Aldus PageMaker 5.0 using MS-DOS-based computers. Graphics were prepared with Micrographx Designer 4.1a TE and Adobe Illustrator 4.0. A number of the illustrations and maps came from CD-ROMs from PhotoDisc, Image Club and Mountain High Maps, processed through Micrographx Picture Publisher 5.0a. Filmsetting by Bodani, Rome; printing by Albagraf, Pomezia, Italy

This publication is printed on Zanders Polarmatt 'environmentally friendly' paper. This means that the wood pulp used to make the paper was produced from sustainably grown plantations, and that no damaging chemicals were released into the environment as a result of the production process. The paper was bleached using oxygen rather than chlorine. As well as eliminating any potential damage to the atmosphere, this means that the paper itself is chlorine free, so that it will not deteriorate or discolour with time

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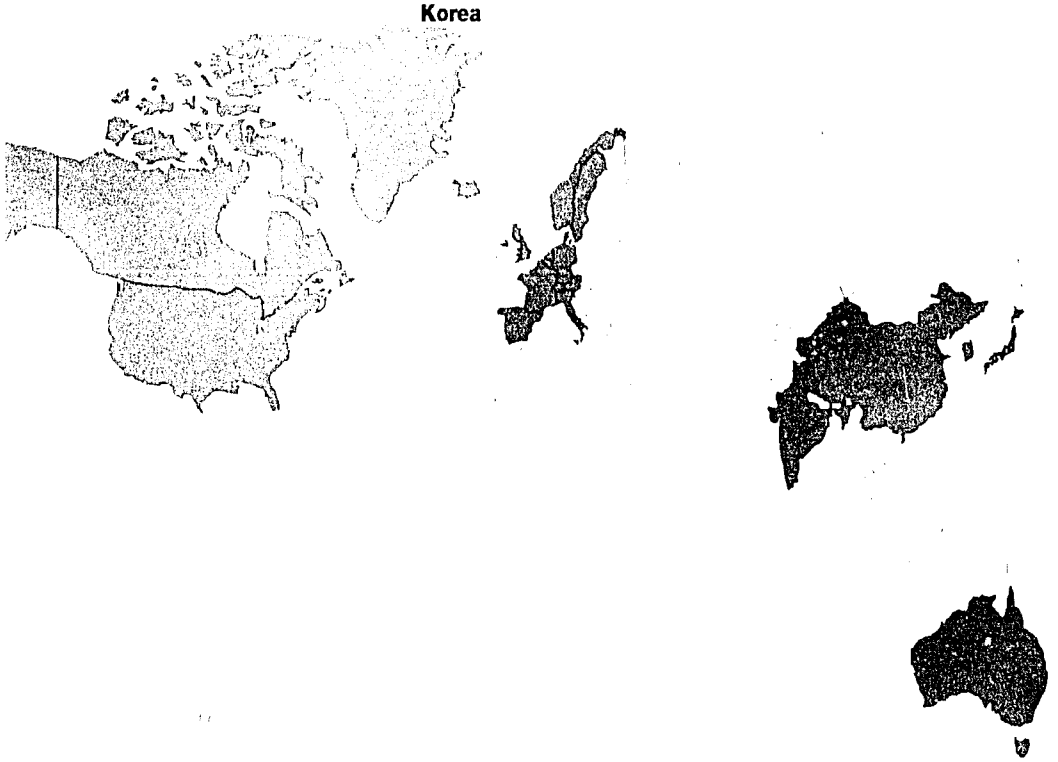
Core Donors

● Financial support for the core programme of IPGRI was provided in 1994 by the Governments of:

- Australia
- Austria
- Belgium
- Canada
- China
- Denmark
- France
- Germany
- India
- Italy
- Japan
- Republic of Korea
- the Netherlands
- Norway
- Spain
- Sweden
- Switzerland
- the UK
- the USA,

as well as the

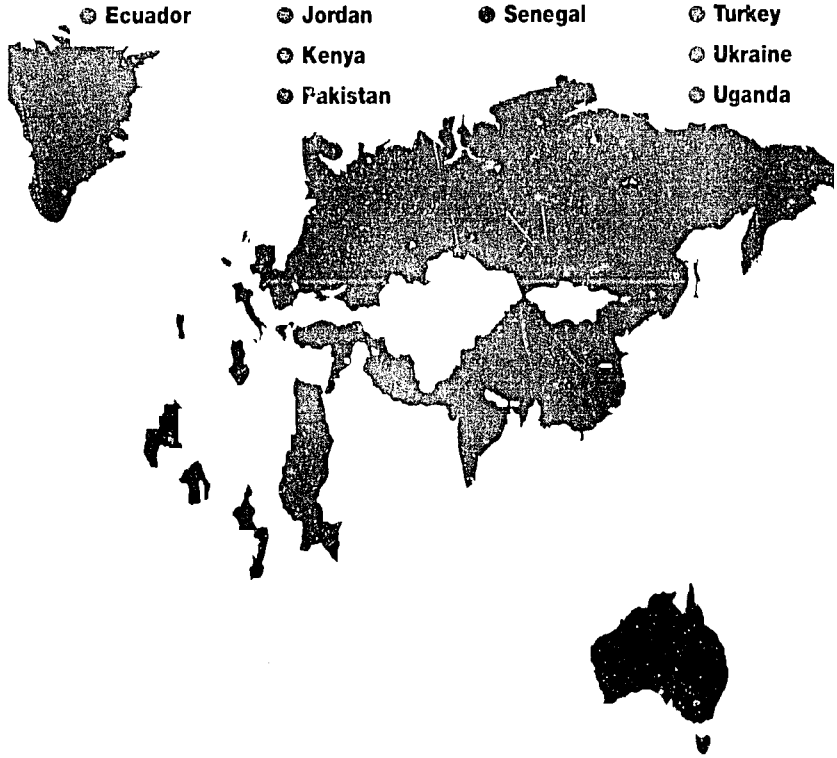
- Asian Development Bank
- United Nations Development Programme and the
- World Bank



Establishment Agreement Signatories

● The international status of IPGRI is conferred under an Establishment Agreement which, by December 1994, had been signed by the Governments of:

- Australia
- Belgium
- Benin
- Bolivia
- Burkina Faso
- Cameroon
- China
- Chile
- Congo
- Costa Rica
- Côte d'Ivoire
- Cyprus
- Czech Republic
- Denmark
- Ecuador
- Egypt
- Greece
- Hungary
- India
- Iran
- Italy
- Jordan
- Kenya
- Pakistan
- Panama
- Peru
- Poland
- Portugal
- Romania
- Russia
- Senegal
- Slovak Republic
- Sudan
- Switzerland
- Syria
- Tunisia
- Turkey
- Ukraine
- Uganda



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Introduction

In the early part of this century, pioneers such as N.I. Vavilov came to appreciate the importance of conserving germplasm. Only more recently have genetic resources been recognized as a distinct area of scientific endeavour. International recognition of the increasing threat of genetic erosion started with the 1967 FAO Conference; awareness was raised still further by the 1972 United Nations Conference on the Human Environment, where the issue of sustainable agricultural development received conspicuous attention. Two years later, IBPGR was established. These related events marked the initial steps in the evolution of conservation science. The early 1990s saw the beginnings of a second, and rather more prominent stage of evolution, stemming from the1992 UNCED Conference. By 1994, exactly 20 years after the founding of IBPGR, the conservation and use of genetic resources was commanding worldwide attention.

The International Plant Genetic Resources Institute began formal operations as the successor to IBPGR on 1 January 1994. The timing could not have been more appropriate. The public focus on the conservation of biological diversity in the wake of UNCED has brought with it a requirement for strengthening all sectors of the genetic resources community. Within the institute, this requirement has coincided with a period of intense self-examination as IBPGR prepared for administrative separation from FAO and its establishment as an independent centre of the CGIAR.

The process required detailed consideration - in consultation with our partners - of the most appropriate role for the new institute. It has resulted in the establishment of a new strategic direction for the institute and the development of a well-focussed yet flexible programme. One important advance has been the addition of new staff with expertise in the social and cultural aspects of genetic resources conservation; this has enabled IPGRI to complement its traditional strength in *ex situ* conservation.

In 1994, the CGIAR resolved to link the existing genetic resources activities of the centres into a comprehensive programme covering both terrestrial and aquatic genetic resources. The System-wide Genetic Resources Programme, comprising the independently managed genetic resources activities related to *in situ* and *ex situ* conservation within the CGIAR, aims to ensure operational coordination among the centres. IPGRI serves as the convening centre for SGRP and lead centre for the System-Wide Genetic Resources Initiative, which comprises the activities funded under an additional annual allocation by TAC. IPGRI is also represented on the CGIAR Policy Committee on Genetic Resources, chaired by Dr. M.S. Swaminathan.

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The CGIAR is now seen as an important partner in the implementation of the Convention on Biological Diversity. IPGRI, representing the CGIAR, was present at the first session of the Conference of the Parties to the Convention on Biological Diversity where it was privileged to give a statement to the Ministerial Session. The statement indicated the willingness of the CGIAR to put its technical expertise at the disposal of the bodies of the Convention. This sentiment provided evidence of the System's strong commitment to the implementation of the CBD, which it views as critical to the future development of sustainable agriculture, forest and aquatic systems.

While IPGRI is no longer a part of FAO, the institute's links with that organization have, if anything, strengthened over the past 12 months. IPGRI played a principal role in the development of agreements to place CGIAR germplasm collections under the auspices of the FAO International Network of *Ex Situ* Germplasm Collections. These agreements were signed in October 1994. FAO is a partner - formally or informally - in a large number of activities, many of which are detailed in these pages. Perhaps foremost among these is the International Conference and Programme on Plant Genetic Resources. This important process, which will culminate in the 4th Technical Conference on Plant Genetic Resources, to be held in Germany in 1996, is being carried out with significant involvement of IPGRI staff both at headquarters and in the regions.

The integration of the International Network for the Improvement of Banana and Plantain into the IPGRI programme was well under way in 1994, bringing a new dimension to the institute's work on *Musa*, a group of crops which is critical to the nutrition and economic well-being of millions of people in Asia, the Pacific, Africa, Latin America and the Caribbean. An agreement signed in May 1994 by the Boards of the two institutions, as well as the INIBAP Support Group, sets out the understanding among the parties of the future of the programme. INIBAP's identity and *modus operandi* as an international research network will be maintained and it will continue to have its main operational base in Montpellier, France. Synergies between the IPGRI and INIBAP programmes will be exploited to the advantage of *Musa* researchers and small-scale producers throughout the world.

1994 was a year both for looking back on IBPGR's accomplishments in the field of plant genetic resources, and for looking ahead to the role that IPGRI will play in the conservation and sustainable use of agricultural biodiversity. On the 20th anniversary of its establishment and in the first year of its new life, IPGRI stood ready to meet the challenges facing the science and practice of genetic resources conservation at century's end and to respond to the opportunities posed by UNCED.

Wanda Collins
Chair, Board of Trustees

Geoffrey Hawtin
Director General

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Programme activities

In 1992, on instituting its new Strategy, IPGRI restructured its programmatic components to assist in working towards the four objectives of the Strategy that were outlined in the publication *Diversity for development*. This restructuring created eight programme groups, five regional and three thematic.

The Regional Groups are based, and coordinate IPGRI's work, in:

Sub-Saharan Africa

West Asia and North Africa

Asia, the Pacific and Oceania

Americas

Europe.

The Regional Groups are responsible for developing and reviewing regional strategies, providing assistance to national and regional programmes, formulating and, where appropriate, having direct involvement in research, collecting, training, documentation and information activities. They have an essential role in bringing genetic resources expertise to the developmental and cultural context of the regions and fostering links between programmes.

The three Thematic Groups were established at Headquarters in Rome, Italy. These Groups are responsible for developing and coordinating research and information work of inter-regional or global relevance in their respective subject areas. The Groups are also responsible for providing scientific and technical support to the regions. The three Groups are:

Genetic Diversity

extent and distribution of genetic diversity, its measurement, *in situ* conservation and *ex situ* collecting, forest genetic resources conservation, and socioeconomic aspects of plant genetic resources conservation and use.

Germplasm Maintenance and Use

strategies and technologies of conservation and use, germplasm management, seed, pollen and *in vitro* conservation and germplasm health.

Documentation, Information and Training

germplasm documentation, documentation technology, library and bibliographic services, publications, training coordination, impact assessment and public awareness.

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IPGRI's strategic objectives

IPGRI has four major elements in its work on plant genetic resources:
1 strengthening national programmes
2 contributing to international collaboration
3 improving strategies and technologies for conservation
4 providing an international information service

In May 1994 this organizational structure was augmented by the integration of the programme activities of the International Network for the Improvement of Banana and Plantain, which came under the governance and administration of IPGRI when a Memorandum of Understanding was signed by the two organizations and INIBAP's Support Group. INIBAP's activities include collecting, conserving, testing and disseminating *Musa* germplasm, in addition to maintaining databases, publishing information and commissioning strategic research. INIBAP also organizes regional network meetings, scientific conferences and provides training.

IPGRI operated under the restructured system for the whole of 1994, carefully monitoring how the programme strategy was functioning to meeting its strategic objectives. Weaknesses in the project management framework were addressed in 1994 following recommendations of the Programme, Planning and Review Committee, which meets three times a year to review the programme structure and project set, including also planning and budget allocation. Specific measures taken to correct perceived weaknesses are briefly discussed below.

Programme structure

IPGRI's programmatic activities are based on projects. At the end of 1994, the IPGRI project set consisted of 56 projects. This represents an increase over the previous year with the inclusion of 10 INIBAP projects, the merger of one project into another, and the addition of a project to coordinate resources and activity management for the CGIAR's System-wide Genetic Resources Programme.

The interdisciplinary nature of IPGRI's projects, in which project and activity team members are drawn from a mixture of two or more Regional and Thematic Groups, allowed the concentration of expertise from different areas of specialization. This allows IPGRI to capitalize on the strengths of both types of Groups. The policy of having staff from both Thematic and Regional Groups work in tandem on the same project resulted in tangible benefits. Regional staff lend greater depth to projects and contribute to a realistic perspective, while staff from Thematic Groups impart greater breadth to regional-based projects and lend a theoretical and/or technological outlook to the Institute's work. The result has been a noted increase in flexibility and versatility in meeting the needs of National Programmes and other partners — important in a strategy which has partnership as a keynote.

Most of IPGRI's projects which are global in nature are managed by the Thematic Groups based in Headquarters. Some projects, however, are coordinated by regional staff, an arrangement which has proven to be very successful.

Resources (budget and staff time) have also been managed on a project basis. This arrangement has facilitated an analysis of how resources are being used and an evaluation of present allocations in terms of our strategic objectives. Individual projects are likely to have components which contribute to more than one of the four strategic objectives, reflecting the inter-related nature of plant genetic resources work. The reviews of the project set made in 1994 sought to examine how projects can most effectively produce the best output for achieving these objectives. The relative support given to the five regions and the four objectives in 1994 allocations is illustrated in Tables 1 and 2.

Project management

Staff

All programme staff of IPGRI are assigned to either a Regional or a Thematic Group. Each Group has a Director responsible for developing strategies, coordinating the allocation of resources to

Abbreviations - see pp. 105-106

projects, supervising and monitoring project inputs' and recruiting and appraising staff. IPGRI has a staff whose expertise spans most of the fields of genetic resources science and technology. Through its network of Regional Offices, IPGRI established working relationships with almost all of the active crop, forestry/agroforestry and forage genetic resources programmes of the world. IPGRI has continuing working relationships with relevant UN agencies and with major international NGOs concerned with conservation and agricultural development.

Information management

In response to the perceived programme needs mentioned above, and in recognition of the fact that effective project design and implementation requires effective management, an improved reporting process was initiated in 1994 by the PPRC. This procedure involves an Annual Progress Report analyzing and compiling information to allow the review of the progress of each project. A revised version of the report was introduced later in 1994, utilizing software that facilitated active use of the information in the reports through its powerful search functions and data retrieval options. This improved report format incorporated information on the lifespan of each project, expected impact with appropriate indicators for evaluating progress, and expected output during the lifespan of each activity, together with an estimate of the current level of achievement. The new software was also applied to the IPGRI travel reporting system to streamline and render it more effective in disseminating information.

The resulting databases, which allow comparison and interaction of information sets, form the basis of a new system for project management, which monitors projects from inception through to evaluation.

Project management framework

IPGRI's project management framework was set forth in a document approved by the PPRC in early 1993, describing the eight phases in the project management cycle from initial consideration of project concept through development, approval, implementation and impact evaluation. The current re-evaluation of the project management structure, as discussed above, will include a re-examination of this document in the light of changing programme requirements, resource allocation and the implications of global policy issues.

Addressing strategic objectives

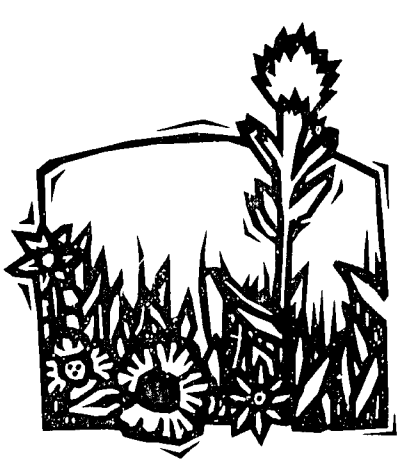
The introduction of the project-based system provided a mechanism for a more effective use of the resources of IPGRI and its partners. It provided IPGRI with specific tools for managing resources and took full advantage of the experience and expertise available in IPGRI's Thematic and Regional staff. Although the programme structure was still evolving, and can only be subject to meaningful analysis following its delivery of clear outputs, the new system had already emphatically demonstrated its ability to facilitate IPGRI's efforts in achieving its strategic objectives.

Table 1
Distribution of IPGRI core budget by region

Region	%
SSA	26
WANA	22
APO	26
Americas	22
Europe	4

Table 2
Distribution of support to IPGRI research projects by objective

Objective	%
1	30
2	20
3	30
4	20



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Sub-Saharan Africa

During 1994, the SSA Group aimed at improving the organization and implementation of activities on plant genetic resources in West Africa and in the Southern African Development Community. The Group continued to provide technical and scientific advice to the national programmes, and facilitate interactions between partners such as the other IARCs, regional research organizations, some NGOs and donors. Activities were intensified in the five IPGRI projects that form the main framework for action in Sub-Saharan Africa.

The Group was also involved in a number of inter-regional project activities. It participated in several system-wide initiatives such as the ecoregional African Highland Initiative, designed to address specific agricultural constraints in the highlands of Eastern and Central Africa.

Another such project was the Seeds of Hope initiative of the IARCs of the CGIAR, aimed at bringing relief to war-torn Rwanda by providing germplasm to the National Programme and much-needed planting material to the population.

The year was also marked by the signing, in December, of the agreement with the Kenya Government for the operation of the Regional Office in Kenya. This significant ceremony provided an identity to the Institute in the country and more visibility to the Regional Office.

Selected project activities

Spatial and temporal distribution of forage genetic diversity

A GTZ-funded study of the spatial and temporal distribution of genetic diversity within five annual forage grass and legume species in Niger continued. This work was part of the project on improved conservation and use of forages and fodder species in Africa.

Eighteen test sites were established. Seeds and leaf samples of the five test species were collected at all these sites. DNA analysis of the samples began at the University of Giessen. A protocol was developed to perfect the field technique for collecting leaf material for DNA analysis. This proved very successful. Leaf material col-

- Conservation and use of plant germplasm in the Southern Africa Development Community
- Initiation and strengthening of plant genetic resources programmes in selected countries in Africa
- Network for the study and conservation of *Coffea* genetic diversity in Africa and southwest Asia
- Improved conservation and use of forage and fodder species in the arid and semi-arid regions of Africa
- Development of a regional network on plant genetic resources in West Africa

lected in the field is put into plastic tubes half-filled with silica gel; these are stored in a refrigerated bag. The dried leaf material was sent to Giessen, where several primers giving polymorphism had been identified for all test species. Further primers need to be tested for *Dactyloctenium aegyptiam* and *Cenchrus biflorus*.

Coffee genetic resources network

The committee of the African Coffee Research Network responsible for developing a plan of action for *Coffea* genetic resources conservation and use in Africa met in Nairobi under the auspices of the Regional Office in May 1994. A first draft of a project proposal addressing priority genetic resources issues was prepared and submitted to donors. The possibility of beginning to forge links between coffee genetic resources workers in Africa and Latin America was pursued, and the 1995 ACRN meeting will include observers from Colombia and Brazil.

A crop expert was identified and commissioned to produce a descriptor list for *Coffea canephora*. A PhD candidate was identified to work on a project to develop a comprehensive conservation strategy for wild *Coffea* in Mauritius, which could serve as a model for other African countries. The project is based on a variability study of the coffee resources from Mauritius and Reunion.

Throughout the Sahel, crops are stored on raised platforms to protect them from vermin

Werner Forman Archive, UK

Exploring the possibility of sun-drying seed in the Sahel

In most developing countries, proper seed drying is a major obstacle in the process of germplasm conservation. Countries in Sahelian Africa are naturally endowed with a climate conducive to natural seed drying. In Niamey, Niger, for example relative humidity can be as low as 15% during the dry season. However, the temperature can easily reach 40°C. To investigate the effect on viability of drying seed under the ambient conditions of low relative humidity and high temperature, an experiment was started in conjunction with GMU. Seed of groundnut, maize and millet was dried in the open air, under direct sun and under shade, at Niamey and compared with the use of a drying room (see also p. 59).

Survey of the effectiveness of targeted germplasm collecting

A literature search was made on the 'Effectiveness of targeted germplasm collecting in the recovery of genotypes, genes and alleles'. Following some preliminary investigations, two species, teff *(Eragrostis teff)* and ragi millet *(Eleusine coracana)*, were selected as case study crops. A general survey as well as a more focused study using the suggested two crops was carried out. Sources of literature were generally very scanty locally. A search of

PLANTGENECD yielded a number of relevant references and a technical report with recommendations for further work was compiled.

The literature survey resulted in the review of 125 publications on germplasm collecting and evaluation, particularly of finger millet, teff and other inbreeding wild and cultivated species.

The technical report indicated that the principal advantages of targeted collecting of germplasm are an increased probability of recovering desirable genes or gene complexes and reduced cost of collecting. Such collecting, however, requires precise and careful planning and execution compared to random collecting. The following points are important in optimizing the efficiency of targeted collecting.

The germplasm collecting mission should have a clearly defined objective in terms of feasibility, personnel requirements and available budget. Targeted collecting should aim at a few specific traits whose diversity is known to occur in the area where collecting is intended.

Before a collecting mission is executed, collectors should be familiar with the relevant literature on the crop of interest, including the location of centres of diversity. Where targeted collecting is the goal, such information is invaluable because it helps in determining the relative concentration of particular characters and hence the chances of recovering the desired allele or allele complexes during the mission. Evaluation studies of previous collecting trips should be useful in fine tuning the objectives of the mission and planning the collecting activities. The purpose of collecting is to search for, recover and conserve material for use in future programmes.

The choice of collecting site should be determined by the concentration of the desired trait within a given environment where the traits are well expressed.

The report recommended the following case studies, which involve targeted collecting and recovery of genes:

Finger millet:

for resistance to lodging from landraces in Ethiopia or for drought resistance from landraces in Kenya.

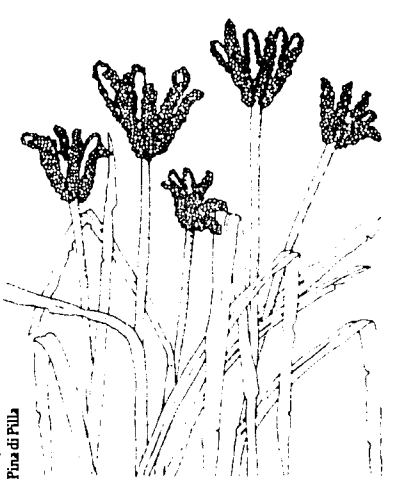
Teff:

for head smudge and rust resistance from wild relatives (*Eragnostis pilosa* and *E. ciliancusis*) in Ethiopia.

Preliminary contacts and consultations were made with PGRC/E, the Crop Breeding Institute, Zimbabwe, and the NRS of Nigeria to test the hypothesis of whether targeted germplasm collecting would be effective in recovering genes, alleles and genotype complexes. This study will be carried out through targeted survey missions in the proposed countries as a joint undertaking during 1995.

IPGRI staff visited Rwanda to assess the facilities at Rubona and Ruhande but access to the stations was not possible due to security problems. Discussions on possibilities for collaboration were made with some NGOs and development agencies. Follow-

Finger millet



Fina di Pilla

Landraces in Ethiopia, illustrated here, are particularly resistant to the problem of lodging, which is the bending over or breaking of plant stems before harvest.

Seeds of Hope initiative

Rwanda

Seeds of Hope is an initiative to locate Rwandan germplasm and repatriate supplies of the material to revitalize the country's agriculture. The project was started by the CGIAR centres involved in agricultural research in Africa, under the leadership of CIAT. and held several meetings in Nairobi in July and September. The participating Centres, FAO, some NGOs such as World Vision, and a few East African NARS, gave brief presentations on the situation in Rwanda and progress reports.

IPGRI initiated a search for germplasm from Rwanda held by CGIAR centres and other international organizations.

A search for material held by CGIAR centres revealed 761 accessions of germplasm, originally collected from Rwanda, as follows:

ICRISAT	*Sorghum bicolor* spp.	(293 accessions)
	Sorghum drummondii	(1 accessions)
IITA	*Glycine max*	(1 accessions)
	Vigna spp.	(9 accessions)
ILRI	22 forage species	(90 accessions)
ICARDA	*Triticum* sp.	(2 accessions)
CIP	*Ipomoea batatas*	(4 accessions)
CIAT	*Phaseolus vulgaris*	(331 accessions)
	nine forage species	(30 accessions)

The search will continue in other international organizations.

ing the visit, a proposal was written to develop a national programme as a joint collaborative venture between IPGRI and ISAR. Activities include setting up a coordination committee, rehabilitating facilities, providing equipment, training personnel, and collecting, evaluating and documenting germplasm.

National programme development

It is particularly important to raise public awareness of genetic resources in subregions such as West and Central Africa where activities are still in the early stages. A means for reaching this goal is a national forum attended by crop scientists, foresters, NGO activists and policymakers. Such workshops took place during 1994 in Cameroon, Congo, Ghana and Côte d'Ivoire. Each workshop established a national committee for the coordination of plant genetic resources and a plan of action for a national programme on genetic resources was elaborated.

Sesame world duplicate collection

The Regional Office assisted the Kenyan national programme to regenerate, multiply and characterize 1200 sesame accessions. This represented the world duplicate base collection entrusted to the Kenya Genebank by the Hebrew University, Israel. This was a joint IPGRI/Kenya Genebank/Nairobi University undertaking. The material was characterized at Kibwezi under irrigation. Descriptors for characterization were developed using IPGRI sesame descriptors and the descriptor lists used by the collaborators. Seed was processed and dried at the Kenya Genebank. Characterization data were compiled. About 200 accessions did not

germinate and regeneration will be repeated under controlled environmental conditions.

Somalia germplasm multiplication

Accessions of sorghum and millet from Somalia were multiplied and characterized at Kibwezi under irrigation as a joint IPGRI/Kenya Genebank activity. The material had to be nurtured by application of fertilizers and pesticides since the initial amount of seed was very low. About 30% of the maize accessions was prone to stem borer attack and about 25% of the sorghum accession was vulnerable to shoot fly disease. However, no accessions were lost to pests or disease. Bagging the seedheads during the process maintained the genetic integrity of the material. The material was fully characterized using IPGRI descriptors for maize and sorghum. A second multiplication will be required to generate sufficient seeds for redistribution in Somalia.

Collaborative research with national plant genetic resources programmes

Support was provided to two specific research activities on plant genetic resources. In Côte d'Ivoire, IPGRI assisted research concerning on-farm conservation of yam germplasm in its natural environment. In Burkina Faso, an indigenous tuber plant species identified as *Anchomanes* sp. of the Araceae family was collected and characterized. The plants are not domesticated but they have great local importance as they are widely consumed by the villagers in the area.

Regional network initiation

All countries in the SADC region except Zimbabwe, Lesotho and Namibia constituted crop working groups. However, due to internal financial constraints, most of them found it difficult to meet as regularly as necessary. At the regional level, the three regional crop working groups, i.e. forage and fodder, food crops, and *in situ* and underutilized plants, were constituted and held meetings to set priorities for activities.

Threshing millet in Somalia

Other activities

Training

Lack of trained staff is a limiting factor for many national programmes in Sub-Saharan Africa. In February, a visit to universities in Côte d'Ivoire, Ghana and Cameroon assessed their potential for teaching MSc courses in plant genetic resources. The development of an association with the University of Côte d'Ivoire was recommended. Two scientists from the region, one from Kenya and one from Cameroon, undertook Research Fellowships in Italy (see p. 72).

In collaboration with IITA and FAO, a 3-week training course was organized in Ibadan. The course built up the skills of researchers and technicians in crop genetic resources collecting, conservation and documentation. Eighteen participants from 11 countries attended. Further details of this and other training activities are given on p. 72.

IPGRI collaborated closely with the SADC Plant Genetic Resources Centre, the collective efforts leading to the training of 40 research staff from SADC national programmes. A documentation course was organized in Harare by the Centre with IPGRI inputs. Nine trainees, one each from nine SADC countries, participated. The first in a series of Darwin Initiative/University of Birmingham/IPGRI/SADC Plant Genetic Resources Centre training courses was organized in Windhoek, training 12 scientists from the SADC countries and from Kenya. The theme of this year's course was 'Plant Exploration and Conservation Strategies'.

A regional training workshop on the concept of a national programme and the modalities for its establishment was organized by the Regional Group and held at the ICRISAT Sahelian Centre in Niamey, Niger. The 14 participants came from 13 SSA countries.

Collecting missions

Regional staff assisted the national programme of Swaziland during a rescue germplasm collecting mission. The area covered was the proposed site for a dam which was likely to be flooded in 1995. The aim of this mission was to identify and collect unique germplasm of species growing in that particular location; 15 samples were collected. A similar mission was conducted in Namibia and a total of 50 accessions collected (see p. 48).

In addition to those missions, various national programmes were active in collecting germplasm within their countries, with various levels of IPGRI involvement. A total of 732 accessions was collected in Angola, Botswana and Zambia (see p. 48 for details). Five other missions were implemented in response to germplasm requests. In Namibia the target species were: *Nicotiana africana*, *Neurolopsis austro-africana*, *Acacia erioloba* and *Eragrostis walteri*.

Meetings

IPGRI staff participated in a number of important meetings in the region during the year.

IPGRI sponsored the second Kenya National Workshop on Plant Genetic Resources, in Nairobi, Kenya. This workshop identified the need for even closer collaboration among national institutions and others on a wide range of plant genetic resources issues. The workshop was devoted to presentations on past and continuing plant genetic resources activities by agricultural and forestry research institutes, government ministries, parastatal departments, NGOs and universities. Papers were presented on *in situ* and *ex situ* conservation, germplasm exploration and collecting, crop improvement and breeding, resource surveys and monitoring, biotechnology, plant health and quarantine, and botanical and floristic studies. The workshop reviewed the progress made and constraints experienced since the first National Workshop, held in 1988 and institutional responsibilities and roles in

the National Programme as agreed in the first National Workshop. Recommendations were made concerning the publication of workshop proceedings, the reconstitution of the National Programme Committee and a review of institutional responsibilities in the context of the Convention on Biodiversity.

A workshop entiled 'Biodiversity in African Landscapes' held in Nairobi, Kenya reached consensus on community participation and reward systems, capacity building and institutional framework, research priorities and policy considerations. The purpose of the workshop was to stimulate a multidisciplinary analysis of the socioeconomic processes affecting biodiversity in Africa. Papers were presented by 30 participants including taxonomists, foresters, botanists, systems ecologists, geographers, archaeologists, anthropologists, social scientists and donors from Africa, the USA, the Netherlands and the UK.

The follow up to this meeting included the publication of the proceedings, fund-raising strategies for identified research priorities; SSRC linking up with IPGRI on biodiversity conservation, and community participation of the proposed research programme; and, AAS spearheading an African Biodiversity Network in close collaboration with AMCEN and other relevant regional networks to avoid duplication of efforts.

A series of meetings with officials of ARC and the Department of Agriculture, South Africa discussed the needs for the envisaged national programme of South Africa on plant genetic resources. The most immediate need that was identified was training. As a result, two staff members were trained in 1994; two staff members were identified to be trained in 1995; and, announcements for training opportunities were sent to institutions in South Africa.

Abbreviations - see pp. 105-106

Abbreviations - see pp. 105-106

West Asia and North Africa

The West Asia and North Africa Plant Genetic Resources Network reached maturity in 1994. The number of countries with national committees in the region increased to 10. The Regional Office did considerable work training National Programme staff and obtained funding for a regional rangeland seed information network. The first stage of a project on fruit trees and nuts in the region was concerned with almond genetic resources.

- Strengthen national programmes in the WANA region through support to conservation, utilization and documentation of genetic diversity of economic plants
- Conservation and use of fruit and nut tree species in West Asia and North Africa
- WANA Plant Genetic Resources Network (WANANET)

WANANET

The structure of the West Asia and North Africa Plant Genetic Resources Network was consolidated in 1994. Its key mechanisms, such as the Steering Committee, Committee on WANA Plant Genetic Resources, and its six Working Groups, were well established and active. Research activities based on recommendations from the Working Groups have been initiated. The network reached an advanced stage of development during the year. Support from FAO, ICARDA, ACSAD and IPGRI provides the basic cost of the operating mechanism. Active development of small research proposals seeking external funds will be critical in providing sufficient financial support for research and development activities.

The Steering Committee of WANANET and the WANA Plant Genetic Resources Committee met in October, 1994 and reviewed Phase I of WANANET. The basis of the Network lay in the National Programmes. The number of countries in the region that had National Committees for plant genetic resources had increased from two to ten since WANANET was established in 1992. National Committees need to be established in the remaining member countries as soon as possible.

The Fourth International Technical Conference on Plant Genetic Resources, to be held in Germany in June 1996, is expected to adopt a Global Plan of Action. The Plan will have major implications for Phase II of WANANET. Part of the preparatory process, through ICPPGR, which is being coordinated by FAO with IPGRI and other organizations, will be a number of regional and subregional activities, such as the preparation in the regions of country reports on plant genetic resources.

Strengthening national programmes

Assistance in establishing national plant genetic resources programmes continued during 1994. A project proposal was completed for Morocco and submitted for funding. Similar work was done with Jordan on a project that NCARTT would implement, in collaboration with Italy.

The Regional Office training programme assisted 23 people from 10 countries. An individual programme provided practical training in documentation, data management and conservation during 1994. Participants were from Oman, Morocco, Syria and Yemen.

Ten scientists attended an advanced course dealing with the major aspects of genetic resources management, as well as legal considerations. Lectures were also given on *in situ* conservation, as well as an overview of the Convention on Biological Diversity and the FAO International Undertaking on Plant Genetic Resources. The course was jointly organized by IPGRI and ICARDA. It was held in ICARDA HQ, Aleppo, Syria 1-12 May 1994.

Postgraduate training at the MSc level was organized for two candidates from Syria and Jordan, with the University of Damascus and the University of Jordan.

Scientists from Morocco, Tunisia, Egypt, Jordan, Syria, Lebanon, Iran, Pakistan, Oman and Yemen. participated in an advanced course dealing with the major aspects of genetic resources management

Regional Rangeland Seed Information Network

UNDP approved the funding of a project proposed by WANA regional staff to establish a Regional Rangeland Seed Information Network. Two Sub-Regional Documentation Units were established in Jordan and Morocco. Each unit held training courses on information handling and computer use, and practical applications for the target species (rangeland plants). Trainees from five countries attended and suggested modifications to the main documentation programme to be used for the network.

The objectives of the network are to:

Document information on rangeland seed plants in the WANA region.

Promote the exchange of information, genetic materials and experience on distribution, availability, ecotypes, etc. of pasture plants.

Strengthen national programmes in the areas of research and production of pasture seed.

Fruit trees and nuts

Regional staff are implementing a project on the conservation and use of fruit trees and nut species in the region. In cooperation with national programmes in Pakistan, Iran and Jordan, the first collecting of almond germplasm took place during 1994. Information on the habitats, observed genetic diversity and farming systems in the collecting sites was incorporated into a database on the collected germplasm. Information on field genebanks in Syria, Iran and Turkey was compiled. The almond collection was evaluated for quantitative and qualitative characters, revealing a high level of variability for all characters under study, such as nut weight, volume, shell weight and thickness.

An *in vitro* collection was developed in cooperation with the Plant Tissue Culture Laboratory at University of Science and Technology, Jordan. Pot acclimatization began, prior to transferring the material to a field genebank. Wild almonds showed a high level (>95%) of survival when plants were acclimatized.

An in-country training course, on the many aspects of plant ge-

Origins of the almond

The ancestral species that peach and almond came from probably split at an early stage somewhere in central Asia. Wild and weedy almonds are still widely distributed in southwest and central Asia. While still maintaining a foothold in Central Asia, almond evolved and moved westward. As a result, a secondary centre of genetic diversity emerged in the area close to northern Pakistan. Eventually, almond was disseminated to all ancient civilizations in Asia (2000 BC), Europe (350 BC) and North Africa (600-700 AD). The Spaniards introduced it into California during the Spanish Mission Period. During the second half of the 19th century, almonds were introduced into regions with Mediterranean climates in West Australia, South Africa and South America.

Almond cultivation in many parts of WANA has not changed from the traditional practices used for centuries. Many orchards consist of seedlings, often being grown in mixed culture with other fruit trees or crops, with minimal inputs resulting in low yields. Local selections (landraces) have been made in most growing areas. These are important sources for adaptation and resistance to biotic and abiotic stresses.

Taxonomy
Cultivated almond was designated by Linnaeus in 1753 as *Amygdalus communis*. However, Miller in 1778 was the first to use the name *Prunus* in designating the cultivated 'sweet' almond (*Prunus dulcis*). Later, in 1801, it was named by Batsch as *Prunus amygdalus*, meaning Greek nut. However, in 1882 it was renamed as *Prunus communis*, and then in 1924 the name *Prunus amygdalus* was accepted in American literature. Finally, in 1964, the General Committee of Botanical Nomenclature of the International Botanical Congress reserved *Prunus dulcis* (Miller) D.A. Webb. for cultivated, sweet almond, with *Prunus amygdalus* and *P. communis* as synonyms.

netic resources of fruit trees, was carried out in cooperation with the Iranian national programme.

Other activities

Three issues of the WANA *Regional Newsletter* were produced, as well as a poster on the experience of networking in plant genetic resources presented at the Fifth Arab Congress of Plant Protection Conference in Morocco, and at the 1994 Annual Meeting of the Crop Society of America, USA. Regional Office staff wrote a number of articles for a special issue of *Diversity* magazine, dealing with fruit trees of the Mediterranean Basin, plant genetic resources of Jordan, plant genetic resources of Syria and networking in plant genetic resources.

***In vitro* culture of wild almond in Jordan**
(A) *In vitro* establishment from seed of wild almond from the WANA region. (B) Shoot multiplication. (C) Acclimatization of seedlings removed from culture conditions. (D) The final shoots ready for planting in the field.

Abdullah Jaradat

Abbreviations - see pp. 105-106

Asia, the Pacific and Oceania

The Asia, the Pacific and Oceania Regional Office is based in Singapore, with coordinating offices in Beijing and New Delhi. In early 1994, a full-time coordinator for the Coconut Genetic Resources Network joined the Singapore office, enabling the activities of this network to expand dramatically during the year. The Office continued to manage projects in the region aimed at strengthening national programmes, improving conservation and use of underutilized crops, tropical fruits and taro and yam, and building up the plant genetic resources component of various networks in the region. The Office also managed a global project on germplasm regeneration in genebanks and carried out activities of Headquarters-based projects in the region.

- Strengthening national plant genetic resources programmes in Asia, the Pacific and Oceania
- Coconut Genetic Resources Network
- Improving underutilized crops of regional or local importance
- Promoting conservation and use of tropical fruit species in Asia
- Improvement of taro and yam resources
- Facilitating collaboration and networks on plant genetic resources
- Strategies for maintenance of genetic diversity and genetic integrity in *ex situ* collections of plant genetic resources

Selected project activities

National programme support and development

IPGRI staff visited 18 countries in the region to provide them with specific advice and facilitate activities. Requests for bibliographic information, and bulk orders for publications, were met from all three APO offices in the region.

An in-depth programme in Vietnam developed a national plan of action to strengthen the plant genetic resources system in the country. In Laos, a country that until recently had been insulated from outside changes, IPGRI is assisting the NARC and NGOs to assess the range of wild and cultivated plants that are utilized in local communities. In Indonesia, a national plant genetic resources workshop held with IPGRI support increased interest in Network Information Systems (see below). A similar workshop held in Nepal recommended that the government form an integrated national committee on plant genetic resources.

Subregional networking among six to eight countries can be very effective in fostering collaboration and developing common perspectives on, and interest in, plant genetic resources. A meeting of five East Asian representatives recommended an East Asian plant genetic resources network.

Abbreviations - see pp. 105-106

Tropical fruits

There are about 120 tropical fruit species of major importance and 275 minor species of importance in Southeast Asia alone. Tropical fruit species are important components of tropical ecosystems and have great potential for nutrition and commerce. Their conservation and use are closely linked to rural development, income generation, improved nutrition and quality of life in rural areas.

Information on the status of the biodiversity of some major and minor tropical fruits is limited. Efficient conservation and sustainable use of the biodiversity of tropical fruit species urgently needs a firm knowledge base. This process involves both the formal sector and local communities. To this end, APO regional staff are collaborating with a number of other organizations to promote conservation and use of tropical fruit species. Such an effort will require synthesizing, documenting and cataloguing information on target species, their impact on the rural economy, ecogeographic studies and assessment of biodiversity. Genetic diversity studies will show the extent and distribution of diversity. Maintenance of tropical fruit species diversity in field and *ex situ* genebanks as well as *in vitro*, complemented by *in situ* conservation, especially of the wild relatives of fruit species, will follow. Guidelines for safe exchange of germplasm between countries will be developed. *In situ* conservation of the priority native species with the participation of local communities, and farmers/growers will provide long-term security. This will require socioeconomic, ethnobotanical studies and training or increasing the awareness among the local people.

High levels of citrus diversity are found in the Himalayan hills

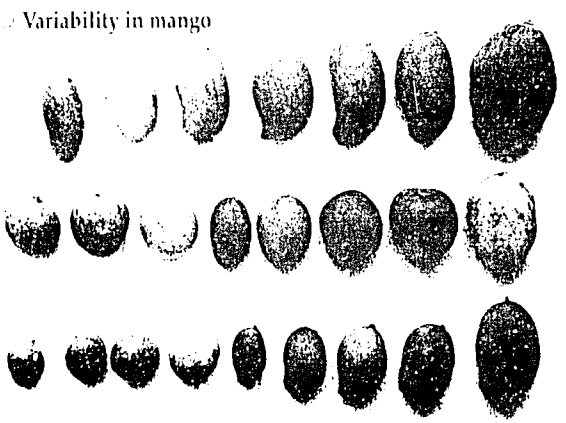
To achieve the objectives, the regional staff collaborated with the ICUC in a survey entitled Identification of Priority Fruit Species for Research and Development in Asia. An Expert Consultation Meeting on Tropical Fruit Species in Asia at MARDI finalized regional priorities for major fruits mango, citrus and rambutan, the minor fruits jackfruit, durian and litchi; and also mangosteen, longan and carambola.

Further research needs were also identified. Experts in the region are preparing reports on the description, classification and cataloguing of genetic resources of mango in the Philippines

and in India, rambutan and durian in Malaysia, and litchi and citrus in China. Suggestions and technical advice were given to several national programmes, and financial support provided for the publication of a revised catalogue of field germplasm collections of tropical fruits and nuts held by the National Plant Genetic Resources Laboratory, Institute of Plant Breeding, the Philippines. Support and technical advice was provided to the Citrus Research Institute, CAAS, China for research on citrus *in vitro* conservation.

The Regional Office focuses on the conservation and use of tropical fruits. Research and development in other areas, including production, processing, marketing, socioeconomics and information, is done in association with the Underutilized Tropical Fruits Asian Network, a network initiated by ICUC, with collaboration from several international organizations including FAO, CSC and ODA. The first meeting of the Network's 11 national coordinators developed a strategy identifying first priority crops as jackfruit, citrus, mangosteen, jujube and guava; with durian, lime, soursop, carambola, *Emblica* and salak as second priority fruits. Working Groups on each fruit will be formed once information from the country coordinators on experts from different disciplines is collated.

Variability in mango



Adapted from a photo by P.N. Gupta, NBPGR, New Delhi

Similar subnetworks are active in Southeast Asia (RECSEA-PGR) and South Asia (SAC).

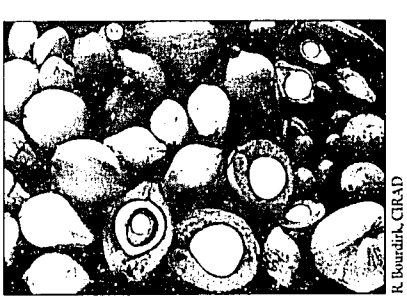
A 3-week documentation training course for genebank managers held at MARDI in Malaysia enabled 27 participants from 16 countries in the region to upgrade their skills on computer and database systems for *ex situ* genebank management. Follow-up by IPGRI staff with the trainees after their return to genebanks in their countries ensures that the training is effectively applied.

The IPGRI-developed Genebank Management System allows better management of plant genetic resources information and exchange among institutions in a country or among countries. Malaysia, Indonesia and the Philippines are attempting to use the software in their genebanks, with the aim of developing a network throughout the region. Regional staff worked to make the software compatible with other commonly used databases to increase its usefulness to national programmes, and enable it to be used as a base for their Network Information Systems.

Collecting activities during the year focused on Mongolia, where native grassland species are being lost, and in DPR Korea, where rapid changes in farming are leading to loss of traditional varieties.

Coconut

COGENT, the international Coconut Genetic Resources Network, increased its country membership from 13 in 1993 to 24 in 1994 with the support for coordination and communications from ODA. The French Government supported the refinement of database software which now contain germplasm information on 500 coconut accessions. A COGENT workshop defined standardized breeding techniques aimed at improving the efficiency of coconut breeding. With the financial assistance of GTZ, the workshop was



R. Bourdin, CIRAD

hosted by IDEFOR, Côte d'Ivoire. A grant from the Asian Development Bank supports 13 Asia-Pacific countries in their efforts to collect and evaluate their coconut diversity, and to coordinate network activities.

Underutilized crops

Buckwheat:

Staff in the Regional Office reviewed available information on the origin, distribution, genetic resources, breeding, cultural practices, diseases and future needs for buckwheat genetic resources in East and South Asia. The review will be published in 1995. A buckwheat bibliography was also prepared for publication. Continuing research at Shanxi Academy of Agricultural Sciences, Shanxi Agricultural University and Shanxi University in China on the genetic diversity of buckwheat indicated great diversity in common and tartary buckwheat. An analysis of the superoxide dismutase and esterase isozymes revealed significant variation among accessions, especially those from different provinces.

A wild relative of sesame (*Sesamum alatun*) in a field in central India

Sesame:

The IPGRI Office in New Delhi published a book entitled *Sesame Biodiversity in Asia - Conservation, Evaluation and Improvement*, the proceedings of a 1993 workshop. Seed from a number of germplasm selections made by breeders from 12 countries in Asia was dispatched by NBPGR, Delhi to the respective breeders. A study of sesame germplasm adaptation was started in the Republic of Korea and India by staff of the national programmes.

Safflower:

The Chinese literature on the medical use of safflower was translated to make the medicinal value of safflower more widely understood.

Taro and yam

Regional Office staff gathered and collated published and unpublished information on taro and yam to guide project activities and provide information to partners. Work to promote a network of activities made progress, in cooperation with ACIAR and SPC. The Regional Office commissioned a status/concept paper on taro and yam genetic resources in the Pacific and Oceania region from a consultant, to form the basis for further work in that region. Ethnobotanical information on taro and yam in Bangladesh was compiled, to which additional information from other countries will be added. Improved tissue culture facilities, supported in PNG in late 1993, can be used for research on virus detection and therapy since exchange of virus-free material is a major concern. Regional staff participated in the Second Taro Symposium, organized by Cenderawasih University, Indonesia and MAFF, Japan, which assisted in forging better linkages with part-

ners in the region. Taro workers, mainly from Indonesia and Papua New Guinea, met during November. Some of the most important areas for work were: taro food processing and diversification of products; use of biotechnological tools in taro genetic resources conservation and use; the problem of multiplication/propagation; safe exchange of germplasm; storage of seed; human resources development; and genetic diversity studies.

Networking

The facilitating role of IPGRI in upgrading genetic resources activities in some of the regional networks and programmes is now well known. Regional staff collaborated with AVRDC in developing an Asian network on *Allium* genetic resources. Staff also participated in joint ICRISAT and CAAS meetings on germplasm exchange and other activities. APO and INIBAP programme staff assisted Vietnam in collecting *Musa* genetic resources. The continuing efforts to evaluate *Musa* germplasm in PNG progressed well. Regional Office staff collaborated with CIP in developing a concept paper on collaboration for the conservation of sweet potato biodiversity in Asia and the Pacific.

NBPGR

Wild okra

Further efforts were made to re-invigorate the okra network. *Abelmoschus manihot*, a relative of *A. esculenta* the common okra, is an important leafy vegetable in the Pacific region. Efforts were also made to bring this related species, commonly called as 'aibika' under the auspices of the okra network. IPGRI's thematic project on neglected crops (see also pp. 62-63), which focuses on *A. manihot*, also assisted in furthering this network. Some progress was made in understanding genetic diversity and species relationships in okra.

IPGRI regional staff participated in international programmes organized in the region by national programmes. APO staff looked at ways of improving information exchange, which is essential for the efficient operation of any network. A data interchange protocol was developed by APO staff, together with national programmes that have well-developed documentation systems, such as the ICGR of CAAS, China and NIAR, Japan. The protocol allows different hardware and software systems of documentation of plant genetic resources to exchange information, with the possible development of central databases and network information systems.

Germplasm regeneration

In a joint activity with the GMU Group, systematic analysis began of data accumulated on germplasm regeneration from 200 institutions worldwide. The intention was to identify priority research needs and develop general guidelines for seed regeneration. A proposal for monitoring genetic structure and variability over four cycles of regeneration using morphometric and electrophoretic techniques was developed and the work started at the National Plant Genetic Resources Laboratory in the Institute of Plant Breeding of the University of Philippines.

A study on regeneration methods for seed in genebanks, to develop optimum methods of regeneration, started early in 1995, in collaboration with ICGR of the CAAS. The first cycle of regeneration was completed. The possibility of using *Mosca domestica* (the common housefly) as a pollen vector appears to be more promising than honey bees in some situations. Seeds from different regeneration regimes are being examined for genetic varia-

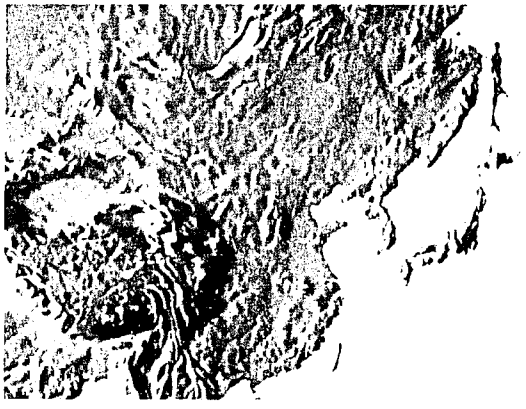
tion using isozyme markers.

Another study found that bees were good pollinators for *Brassica* under natural conditions, but were not very effective for onion and carrot. The study was done with financial support from BMZ GTZ (Germany) by IPK, Gatersleben and FAL, Braunschweig. Work on the experimental rearing of insects that can be used cheaply and effectively as pollinators is a promising innovation.

Work on the use of RAPDs to detect off-types of banana and plantain generated *in vitro*, in collaboration with the University of Birmingham, UK, indicated that, though RAPDs may be good for taxonomic studies, they may not be very useful to detect off-types in banana and plantain. (See also the GMU section.)

Priority activities in East Asia

germplasm exchange;
collecting;
evaluation;
research and training on *in vitro* conservation



Other activities and meetings

East Asian cooperation

A meeting of coordinators of national programmes in East Asia recommended that a network should be formed. There is a good possibility of donor support. A series of papers described the national system of crop genetic resources in each of the five countries in East Asia. The meeting agreed on priority activities in aspects of germplasm exchange, collecting, evaluation, research on *in vitro* conservation and training.

The rights of plant breeders and farmers

Regional staff attended a workshop entitled 'Methodologies for Recognizing the Role of Informal Innovation in the Conservation and Utilization of Plant Genetic Resources', organized by MSSRF, Madras. The workshop discussed the development of a *sui generis* system of plant breeders' rights, incorporating an implementable methodology for recognizing and rewarding farmers' rights. There is a continuing need of funds for international collections to ensure free access to germplasm material. Plant breeders' rights in developing countries need to consider and reward the intellectual contributions of tribal and rural families in the conservation of plant genetic resources. A draft document on plant breeders' rights was tabled and discussed. The final draft was to be submitted to the Government of India for consideration.

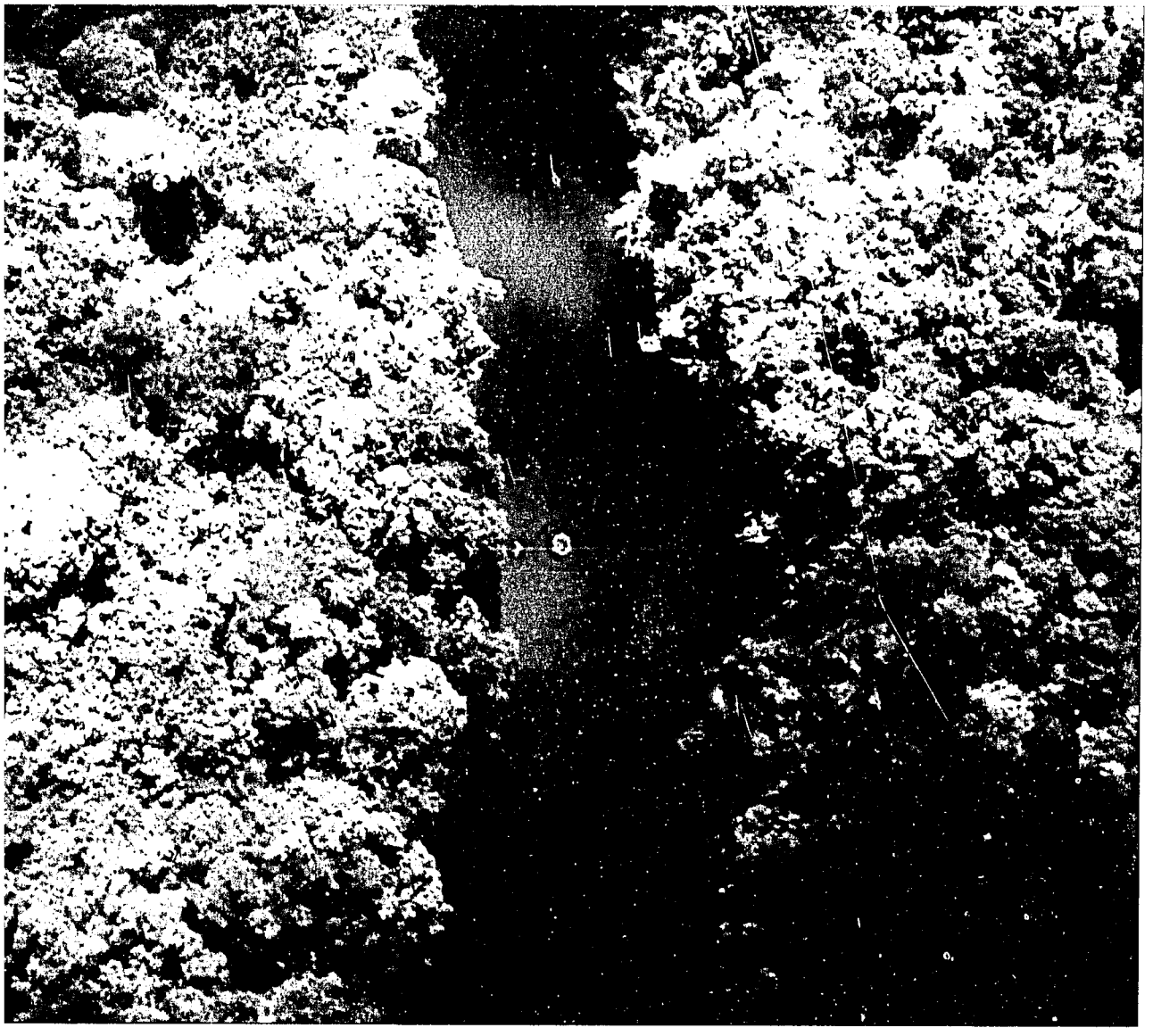
Root and tuber crops

Root and tuber crop specialists agreed that there are considerable gaps in collections for many crops, for example, taro, yam and other minor root and tuber crops. A MAFF-organized work-

shop in Tsukuba, Japan also decided that ecogeographic and ethnobotanical studies were needed to identify areas rich in genetic diversity. Strategies and methods for characterization and evaluation, including wild relatives, need to be improved. Different countries and institutions are at various levels of development in their documentation methods. Many require assistance in improving the methodology they use. Research is needed in developing cost-effective complementary conservation methods and strategies. Safe movement and exchange of germplasm should be promoted. The workshop highlighted interdependence among countries for plant genetic resources, and stressed the need for increased collaboration, assisted by international and regional organizations.

Forest biodiversity

An IUFRO meeting on monitoring and measuring biodiversity in tropical and temperate forests recognized as priorities rapid assessment methods, measuring the size of changes, ascertaining causes of changes and mitigating the impact of these changes on biodiversity. The discordance between various indices, scales, alleles and genetic diversity that can arise in studies due to lack of proper understanding of techniques used and population sizes was highlighted. Socioeconomic and developmental studies need to be integrated with studies on biodiversity. The relationships between functional ecosystems (agroecosystems) and natural ecosystems (the total landscape) need investigation.



Abbreviations - see pp. 105-106

Americas

During 1994, the Regional Office for the Americas continued to assist sub-regional networks throughout the region and to help strengthen their capacity to deal with plant genetic resources. Good results have been obtained by building strategic alliances with key regional institutions such as IICA (and its PROCIs) and CATIE. Evidence of progress in this area is the creation of plant genetic resources programmes in many countries of Latin America and the Caribbean. Raising awareness of the importance of plant genetic resources was an important factor in these developments. But this awareness is not yet reflected in the resources that many of the countries in the region allocate to plant genetic resources work and breeding.

- Mesoamerican Network on plant genetic resources (REMERFI)
- Diversity, conservation and sustainable use of fruit germplasm of tropical America
- Biodiversity, conservation and sustainable use of little-known native vegetable crops of Latin America
- Andean Network on plant genetic resources (REDARFIT)
- Plant genetic resources network for the Amazon region (TROPIGEN)

A significant achievement of the Regional Office was the implementation of the IDB-funded project on the genus Passiflora and the family Sapotaceae in association with national programmes in Mesoamerica and the Andes. A scientist was appointed to coordinate the project on *Sapotaceae* and *Passifloraceae* in Central America, and a geneticist, seconded by CIRAD-FLHOR, joined the Office in September to coordinate tropical fruit projects for TROPIGEN.

Selected project activities

The TROPIGEN project supports the creation of the Amazonian Network on Plant Genetic Resources. Within this project, the Office contracted PROINFO (a local NGO) to survey part of the Colombian Pacific coast (Valle and Chocó). The purpose was to assess the state of conservation and use of plant genetic resources in this region and to look for promising crops and opportunities to start a project on *in situ* conservation. The field work was completed in 1994. Preliminary results indicated a great diversity of fruits, palm trees, and roots and tubers, with potential for cultivation in agroforestry systems. The existing systems in use by local communities are a promising starting point for an *in situ* conservation project.

Abbreviations - see pp. 105-106

Native fruits of tropical America

Passion fruit (Passifloraceae) - above - and sapotes (Sapotaceae)- below - represent two ends of the commercial scale. Sapotes are mainly grown for home consumption while passion fruits are processed (pulp and juice) for export to international markets.

The project Biodiversity, Conservation and Sustainable Use of Native Fruit Germplasm of Tropical America, supported by IDB, focussed its activities on two important plant groups, the genus Passiflora and the family Sapotaceae. Activities take place in Central America and the Andean Region, areas of important diversity for both groups of fruit, conducted within the framework of REMERFI and REDARFIT.

Participating institutions in Mesoamerica began to document and evaluate the distribution of variability within the economically important sapote species to identify threats to genetic resources and determine future action. Indigenous knowledge is an important component of this evaluation because of the information it provides on variability and geneflows.

CATIE (Costa Rica) is characterizing its sapote field genebank, most of which is native to Central America. The University of San Carlos in Guatemala has seven students working on *in situ* characterization. The first student has completed a thesis with an initial evaluation of the descriptors to be used in the project.

Activities on passion fruit within the project began to unfold during the year. Besides documenting and evaluating variability and threats to the genetic resources, member institutions of REDARFIT developed methods for conservation. Reproductive systems and seed physiology vary considerably among, and even within, species. Understanding these mechanisms is essential if the collection is to be maintained successfully. CORPOICA (Colombia) worked with CIAT to develop protocols to use RAPD markers to evaluate variability. This is exceptionally useful in a genus with as many classification systems as there are taxonomists working on the genus.

Photos: IPGRI Americas, 1995

Abbreviations - see pp. 105-106

Extent and distribution of genetic diversity in crop genepools

Breeding systems

Within the first component of the project with the University of Mexico, studies on breeding systems (the case of a short-living perennial, alternatively outbreeder-inbreeder, *lima bean (Phaseolus lunatus)*, and its consequences for germplasm conservation), all populations of the target species were mapped in the target zone and related to land use patterns. Allozymes revealed polymorphism with diversity indexes in the expected range of a near autogamous plant. The mean number of alleles per locus was not high, so it will be necessary to increase the number of enzymatic systems tested so far (30), or turn to molecular markers. A simulation computer model was established to predict the effects of population genetic heterogeneity, geneflow, plant demography variations and different spatial arrangements of mother plants in natural populations.

Co-evolution studies

Work on the project's second component was done with the University of Louvain (Belgium). The geographic distribution of the different forage species of *Stylosanthes*, the host plant, was further documented by studying herbarium specimens (in Mexico and the USA) and by field checking in subtropical Mexico. Samples of fungus and host plant seeds were collected and sent to Belgium for further analysis of genetic diversity to study the co-evolution of host plant and fungus, mainly with isozyme and RAPD markers. Protocols previously established using existing collections of *Stylosanthes* germplasm and *Colletotrichum* fungus can now be tested on Mexican material. Polymorphism within accessions of both the host plant and the fungus has been found in the existing germplasm collections. Data for the different *Stylosanthes* species of Mexico were assembled into a BRAHMS format database and distributed. Taxonomic literature on the same genus was assembled into the computer database program Endnote.

National programme development

Support to national programmes mainly focused on strengthening the subregional networks on plant genetic resources, namely REDARFIT, REMERFI, TROPIGEN, CCMPGR, and the Southern Cone Network. A proposal for funding REMERFI was prepared on behalf of its members. IICA submitted it to BMZ. Action in the Caribbean included a meeting of CCMPGR in Puerto Rico to discuss the Plan of Action for 1994. Fruit trees, food legumes and root crops were considered a priority. IPGRI sponsored a one-day seminar on plant genetic resources during a conference on agriculture for the next century held in Trinidad and Tobago. The intention was to set the foundations for plant genetic resources research in the Caribbean.

Subregional networks on plant genetic resources

REDARFIT
Andean
REMERFI
Central American
TROPIGEN
Amazonian
CCMPGR
Caribbean
Southern Cone Network.

Other assistance included supporting the genebanks at INIA (Peru) and the University of Costa Rica to upgrade their conservation equipment. FONAIAP (Venezuela) was assisted in duplicating the national collection of sesame and in sending the duplicate material to the world collection in

Abbreviations - see pp. 105-106

the Republic of Korea. The Regional Office also assisted INIAP (Ecuador) to introduce, conserve and evaluate sweet potato germplasm.

Other activities

The Regional Office published English and Spanish versions of the Regional Newsletter for the Americas and developed new public awareness products such as a folder, a poster on the centres of origin and diversity of cultivated plants (see below) and a set of leaflets on key isses on plant genetic resources. About 10 000 copies of technical and general publications and other public awareness material were distributed in 48 countries, by mail as well as at meetings and conferences. Regional staff offered a series of five lectures on plant genetic resources at CIAT and supported the publication of several titles.

Collecting missions

A mission collecting wild *Manihot* (cassava) species was sponsored by IPGRI and CIAT along the transect Anapolis-Belem in Brazil. The purpose of the mission was to look for drought-tolerant germplasm in a seriously endangered area to complete the collections held at EMBRAPA. The Office also supported collecting and maintenance of pre-Columbian crops in Argentina, medicinal and insect-repelling plants in the Colombian Pacific Coast and sweet potato in Ecuador. Americas' staff participated in a mission to collect and find domestication foci of *Capsicum*, hot peppers, in Bolivia. The mission was conducted in collaboration with the Centro de Investigaciones Fitogenéticas de Pairumani (Bolivia) and the University of California at Davis (USA).

Training

During 1994, the Regional Office made it possible for 31 people from 14 countries to attend conferences, training courses (offered by IPGRI or other institutions) and on-the-job training. The Office also supported 14 lecturers from eight countries and co-sponsored eight scientific meetings in six countries.

The main training event organized by the Office was a course on documentation of plant genetic resources. The course, jointly

Centres of plant origin and diversity

Many products used every day come from plants that originated thousands of years ago in places known as centres of plant origin and diversity. The ancient cultures that lived in these areas domesticated many plant species to obtain food, shelter, medicine or clothing. Plants cultivated in these centres, such as wheat, corn, potato and rice, were later introduced to other regions where they became crops of worldwide importance. The Centres are still a valuable source of genes to improve existing crops and obtain new plant genes. Four such areas have been defined in the Americas region:

1. **Mexico-Central America - e.g. beans, chillies, corn, tobacco, tomato**
2. **the Andes - e.g. sweet potato, squash**
3. **Southern Chile - e.g. strawberry, potato**
4. **Brazil-Paraguay - e.g. brazil nut, cacao, cashew, cassava, pineapple**

Information adapted from the poster *Centres of plant origin and diversity* produced in Spanish and English by the IPGRI Regional Office for the Americas

organized with CIAT and held in its headquarters in June, responded to a priority need for trained personnel on documentation of plant genetic resources expressed by most countries in the Americas. Sixteen participants from 10 countries spent a week studying the tools and techniques to effectively manage germplasm collections in genebanks, and prepared projects to apply this knowledge in their countries. Participants in the course emphasized the need for a standard documentation system; different systems are being simultaneously developed in various countries. Important genebank information is available locally only, as these systems rarely address the problem of exchanging information. IPGRI's Genebank Management System and attendant software was introduced to course participants, as a training tool that allows information exchange and standardization within genebanks.

Collaborative activities

A 1-year project, conducted in association with the RVAU of Denmark and funded by DANIDA, found no direct evidence of co-evolution of symbiotic *Rhizobium* strains with yam beans (*Pachyrhizus* sp., a tuberous legume). Collecting symbiotic bacteria on the roots of wild and cultivated yam beans from Honduras to Ecuador, a surprisingly wide range of nitrogen-fixing bacteria were found, including both *Bradyrhizobium* and *Rhizobium* strains. Greenhouse trials showed most of these strains to be poor nitrogen-fixing symbionts with yam beans. Strains showed no specificity for the species they were collected on, suggesting that they have not specifically evolved with those species. The wide dispersal and small numbers of plants that characterize yam bean distribution have probably made the plant an unreliable partner in evolution. This means that, when cultivated, yam beans may need inoculation with efficient strains. Nevertheless, even these treated types risk being out-competed by inefficient native strains.

CIAT-IPGRI Consortium of Agrobiodiversity

A conceptual framework was prepared for the four CGIAR centres in the Americas (CIAT, IPGRI, CIP and CIMMYT) to work together with national and regional partners along five major lines of action for the implementation of the Convention on Biodiversity. These include inventory of agrobiodiversity, conservation of agrobiodiversity through integration of *in situ* and *ex situ* approaches, use and enhancement of neglected sets of agrobiodiversity, capacity building and training, and public awareness.

Reproduced, with thanks, from Semillas, Seed Program, Colombia

Europe

The appointment in the middle of 1994 of a scientific assistant and a full-time coordinator for the ECP/GR programme has considerably strengthened the Europe Group. Because of this, the level of interactions with the region's national programmes increased substantially in the second half of the year. In 1994 two important programmes began. Phase V of ECP/GR represented a new start in this 15-year-old programme. Unanimous support by participating countries for this new phase will allow an ambitious programme to be implemented. The European Forest Genetic Resources Programme became operational in October 1994 with the organization of the first Network meeting on *Populus nigra*. Despite the difficulty in identifying new sources of funding for this new initiative, European countries provided strong support for the project. Most signatories of Resolution 2 of the Ministerial Conference on the Protection of Forests in Europe, held in Strasbourg in 1990, will have joined the programme by the end of 1995.

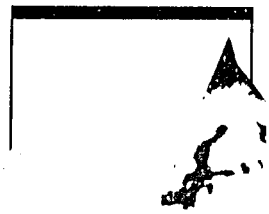
- European cooperative programme for crop genetic resources networks (ECP/GR)
- European forest genetic resources programme (EUFORGEN)
- Sustainable plant genetic resources programmes in eastern Europe
- Transfer of technology between Europe and developing countries

The Europe Group has also been able to increase its activities in support of eastern Europe. A series of joint missions with FAO strengthened contacts with the Newly Independent States of the Caucasus, Central Asia and the Baltic countries Estonia, Latvia and Lithuania, and allowed analysis of their activities and needs in the area of plant genetic resources. Technology transfer between Europe and developing countries has also received increased attention. This was achieved through a number of mechanisms including training, research collaboration between laboratories in Europe and developing countries, and developing informal networks involving countries on both sides of the Mediterranean.

European Cooperative Programme for Crop Genetic Resources Networks

Phase V of ECP/GR became operational at the beginning of 1994. At the end of the year, 26 European countries had committed themselves to participating in this phase, which is scheduled to last 5 years. A further

Focus on *Brassica* in Europe

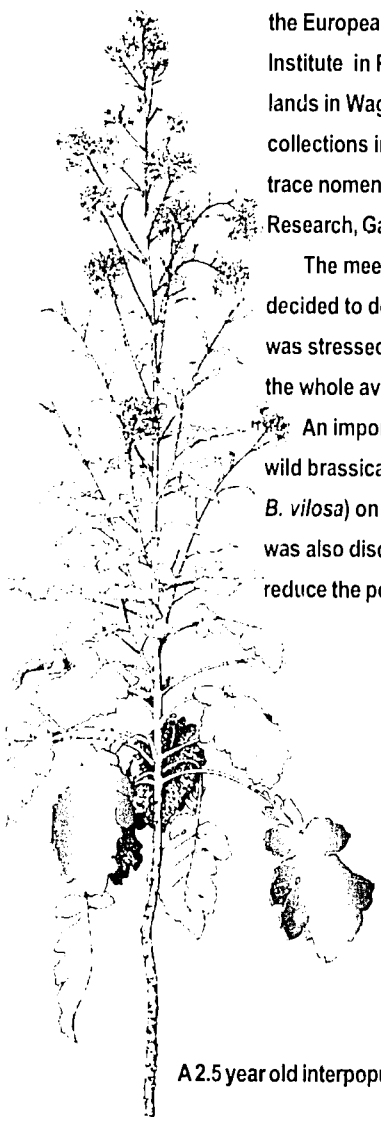


The ECP/GR *Brassica* Working Group met in Lisbon, Portugal in November 1994. Since 1991, an important activity of the group has been the transfer of the European *Brassica* Database from the Plant Breeding and Acclimatization Institute in Poznan, Poland to the Centre for Genetic Resources the Netherlands in Wageningen, and its updating. By the end of 1994 the Database held 11 958 accessions from 16 collections in 15 countries, including 57% *B. oleracea*, 17% *B. napus* and 15% *B. rapa*. Work continued to trace nomenclatural duplicates using software developed at the Institute of Plant Genetics and Crop Plant Research, Gatersleben.

The meeting heard a presentation on a concept for a cultivated *B. oleracea* core collection and decided to develop such a collection further, to make access to the complete genepool more efficient. It was stressed, however, that the existence of core collections did not justify reducing efforts to conserve the whole available diversity of the respective species.

An important new initiative was the development of practical strategies for the *in situ* conservation of wild brassicas. Concrete steps were started to include two endangered species of Sicily (*B. rupestris* and *B. vilosa*) on the European Red List. The impact of new European legislation on the marketing of seeds was also discussed. The group was concerned that the proposed European Directive would seriously reduce the possibilities for on-farm conservation and cause further genetic erosion.

● *B. vilosa*, together with other wild *Brassica* species is of particular interest and potential to breeding programmes as it belongs to the primary genepool of the cultivated brassicas. It has been used as progenitor in projects to resynthesize rape (*B. napus*) in order to give this important cultivated oilcrop a wider genetic base. One drawback of being part of the primary genepool of cultivated brassicas is the threat of introgression from cultivated species grown close to the sites where *B. villosa* still occurs. This species is further threatened by the destruction of cliffs where it thrives (by quarrying to produce tarmac).



A 2.5 year old interpopulation cross of *Brassica villosa* from Italy in early first flower. Height approximately 1.2 metres

Abbreviations - see pp. 105-106

six countries had shown strong interest in joining. A full-time coordinator was appointed for this programme at the beginning of July, with the task of serving the needs of the ECP/GR working groups and maintaining contacts with national institutes and coordinators, as well as relevant ministries.

In 1994, the first concrete steps were taken toward establishing an ECP/GR Wheat Database. Two institutions offered to collaborate in developing this new and potentially the largest European central crop genetic resources database: GEVES/INRA in Clermont-Ferrand, France which is responsible for managing the French cereals genetic resources databases; and, RICP in Prague, Czech Republic which maintains the Czech crop genetic resources database. In December, IPGRI sponsored a first meeting between the documentation officers of the two institutes. The meeting assessed the two existing documentation systems, discussed the database structure and established a workplan.

The *Brassica* Working Group met in Lisbon, Portugal and made substantial progress in updating the European *Brassica* Database and developing a *Brassica* core collection. The Group also addressed the possibilities for *in situ* conservation of wild *Brassica* relatives (see opposite page).

The *Avena* Working Group made good progress establishing a core collection. IHAR in Radzikow made a major pedigree study of oat varieties to optimize entries of the cultivated *Avena* component of this core collection. IGER in Aberystwyth, UK collaborated with VIR in St Petersburg, Russia to develop the wild *Avena* component.

The *Prunus* Working Group started updating its database, which was transferred in 1993 from NGB, Alnarp, Sweden to INRA, Bordeaux, France.

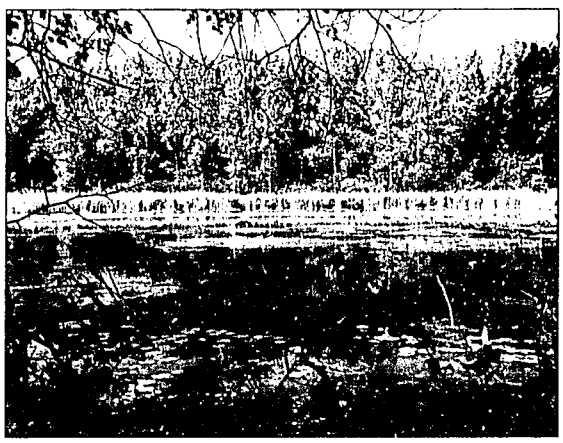
The Forages Working Group implemented the *Lolium* core collection concept developed in Budapest in 1991. During 1993 and 1994, 154 accessions were multiplied and distributed.

The different working groups of ECP/GR developed a number of project proposals to submit to the EC programme for the conservation, characterization, collecting and utilization of genetic resources in agriculture, established in June 1994 (Council Regulation EC No 1467/94). The ECP/GR coordinator played an active role in facilitating the development of these proposals. He also organized three Working Group meetings for 1995, among which will be the first meeting of a new Grain Legume Working Group.

EUFORGEN

In 1994, EUFORGEN emerged as an operational programme. By the end of the year, 12 of the 31 signatories to the Resolution on the Conservation of European Forest Genetic Resources had made an official commitment to the programme by signing a letter of agreement. Fifteen others had expressed their intention to join the programme. The EUFORGEN coordinator position was advertised and a candidate selected to begin work in early 1995.

Two of the networks, *Populus nigra* and *Quercus suber*, held their first meetings during the year. The *P. nigra* meeting was held with the FAO/Poplar Commission in Turkey, during which participants of national conservation activities for the species reviewed the situation in the distribution area of the species. This



Jozef Turok

European lowlands provide an ideal habitat for *Populus nigra* stands. The species is threatened by habitat destruction and spontaneous hybridization with introduced American poplars.

Jozef Turok

Wild malus blossom near Almaty in Kazakstan, one of its centres of origin.

allowed the meeting to establish a workplan with precise, practical objectives. Developing descriptors for *P. nigra* and compiling a database of diversity maintained *ex situ* will be among the first steps.

The first *Q. suber* network meeting held in Rome in December, identified as a priority compiling an inventory of existing resources. The meeting requested that FAO serve as a link with North African countries through its *Silva mediterranea* network. This network includes the conservation and improvement of genetic resources of cork oak within its programme.

Both the *Populus* and *Quercus* networks collaborated in developing project proposals to submit to the relevant EC programmes.

Informal activities began for the *Picea abies* and the noble hardwoods networks.

Sustainable programmes for plant genetic resources

Efforts continued to protect germplasm collections in eastern Europe and the Commonwealth of Independent States. Direct assistance was provided through the trust fund held by the CGIAR Secretariat, for which IPGRI is the executing agency. Funds from USAID and UNDP were directed to the N.I. Vavilov Institute of Plant Industry in Russia. This Institute contains one of the world's largest national collections of germplasm, much of it not duplicated elsewhere. Missions in 1993 and early in 1994 identified the most urgent needs. Material provided to secure the collections included refrigeration equipment, dehumidifiers and seed packaging apparatus.

The refrigeration system of the medium-term storage facility in Kuban, southern Russia, was entirely renewed. Funds from Sweden and IPGRI were used to purchase drying equipment and packaging materials for the Ukraine. Conservation equipment was also provided to Albania and Romania to improve storage conditions. Italian funding, with support from IPGRI, allowed an emergency collecting mission to be made in Albania, focusing on landraces which were being lost due to rapid change in the country.

Thanks to financial support provided by ODA, UK, the safety duplication of the European *Allium* collection in Olomouc, Czech Republic, continued in 1994. IPGRI facilitated the development of eastern European projects, identifying potential bilateral donors to support activities in the zone. Because of this, the Swiss Government provided funds to support regeneration and evaluation activities at the Bulgarian Genebank.

In 1994, efforts in the area of eastern Europe further expanded through a series of joint FAO/IPGRI missions to survey activities in plant genetic resources in the Newly Independent States of the Caucasus, Central Asia and the three Baltic countries (Estonia, Latvia and Lithuania). Previously, the USSR had met the genetic resources needs of these countries. Material collected in the countries was and still is maintained at VIR or at former VIR substations. The FAO/IPGRI visits highlighted a range of needs, with some countries requiring emergency action to secure unique collections. All Central Asian countries were in the initial stages of

developing national programmes. Above all, the preliminary analysis revealed the need for training and funds to support activities on plant genetic resources in these countries.

The Baltic States showed a great desire to work with neighbouring countries and international organizations. A collaborative project established a joint programme as well as developed strong links with the Nordic Gene Bank. Reports of these missions were published in 1994.

IPGRI participated in a planning mission for a World Bank loan to the Russian Federation for research in some specific agricultural sectors. Part of the loan was to be allocated to the Vavilov Institute to allow it to develop long-term storage facilities, and to reorganize its *modus operandi* and infrastructure to reflect modern conservation methodologies and genebank management.

Collecting

IPGRI supported a third multicrop collecting mission in Albania, involving the University of Tirana, IPK, Gatersleben and Istituto del Germoplasmo, Bari, Italy. With complementary funding provided by Japan, IPGRI supported a collecting mission in southern Russia and Uzbekistan. For more details, see the section on collecting in the Genetic Diversity Group report, p. 48.

Underutilized Mediterranean species

How to better conserve and improve the utilization of indigenous underutilized species of the Mediterranean was the theme of an international workshop organized by IPGRI in March 1994, at Bari, southern Italy. The meeting dealt with a number of selected species: einkorn, emmer, spelt, *Pistacia* species, rocket, and medicinal and aromatic species. This gathering established a number of crop-oriented networks and added a genetic resources dimension to existing networks, to foster cooperation within the region in the area of underutilized species.

The Rocket Genetic Resources Network met in November 1994 in Lisbon, Portugal. Members committed themselves to undertake germplasm collecting and conservation activities, establish a rocket database, and prepare descriptor lists for *Eruca* and *Diplotaxis* species.

Training and transfer of technology

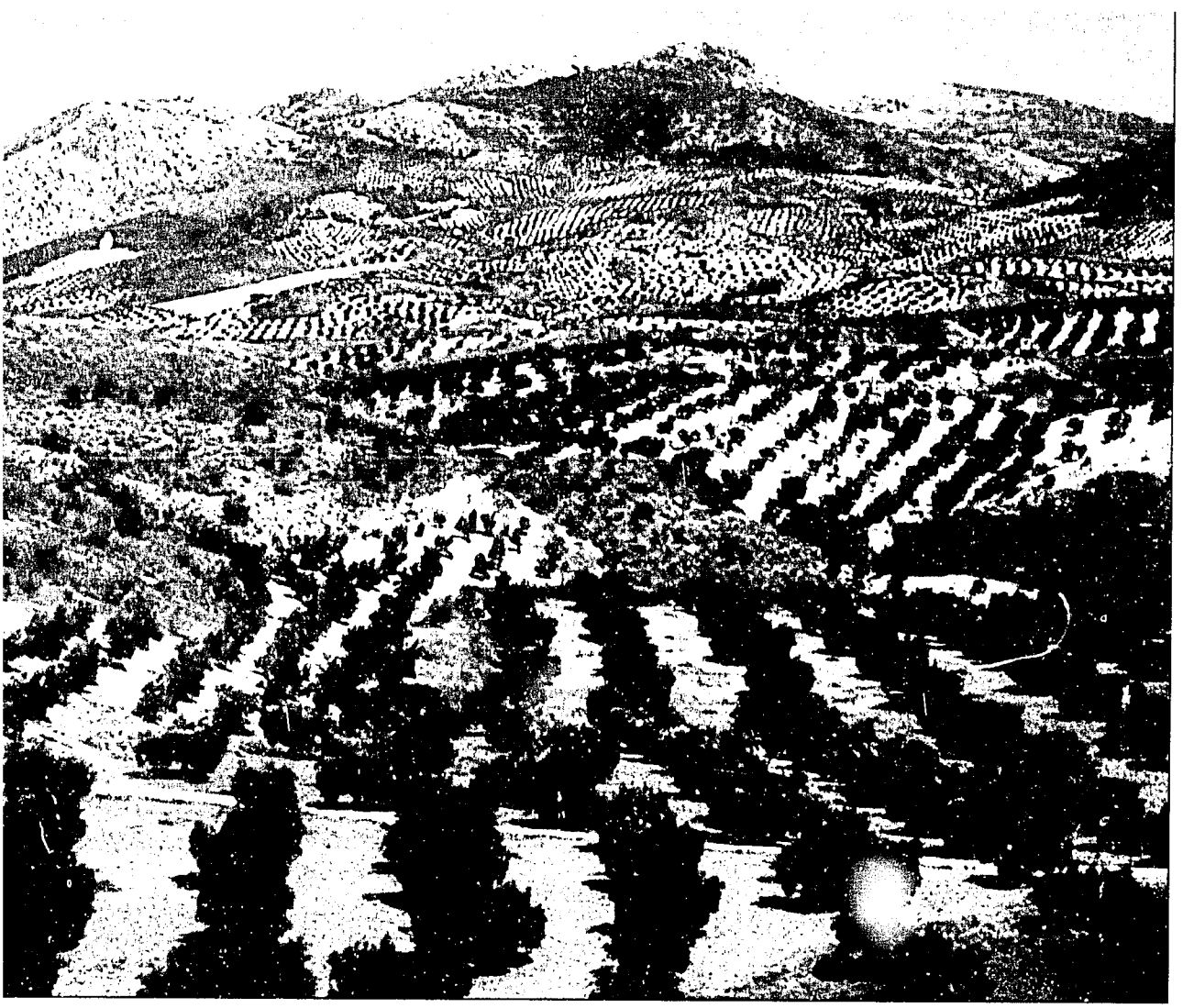
To date, six developing country scientists have received training at Italian institutions through the support of the Italian Government. Among those who received special skills training in 1994 was Mrs. Silvia Strajeru from the Banca de Gene, Suceava, Romania. At the Istituto del Germplasma (CNR), Bari, she received training in seed conservation for a period of 3 months, followed by a further 3 months at the University of Naples, Faculty of Agriculture, Portici where she was trained in *in vitro* conservation techniques. For further details of this training scheme, see p. 73.

The development of collaborative research opportunities is an important mechanism for the transfer of technology between Europe and developing countries. The Europe Group was directly involved with two projects funded by BADC, Belgium and involving universities in Belgium, Costa Rica and Mexico. (These projects are described in more detail in the section on the Americas on p. 35 *et seq.*)

Newsletter for Europe

The IPGRI Newsletter for Europe was launched in 1994. Starting with three issues annually, the Newsletter is intended as a vehicle for information exchange on plant genetic resources issues and as a mechanism for informal dialogue among the people involved with plant genetic resources. Through its wide distribution, the Newsletter contributes to raising awareness in Europe, and in particular informing policymakers of the importance of plant genetic resources activities.

The Kremlin, as used to illustrate an article in Newsletter No. 3 about the Russian government working to finance the strengthening of the Vavilov Institute to develop long-term storage facilities.



Abbreviations - see pp. 105-106

Genetic diversity

The Genetic Diversity Group is concerned with the extent and distribution of genetic variation in plants. Such knowledge can be used to guide conservation activities and a more effective use of genetic resources. The major concern is with crop plants and their wild relatives, and with useful forestry species. These concerns reflect both the biological characteristics of the species and the human dimension; the way in which species are used by farmers and communities in agriculture, agroforestry and forestry.

- The role of specific factors in determining the extent and distribution of genetic diversity in crop genepools
- Strategies for maintenance of genetic diversity and genetic integrity in *ex situ* collections of plant genetic resources
- Improving the accessibility and use of plant genetic resources
- The development of improved collecting strategies
- The distribution, extent and dynamics of genetic diversity in landraces and its conservation
- Strategies and priority actions for conservation and use of forest genetic resources
- The socioeconomic and cultural aspects of conserving plant genetic resources

During the year there were a number of important developments in the work of the Genetic Diversity Group. A new staff member arrived to develop the socioeconomic and cultural aspects of conservation. Thanks to support from the Swiss Development Cooperation, another scientist joined the Group for one year to develop a major new project on the *in situ* conservation of crop plants. Linking work on the genetic aspects of diversity conservation and the human dimension will be an important component both of the socioeconomic programme and of work on farm-based conservation of crop landraces as described below. IPGRI acknowledged the increasing worldwide interest in conservation *in situ* by setting up an *In Situ* Task Force (see the box on the following page for the terms of reference for this group).

Improving the accessibility and use of genetic resources

A project concerned with improving the use of variation in crop genepools is investigating the ways in which variation in useful characters can be made available to potential users.

Investigations in variation of environmentally sensitive characters

Evaluation descriptors involve those genes which are among the most important to plant breeders, agronomists and farmers. However, these descriptors are also the most problematic: their expression depends on genotype, environment and (in the context of the entire germplasm collection) on the interactions between genotype and environment. In other words, the ob-

● The IPGRI *In Situ* Task Force

IPGRI set up its *In Situ* Task Force in March 1994 with the following terms of reference:

Describe what is meant by *in situ* conservation and its different components; recommend appropriate terminology.

Develop IPGRI's approach to *in situ* conservation reporting on:
the reasons for supporting *in situ* conservation and its role in conservation efforts; work needed on *in situ* conservation (current problems and constraints); IPGRI's potential contribution to *in situ* work; how we should get involved in *in situ* initiatives and the processes we should adopt; what work IPGRI should undertake; with whom we should be working.

Develop an inventory of IPGRI's current and proposed activities, proposals and collaborations on *in situ* conservation.

Identify appropriate resources needed for IPGRI's *in situ* work and identify ways of obtaining them.

Determine IPGRI information needs in respect of its *in situ* work and begin to assemble information on potential partners and on relevant current work.

Prepare a position paper summarizing IPGRI's approach to *in situ* conservation work.

● **Evaluation descriptors** are susceptible to environmental influences but are generally useful in improving crops. Examples are yield, and stress susceptibilities.

● **Characterization descriptors** are highly heritable and expressed equally in all environments. They allow an easy and quick discrimination between phenotypes.

servations are site- specific (and often sowing date and season) and are not necessarily of direct use elsewhere. Characterization descriptors, on the other hand, are independent of environment and so are neither site- nor season-specific.

A model of flowering responses to temperature and photoperiod was developed with the potential to convert evaluation descriptors for times to flowering to characterization descriptors of flowering responses to the photothermal environment. The model was the result of a collaborative project between the Plant Environment Laboratory, Department of Agriculture, the University of Reading, UK, the Division of Tropical Crops and Pastures, CSIRO, Australia and IPGRI. Project work validated the model in the field over wide ranges of locations and seasons. The project also developed a computer programme called *RoDMod* (*R*ate *o*f *D*evelopment *Mod*el) that provides an objective procedure for fitting the model, together with extensive documentation, tutorials and bibliography. The approach can assist germplasm users in the development of cultivars phenologically well adapted to their target environment, and is described in the documentation to the software.

Developing and using core collections

IPGRI is keen to see the value of the core collection approach recognized and the various problems involved in developing such collections explored by genebanks. A number of international collaborative efforts have been initiated. The international barley core collection is an example. Some CGIAR centres are evolving core collections. National programme genebanks need to explore the practical aspects of developing core collections. During 1994, a joint 3-year project started with the Oil

Core collections are limited sets of accessions from existing genebank collections representing the entire spectrum of diversity in the collection. They are tools to increase the *use* of collections, *not* a reduced set of accessions for conservation.

Crops Institute of the Chinese Academy of Agricultural Sciences, Wuhan Province, China, to develop a sesame core collection. The Institute holds more than 4000 accessions of sesame, over 90% of which are of Chinese origin.

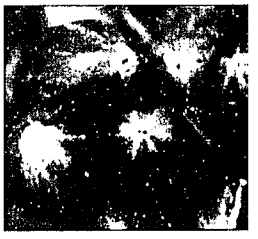
During the first year of the project, the accessions were grouped according to agroecological and agronomic traits so that a provisional core collection of some 800 accessions (20% of all accessions) can be established and the diversity present in this fraction compared with that of the whole collection using isozyme and molecular markers. This information will be used to define a core of about 400 accessions. As well as providing a valuable national resource, the project will provide detailed information on the distribution of variation within traditional sesame cultivars which can be linked to that on the international sesame collection maintained in Kenya and the Republic of Korea.

Developing improved collecting strategies

The aim of this project is to develop and implement appropriate collecting strategies so that increased levels of genetic diversity can best be located and collected, studied and used. The project has made significant progress in the development of methodologies for ecogeographic surveys and indicators for genetic erosion through survey missions of vegetable crops to Pakistan, Syria and Iran (see p. 48).

Following initial surveys to Syria and Morocco in 1993, the project team, in light of feedback from national programme counterparts, revised both the formats used for ecogeographic surveys and indicators of genetic erosion, and the structure of their database files for compiling the survey data. The vegetable collections from Syria were grown out for morphological characterization and evaluation in 1994-95. Researchers from the national programmes who had participated in the missions received training before and during the exploration missions and are fully involved in establishing databases, computerizing field data and post-survey evaluation.

In Pakistan, the survey team found that genetic erosion in cauliflower, radish and turnip was high in the districts surveyed due to changes in land use and introduction of commercial varieties. In some sites, however, farmers continued to maintain and market local varieties and to use traditional cultivation methods. In these areas substantial indigenous knowledge was also maintained.



Four survey and study missions were fielded in Iran to survey summer vegetables. The main factors responsible for genetic erosion include the import of improved seeds, low economic value of native vegetables compared with cash crops, limited irrigation water, deteriorating soil fertility, poor seed production from low-quality types, replacement by improved cultivars, changes in consumption habits, lack of extension and changes in land use.

In Syria, many local varieties of *Abelmoschus esculentus*, *Solanum melongena*, *Phaseolus vulgaris*, *Citrullus lanatus* and *Cucumis melo* were identified and collected in both the northeastern and central provinces. Many traditional varieties could still be found in Homs province, where a particular region (El-Markaz) was recognized for its ancient tradition of vegetable growing. One recommendation of the survey team was a study to assess ways to provide technical support to farmers through research and extension so that they could continue to grow these traditional varieties. Policymakers should be made aware, the team concluded, of the importance of strengthening methods of exchange of local seed between farmers in the national conservation plans for genetic resources of vegetable crops in Syria.

Germplasm collected in 1994

Partner	Country of collection	Target taxa (No. of samples)
PGRI, Islamabad, Pakistan	Pakistan	*Prunus* (97) *Brassica* (18) *Solanum* (3) *Raphanus* (29)
SPII, Karadj, Iran	Iran	*Prunus* (44) *Hibiscus* (3) *Daucus* (8) *Brassica* (6) *Solanum* (17) *Capsicum* (14) *Cucurbita* (24) *Citrullus* (10) *Cucumis* (107) *Allium* (27)
SARD, Douma, Syria	Syria	*Solanum* (27) *Cucurbita* (4) *Hibiscus* (35) *Vigna* (23) *Capsicum* (21) *Spinacia* (4) *Beta* (5) *Lycopersicon* (6) *Cucurbita* (6) *Phaseolus* (7) *Raphanus* (6) *Brassica* (10) *Cucumis* (107)
NCARTT, Baq'a, Jordan	Jordan	*Prunus* (10)
CENARGEN/ EMBRAPA, Brasilia, Brazil and CIAT, Cali, Colombia	Brazil	*Manihot* (76)
HIA, Tirana Albania; CNR/Istituto del Germoplasma, Bari, Italy and IPK, Gatersleben, Germany	Albania	Cereals (80) Pulses (89) Vegetables (126) Other crops (30) Other wild spp. (29)
NBRI, Windhoek, Namibia	Namibia	*Citrullus* (14) *Acanthosicyos* (10) *Corollocarpus* (4) *Cucumis* (12) *Dactyliandra* (1) *Momordica* (2) *Zeheneria* (2) Others (2)
SNTC, Swaziland	Swaziland	*Acacia* (1) *Annona* (1) *Ceropegia* (1) *Combretum* (1) *Ozoroa* (1) *Paspalum* (1) *Peltophorum* (1) *Pseudarthia* (1) *Sesbania* (1) *Strychnos* (1)
VIR, St Petersburg, and NIAR, Tsukuba, Japan	North Caucusus	*Aegilops* (109) *Hordeum* (3) *Avena* (10) *Secale* (1)
DAST, Hanoi, Vietnam and NIAR, Tsukuba, Japan	Vietnam	*Oryza* (189)
EAP, Tegucigalpa, Honduras	Honduras	*Zea* (27) *Phaseolus* (66)
BARI, Dhacca, Bangladesh	Bangladesh	*Colocasia* (40) *Dioscorea* (97)
PSARI and RIAH, Darkhan, Mongolia	East Mongolia	Fruit, vegetable and medicinal (215)
CFP, Bolivia and UCD, USA	Bolivia	*Capsicum*

Vietnamese woman planting rice

Abbreviations - see pp. 105-106

Effectiveness of targeted collecting in the recovery of specific genes and gene complexes

Investigations started with a fact-finding survey in agricultural research stations in Kenya and visits to Zimbabwe. *Eragrostis* and *Eleusine* spp. were selected as case studies. A consultant made an in-depth literature search, using these two crops as examples. One of the main conclusions was that certain areas can be targeted for collecting germplasm rich in particular characters, as shown below.

Barley Yellow Dwarf Virus

Targeted collections of barley in Ethiopia to obtain resistance to this virus from higher elevations had a greater frequency of resistance than those in lower areas. Although resistance to the virus was not restricted to one region in Ethiopia, probably owing to geneflow across the barley growing areas, two centres of concentration of the resistance were identified.

Crown rust of oat

A search for crown rust resistance in *Avena sterilis* was made in Israel by coarse grid collecting throughout the distribution range followed by screening of the collected accessions for resistance to two rust races. Resistance to crown rust was found to be concentrated in the Mediterranean coastal belt from a few kilometers north of Haifa and south of Tel Aviv to approximately 20 kilometers inland, showing the validity of this sort of targetted approach.

- **Four types of collecting are recognized and addressed:**
  - **general conservation-oriented collecting whereby the conservation of genetic diversity *per se* is the overall objective;**
  - **targeted collecting for particular traits of direct use by breeders;**
  - **rescue collecting, typical of rescue missions and to combat genetic erosion;**
  - **collecting for research, especially of poorly known crops, to increase knowledge, including indigenous knowledge, on crop genepools**

Germplasm acquisition

Germplasm collected in 1994 through various projects is listed on p. 48 and described where appropriate in the reports of the regional groups.

Genetic diversity in landraces and its conservation

Variation in traditional crop varieties or landraces is a primary resource for plant breeding. It is an essential component of low input agriculture for millions of farmers throughout the world. The maintenance of this diversity requires both *in situ* and *ex situ* conservation.

Improving the scientific basis of agrobiodiversity conservation *in situ*

In defining *in situ* conservation, the Convention on Biological Diversity includes specific reference to the conservation of crop species in the environments in which they were developed, i.e. on farm. With funding from the Swiss Development Cooperation, work began on a project aimed at providing a firmer scientific basis for on-farm conservation of crop plants and agroforestry species (see p. 50). During the year, work began on building the project framework and on identifying partners. Important aspects of GD's approach to work in this area are bringing together workers in the agricultural sciences with those from socioeconomic disciplines, and linking conservation and development workers.

The potential use of 'home gardens' for *in situ* conservation

In many societies 'home gardens' are an important source of food, medicines and other useful products for the household. They also contain significant amounts of intra- and interspecies genetic diversity with large numbers of plant taxa.

Strengthening the scientific basis of *in situ* conservation

Overall objectives

To support basic and applied research on *in situ* (on-farm) conservation of agricultural biodiversity.

Specific objectives

To describe the diversity of plant genetic resources.

To understand the nature of the farming systems that maintain and use agricultural biodiversity.

To explore how national programmes can best support *in situ* conservation.

To jointly plan programmes of *in situ* conservation with collaborating organizations.

Methods

Activities of national programmes, universities, NGOs and farming communities in the following areas will be supported.

Crop biology and ecology: describe and analyze the status and trends of intra- and interspecies diversity in selected crops, biomes and farming systems.

Socioeconomic research: describe and analyze farming systems, farmer decision-making, and national agricultural policy as they relate to the identification, selection and maintenance of intra- and interspecies diversity.

Decentralized breeding and landrace improvement: increase the use of local agricultural biodiversity.

Community participation: develop farmer training and other community-level activities to validate local knowledge and practices that lead to maintenance of agricultural biodiversity

Training: train national programme staff in the methods and practices that lead to *in situ* conservation and enhanced use of local agricultural biodiversity.

Based on earlier studies by collaborators, a small project began in collaboration with the genebank of INIFAT, Cuba with help from the IPK genebank in Germany to identify Cuban home gardens ('conucos') that could form an element in an *in situ* conservation programme for Cuba.

Over 80 taxa were grown by the proprietors of just five home gardens in Cuba

A survey identified different landscapes variants and the ways in which different communities within Cuba have used them. Cuba has communities with diverse American, European, African and Asian origins and the survey has shown that this is often reflected in the characters of the home gardens. Preliminary inventories of the species grown and used will identify sites for further study and involvement in the *in situ* conservation programmes developed by INIFAT.

A bibliography for *in situ* conservation of landraces

The considerable literature on the many different areas relevant to conservation of landraces by farming communities is widely scattered and often difficult to access. This is due partly to the number of subject areas covered but also reflects the fact that many of the studies exist only as part of the 'grey literature'. Funding from SIDA and DGIS allowed CGN (CPRO-DLO), Wageningen, the Netherlands and the Overseas Development Institute, London, UK to collaborate with IPGRI in preparing a summary bib-

liography on the subject. Literature was selected and abstracts prepared in four thematic sections: descriptive studies on local crop development, local seed systems and related local knowledge systems; biological studies on local crop development; social, economic and policy aspects; and, research methodologies relevant to local crop development.

Forest genetic resources

During 1994, close collaboration with CIFOR, ICRAF and FAO was particularly beneficial in identifying areas of interest where IPGRI and other CGIAR centres and partners could complement existing efforts. The result is a comprehensive programme on forest genetic resources. The work has several main axes. As well as information, methodology development, human resources development and public awareness, the research agenda covers key aspects of *in situ* and *ex situ* conservation, with application to tropical humid and dryland forests, timber and non-wood forest products. Continuing activities developed in Asia, Latin America and Africa link research and training.

TRESOURCE: A global information system

TRESOURCE was developed as an information source in forest genetic resources. The usefulness of TRESOURCE rests with its ability to provide an information service to the global community on what, where and who is responsible for the forest genetic resources of a particular species and associated details. The database provides an overview of the current holdings and locations of forest genetic resources on a global basis.

The software required for TRESOURCE was written and completed in the latter part of 1994. Several aspects of the original design were modified to add the location of species that are known to be maintained *in situ*, together with some general descriptive data on the location. By the end of 1994, the programme was ready

IPGRI's programme on forest genetic resources

Areas	Approaches	Activities
Information system	Provide relevant information	TREESOURCE and networking
Methodology development	Strengthen knowledge	*In situ*, locating diversity, recalcitrant/ intermediate seeds, bamboo and rattan, fruit trees
International collaboration enhancement	Communication	FAO, IUFRO, CGIAR, regional international programmes
Human resource development	Building and supporting national capacity	Training, education
Public awareness	Promoting greater understanding	Brochure, poster

Abbreviations - see pp. 105-106

for distribution. National programme partners will enter data particular to their responsibilities. These data will be used to update the master copy of TREESOURCE at IPGRI.

The programme provides many different types of information. These include: the location of stands that contain particular species, taxonomic nomenclature, and locations of genetic resources of *ex situ* forest species. To assist national programmes with data management of *in situ* forest genetic resources, the system can access detailed information on natural stands, and provenance locations and characteristics. However, such detailed information is not managed at TRESOURCE level.

Bamboo and rattan genetic resources

Significant progress was made on the project on conservation and use of bamboo and rattan genetic resources, which received financial support from Japan. Limited information is available on intraspecific variation and breeding systems, which are necessary to design conservation strategies. Important phenological variation was recorded over a period of several decades, with implications for sampling and collecting strategies. Uncertainty and ambiguities were found in herbaria records due to multiple taxonomic revision, stressing the need to increase the taxonomic expertise and knowledge in national programmes. For *Bambusoideae* in particular, little effort has been made to gather baseline information on inter- and intraspecific diversity.

A number of research projects were initiated during the year. These include:

A survey of eight bamboo priority species in China, to identify the best locations and populations for genepool selection and conservation in collaboration with the Subtropical Forestry Research Institute, Fuyang, Zhegiang, China

Bamboo - priority research

An INBAR Biodiversity Genetic Resources and Conservation Working Group identified the following priority areas:

- ***In situ* conservation**
- **Genepool approach for useful species**
- **Focus on population diversity**
- **Community-based conservation**
- **Develop descriptors**
- **Genetic diversity**
- **Measurement of genetic diversity using appropriate techniques (morphometric, cytology, ecogeographic survey, biochemical, molecular, provenance/progeny trials, early selection). Model species: *D. strictus* and *Phyllostachys pubescens***
- **Monitoring of genetic diversity, with emphasis on protected areas**
- ***Ex situ* conservation**
- **Herbarium collections**
- **Seed storage**
- **Tissue culture**
- **Slow-growth system**
- **Germplasm availability and enhancement**
- **Seed exchange and temporary storage**
- **Bamboo seed orchards**
- **Guidelines on exchange of material**
- **Flowering and flinting problem**
- **Vegetative propagation research and provenance trials**

Abbreviations - see pp. 105-106

A survey of six priority *Calamus* species in China in collaboration with the Research Institute of Tropical Forestry, Guangzhou

A survey on the distribution of bamboo and rattan species in Thailand, to be carried out by the Royal Forest Department, Bangkok.

Research on seed physiology of seven bamboo species including seed collection, germination tests and seedling development studies. A manual will be prepared by the ASEAN-Canada Forest Tree Seed Centre, Muak Lek, Thailand

A study of population distribution and genetic diversity of *Calamus palustris*, *C. andamanicus* and three other species of commercial importance in the Andamans and South India by Kerala Forest Research Institute, in India.

Rattan - priority research

An INBAR Biodiversity Genetic Resources and Conservation Working Group identified the following priority areas:

- **Conservation**
- ***In situ* jungle conservation with *ex situ* back-up**
- **Emphasize *ex situ* forest plantation**
- **Community-based village plantations**
- **Extractive reserves**
- **Inventory**
- **Focus on species identification (Myanmar experience)**
- **Identify species diversity, mapping, productivity**
- **Herbarium survey and database IUCN, WCMC, RBG, Kew**
- **Field surveys**
- **Genetic diversity**
- **Baseline information on pattern analysis**
- **Morphometric research and ecogeographic survey**
- **Biochemical analysis**
- **Cytology**
- **Species and field tests**
- **Sex identification through markers**
- **Mating and breeding systems**
- **Genetic enhancement research**
- **Selection and cultivation of superior varieties**
- **Movement of genetic material among national programmes**
- **Availability of appropriate planting materials**
- **Capacity building**
- **Increase limited expertise**
- **Link research and capacity building, and the private sector**

The INBAR Beijing meeting held in August 1994 started a working group on the genetic resources of bamboo and rattan. The first meeting of the group identified many future activities, summarized here.

Preliminary results from ecogeographic surveys of bamboo and rattan

- **Limited information is available on intraspecific variation and breeding systems that are important in designing conservation strategies**
- **Important phenological variation has been recorded over a period of several decades, with implications on sampling and collecting strategies**
- **Doubts and ambiguities are regularly found in herbaria records due to multiple taxonomic revision, highlighting the need to strengthen taxonomic expertise in National Programmes**
- **For Bambusoideae in particular, little effort has been made to gather baseline data on inter- and intraspecific diversity**
- **European herbaria such as the RBG, Kew, UK and Leiden, the Netherlands are good sources of taxanomic information and expertise**

Abbreviations - see pp. 105-106

In situ conservation of tropical forests

A joint CIFOR/IPGRI research project was initiated in Southeast Asia to design effective *in situ* conservation strategies for tropical forest ecosystems. The project was developed in close collaboration with four national programmes. Collaborating institutions are FRIM, UPM, AFTSC, RFD, BFRI and UASB.

During 1994 the collaborating institutes agreed on procedures for species and site selection, protocol development for isoenzymes and molecular analysis and the need to integrate socio-economic aspects in the projects. Sampling and analysis started in Malaysia, southern Thailand and India, where many of the protocols were developed.

Work started to identity important forest ecosystems that are economically valuable and in need of *in situ* conservation efforts. In each geographic region a suite of species is chosen which are frequently found within the selected ecosystem and which represent widely different life history strategies. Species include large trees (e.g. *Hopea odorata*, diptocarps, *Chukrasia* sp.), understorey species (*Calamus* sp., *Ficus* sp.), solitary species (*Mesua ferra*, *Calamus* sp.), gregarious species (*Hopea odorata*, *Diptocarpus bandii*), wind-dispersed and animal-dispersed species.

Tree sampling and isoenzyme protocol development

A 3-year collaborative project with AFTSC in Thailand started in 1993, using *Cotylelobium melanozylon* as a model species. The main objective of this study is to use isoenzyme markers and the reproductive biology of the species to define the population size of *C. melanoxylon*. The study site is in Tung Khai arboretum in southern Thailand. A survey mapped 1550 individuals of the target species. Isoenzyme protocols suitable for the study were developed for inner bark of current shoot and seed tissues. Nine enzyme systems were found to be reliably assayed in both inner bark and seed tissues, namely alcohol dehydrogenase, glucose 6-phosphate dehydrogenase, 6-phosphogluconic dehydrogenase, glutamate dehydrogenase, malate dehydrogenase, malic enzyme, menadione reducatase, phosphoglucose isomerase and shikimic acid dehydrogenase.

Abbreviations - see pp. 105-106

'Measuring and Monitoring Biodiversity in Temperate and Tropical Forests'

IPGRI and CIFOR jointly sponsored 15 participants to this IUFRO symposium in Thailand, and organized a satellite meeting to identify priority issues for a globally coordinated programmme on *in situ* conservation of tropical forests. The major areas identified for strategic research were:

the main factors that contribute to losses of genetic diversity in tropical forests: deforestation, forest fragmentation, extraction and climate change;

the extent of genetic losses in different forest ecosystems by gathering baseline information through model studies;

useful model species with criteria which integrate their economic significance to local communities, their ecological importance, their particular biological system and their life history, and management practices of local communities.

Ethnobotany and human aspects of plant genetic resources

This project provides the operational framework for the development of IPGRI's programme on the socioeconomic and cultural aspects of conservation and use of plant genetic resources. The conservation and use of plant genetic resources have a human dimension that IPGRI has made part of its core agenda. At the end of 1994 a staff member was appointed to lead IPGRI's work in this area and to develop the range of project activities required. Research on *in situ* and on-farm or community level conservation must take into account social factors such as decision-making patterns, social organization, economic aspects, gender variables and cultural perspectives. Gender analysis is being introduced on a systematic basis in project development and execution within IPGRI.

Other activities

Members of the Genetic Diversity Group carry out a wide range of activities on other IPGRI projects. Of particular importance is the work done in support of IPGRI's input to the further development and implementation of the Convention on Biological Diversity (see p. 7). Members of the Group have also collaborated with other organizations including membership of the Scientific Advisory Panel of the Turkey GEF Project to conserve wild relatives of crops, the IUCN Plant Conservation Committee, the Steering Committee of the IUBS/SCOPE/UNESCO Diversitas programme on the conservation of genetic resources, the CIRAD-Fôret Programme Committee and the ICRAF Programme Committee. These activities allow the Group to place its work in a wider context and to make a direct contribution to important national and international initiatives.

Abbreviations - see pp. 105-106

Germplasm maintenance and use

The Group's activities cover technology research and the study of the strategic, policy and organizational aspects of *ex situ* conservation and use. Conservation technologies and methods are developed through four projects covering IPGRI's priority areas of strategic research: seed conservation, *in vitro* conservation, germplasm health and genebank management. Strategies and policies to facilitate the management of *ex situ* conservation are investigated through a fifth project. A special activity within this project looks at conserving and using neglected crops.

Research on conservation technologies has two objectives: to solve problems and develop general methodologies; and to develop low-input techniques and methods. The Group's activities on optimum moisture contents for seed storage and *in vitro* slow growth protocols are examples of research aimed at developing generic methods that individual genebanks can adapt to their specific requirements. Developing low-input methodologies, such as sun and shade seed-drying, is a strategic focus of the Group, aimed at meeting the needs of the resource-limited programmes now emerging in many developing countries.

Policies, strategies and institutional structures for *ex situ* conservation are studied with the aim of improving the efficiency and effectiveness of the conservation of plant genetic resources. This work seeks to improve the policy and institutional environment within which the results of technical research are applied. Work at the international level, including activities on intellectual property rights, is mainly done within the CGIAR system as a whole and in conjunction with FAO. This work is reported under the section International Collaboration (p. 86).

Selected project activities

Seed conservation

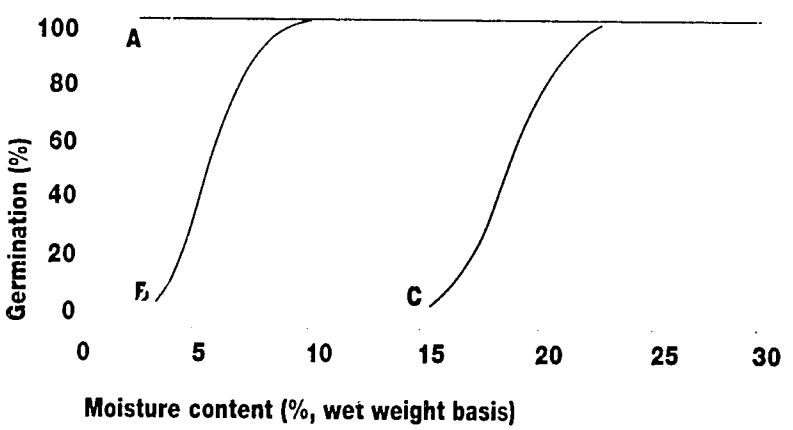
During 1994 the Group decided that there was a need in the plant genetic resources community for what came to be called Technical Bulletins. These are simple, comprehensive guides for assisting genebank staff in using techniques and doing the experimentation necessary to adapt conservation procedures to their particular circumstances. Technical Bulletins were commissioned on the prin-

- *In vitro* conservation of vegetatively propagated crops by slow growth techniques
- Methods and tools to aid organization and management of germplasm programmes/genebanks
- Development and adoption of improved phytosanitary procedures for germplasm handling
- Cryopreservation techniques for conservation of vegetatively propagated crops and species with recalcitrant seeds
- Furthering understanding of longevity in seed and pollen, and developing low input techniques for processing and storing orthodox seeds for conservation
- Advancing concepts and strategies for conservation and use of plant genetic resources

Behaviour of seed in storage

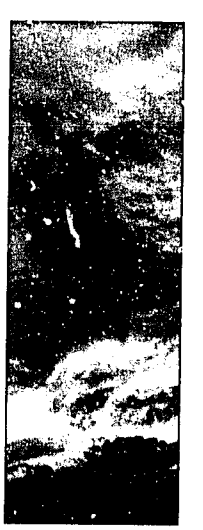
As plant genetic resources programmes have increased in number and expanded in scope, so the range of species being conserved *ex situ* has broadened from major crops to include forestry species, and wild and underutilized species. Knowledge about the storage behaviour of many of these species is often lacking or scattered in the literature.

With IPGRI support, the University of Reading, UK, prepared a compendium on seed storage behaviour. This document provides information, including literature references, on seed survival in relation to the seed storage environment and duration for about 6000 species from over 200 families. It classifies seed storage behaviour (orthodox, intermediate or recalcitrant) in a format which assists genebank managers and other conservation scientists intending to handle species which are new to their collections.



The figure above shows three typical patterns of desiccation tolerance for (A) orthodox, (B) intermediate and (C) recalcitrant seed storage behaviour. Seeds of some species with recalcitrant seed storage behaviour are even less tolerant of desiccation than those shown by pattern C.

For many species, particularly forestry species, there is little or no indication of storage behaviour in the literature. Therefore, the University of Reading developed under contract a protocol for the determination of seed storage behaviour. This assists in experimentation and in the interpretation of results on the desiccation and temperature tolerance of seeds of species of unknown storage behaviour.



Earlier research by the University of Reading on forestry species showed that several species in this 'unknown' group have some desiccation tolerance, but do not display orthodox behaviour, and are thus classified as intermediate. Research focused on eight species from two families (Sapotaceae and Meliaceae) in which it was suspected that all three types of seed storage behaviour (orthodox, intermediate or recalcitrant) would be found. Species within these two families did indeed show contrasting seed storage behaviour. In particular, *Azadirachta indica*, *Khaya senegalensis*, *Swietenia macrophylla*, *Chrysophyllum cainito* and *Manilkara zapota* showed intermediate behaviour. Their seeds can be stored for several months, and for more than one year when dried to fairly low seed moisture content levels (varying from 3 to 13%) and stored at 0 and 10°C.

Abbreviations - see pp. 105-106

ciples and practice of drying seeds using silica gel, and on methods for determining seed moisture content. Drafts were reviewed in 1994, to be published in 1995.

Research started on low-input techniques for the drying of seed by investigating the effects of sun and shade drying on seed longevity. The drying experiments are being done at the IPGRI Office in Niger, and the ageing and viability determinations at RBG Kew. Sun- and shade-drying of maize, millet and groundnut seed harvested during the dry season did not reduce subsequent longevity of the seed compared to drying under the recommended conditions of low humidity and temperature. Research is continuing on seed harvested in August, a more humid time of the year in Niger.

With the collaboration of the University of Bonn, Germany, research is being done on the incidence of seed-borne diseases under different drying treatments. Millet and groundnut seeds from the dry season harvest were tested and preliminary results showed there was no significant effect of the drying method (sun, shade, drying room) on the level of infection of diseases that all the seed carried.

Collaborative research at the University of Reading, UK, the Vegetable Genebank, UK and CPRO-DLO, the Netherlands, showed that, at least in onion, lettuce and carrot, lowering moisture contents to levels in equilibrium with 10% relative humidity favours seed longevity when the seeds are stored at 20 C. The long term experimentation needed to clarify the relationship between seed storage temperature and low-moisture-content limits continued.

Over the last few years, a controversy has developed over the use of very low seed moisture contents for the long-term storage of seeds under different temperature regimes. A 5-year project was developed in 1994 to investigate optimum seed moisture contents and storage temperature with the involvement of both NSSL, USA and the University of Reading, UK.

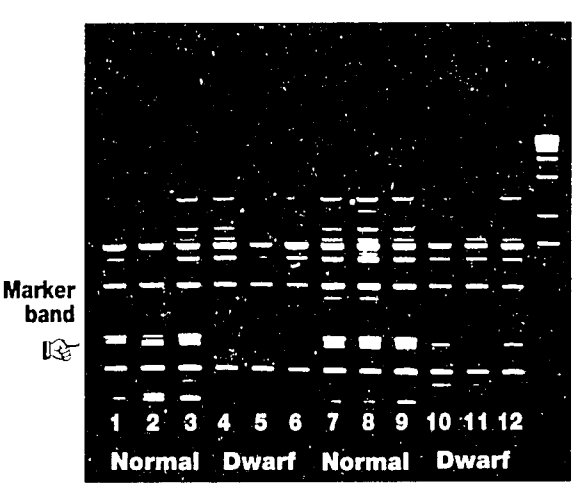
During the year a complementary funded project at ESTIA, Madrid, Spain, was initiated to investigate different packaging methods for seed stored with silica gel. The experiments will be conducted on cabbage (long-lived) and onion (short-lived) seed, using a variety of containers. A questionnaire was developed and circulated to selected genebanks through the IPGRI Regional Offices to learn more about the types of seed storage containers used and their performance in the genebank. Results will be used to guide genebanks to improved products and to identify aspects of seed packaging that require research.

In vitro *conservation*

Several IPGRI activities focus on *in vitro* conservation of vegetatively propagated species. Two researchers, one from CNIC and the other from INIFAT, Cuba were trained in ORSTOM, France in cryopreservation techniques. Back in Cuba, the CNIC researcher applied the technique to more than 10 Cuban varieties of sugarcane. At INIFAT, researchers successfully cryopreserved banana apices. In Germany, the IPGRI/DSM/FAL project successfully applied its freezing technique to apices of 100 varieties of potato. Over 25 000 potato apices are stored in liquid nitrogen.

ODA funded a project to develop RAPD markers to assess somaclonal variation in *in vitro*-propagated *Musa* genotypes. Work in 1994 demonstrated that the RAPD approach generates data that can be used for taxonomic study and identification. Candidate bands which allow discrimination between normal

The RAPD marker band clearly indicates the difference between the normal type and the dwarf off-type of the banana cultivar Uunapope

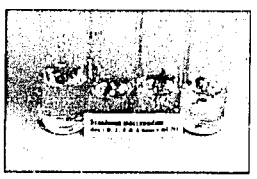


Data and gel courtesy of E. Howell, J. Newbury and B. Ford-Lloyd, University of Birmingham, UK

Abbreviations - see pp. 105-106

T. Engelman

Plantlets originating from control (above) and cryopreserved (below) zygotic embryos of *Scaphium macropdum*



plants and off-types have been found for several varieties. The project is based at the University of Birmingham, UK and works in collaboration with KUL, Belgium and IITA, Nigeria.

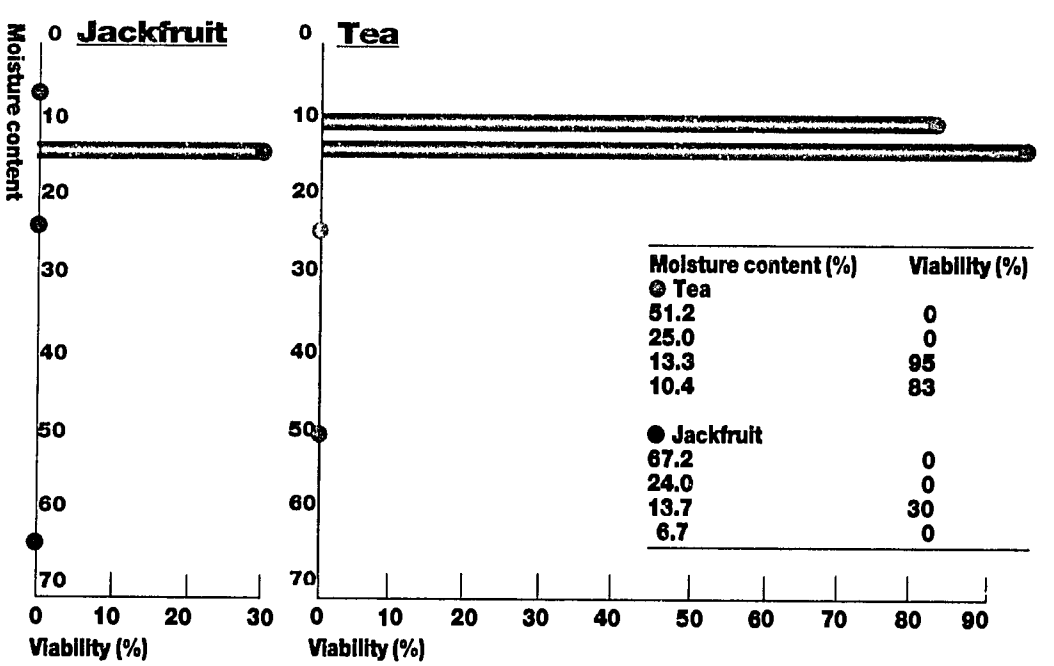
Work on projects focusing on conserving recalcitrant seeds continued in Malaysia and India. At FRIM, preliminary studies aiming at developing cryopreservation techniques for Dipterocarpaceae and other tropical tree species such as *Scaphium* showed that excised embryos of seven Dipterocarp species differed greatly in their desiccation sensitivity. UPM is developing cryopreservation techniques for tropical fruit trees. Whole jackfruit embryos did not withstand freezing using the encapsulation-dehydration technique, whereas some survival was obtained with excised apices. At NBPGR, India, an ODA-funded project aimed at understanding the biological mechanisms determining the recalcitrance of seeds of tea, cacao and jackfruit ended in March 1994. The project yielded new and relevant information on desiccation limits of intact seeds and embryonic axes, on their tolerance to cryopreservation and on the structural damage caused by desiccation and freezing. The project also successfully cryopreserved embryonic axes of tea and jackfruit (see below).

Germplasm health

The Technical Guidelines for the Safe Movement of Germplasm series, produced by a joint FAO/IPGRI programme, published guidelines for small fruits (*Fragaria, Ribes, Rubus, Vaccinium*). Meetings to develop guidelines for cereals and stone fruits were held in Aleppo, Syria and Rome. Collaboration with other CGIAR centres in the area of germplasm health was intensified. A pamphlet was produced to draw the attention of genebanks and seed projects to training opportunities in CGIAR centres in the field of germplasm health.

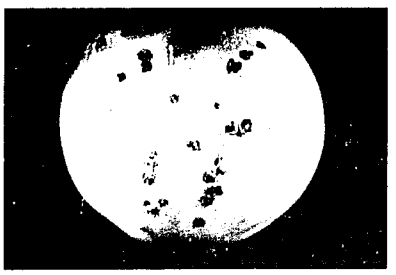
GMU staff participated in a one-week seed pathology course at

Cryopreservation of tea and jackfruit



Moisture content (%)	Viability (%)
○ Tea	
51.2	0
25.0	0
13.3	95
10.4	83
● Jackfruit	
67.2	0
24.0	0
13.7	30
6.7	0

Both tea and jackfruit axes desiccated to 13% moisture content and below could be cryopreserved, with significant survival rates.



K.E. Small, Univ. Florida

Bacterial spot of tomato caused by *X. campestris* pv. *vesicatoria*

Bonn University, Germany for graduate students. The course included lectures as well as laboratory sessions.

Several research projects were initiated during the year. A collaborative project with AVRDC was started that aims at developing a test for all groups of strains of *Xanthomonas campestris* pv. *vesicatoria* in tomato and pepper seeds. Previously available tests had a major shortcoming in that they reacted to only two of the three existing groups of the pathogen. The project successfully identified two sets of primers for use in single-round polymerase chain reactions. They amplified DNA from all three groups of strains. This means that now a sensitive and reliable test method can be recommended that can detect all known groups of strains of the pathogen in tomato and pepper seeds.

Genebank management

A first version of a computer program to aid the design of seed genebank facilities, sized according to predicted storage needs, was produced through a project with RBG, Kew, UK. The program uses a series of equations developed by the Kew scientists on the specification of seed-drying and cold rooms. With information provided by the genebank manager on the species to be stored and the likely rate of acquisition over coming years, the program estimates the volume of drying and cold rooms, humidity levels within the drying room and the effect on longevity of the various room conditions. It also prompts the user on requirements for establishing the site, equipping and staffing the facilities. Refinement of the program and the accompanying manual was in progress to produce a more user-friendly version. Also through a joint activity with RBG Kew, a Technical Bulletin was drafted (see above) that presents options for equipment and techniques for the drying and storing of seeds, and discusses the implications of the choices available on seed storage life.

GMU staff presented lectures on the technical and organizational aspects of genebank management during the regional training course 'Conservaçao de Germplasma Semente' organized in September 1994 by CENARGEN/EMBRAPA for participants of the PROCISUR and PROCITROPROS networks.

Policies and strategies for germplasm conservation and use

Studies conducted in 1993 on legal aspects of germplasm exchange and international arrangements for the conservation and use of plant genetic resources were published in 1994 in the new IPGRI series *Issues in Genetic Resources: No. 1, Material transfer agreements in genetic resources exchange - the case of the International Agricultural Research Centres*; and *No. 2, A multilateral system for plant genetic resources: imperatives, achievements and challenges*. The first step in establishing a formal international system for germplasm conservation was taken with the signing in October 1994 of the FAO-CGIAR Agreement that brings the CGIAR collections under the auspices of FAO and into the FAO International Network of *Ex Situ* Germplasm Collections. This achievement is further described in the section on International Collaboration (p.85 *et seq.*), as is the involvement of the GMU Group in activities on intellectual property rights.

A consultant in the APO region started developing a guide to organizing national programmes. The study had three elements: developing a framework to analyze national programmes; examining the systems in selected countries, and describing the options for national programme structure. The outputs will be merged with in-

Neglected crops

Starch plants:
- teff (*Eragrostis tef*)
- fonio (*Digitaria exilis*)
- hulled wheat (*Triticum* spp.)
- buckwheat (*Fagopyrum esculentum*)
- quinoa, cañihua, lamb's quarters (*Chenopodium spp.*)
- taro (*Colocasia esculenta*)
- yambean (*Pachyrhizus* spp.)
- Andean roots and tubers
- sago palm (*Metroxylon sagu*)

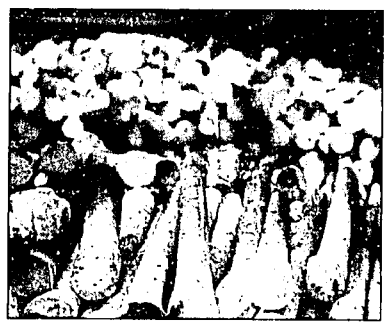
Oil plants:
- safflower (*Carthamus tinctorius*)
- niger (*Guizotia abyssinica*)
- physic nut (*Jatropha curcas*)

Protein-providing plants:
- Bambara groundnut (*Vigna subterranea*)
- lupins (*Lupinus* spp.)
- grasspea (*Lathyrus sativus*)

Vegetables:
- chayote (*Sechium edule*)
- aibika (*Abelmoschus manihot*)
- cat whiskers (*Cleome gynandra*)
- black nightshade (*Solanum nigrum*)

Fruits:
- peach palm (*Bactris gasipaes*)
- tamarind (*Tamarindus indica*)
- carob (*Ceratonia siliqua*)
- passion fruit (*Passiflora* spp.)
- Sapotaceae (*Chrysophyllum cainito*, *Manilkara zapota*, *Pouteria* spp.)

Spices:
- marjoram (*Origanum* spp.)
- coriander (*Coriandum sativum*)



● **Peach palm** (*Bactris gasipaes*) was one of the major crops of the pre-Colombian Amerindians. Today its fruits are still important.

● The delicacy *palmetto* or hearts of palm (above, left) also comes from this plant, which has recalcitrant seeds and so needs to be maintained in field collections.

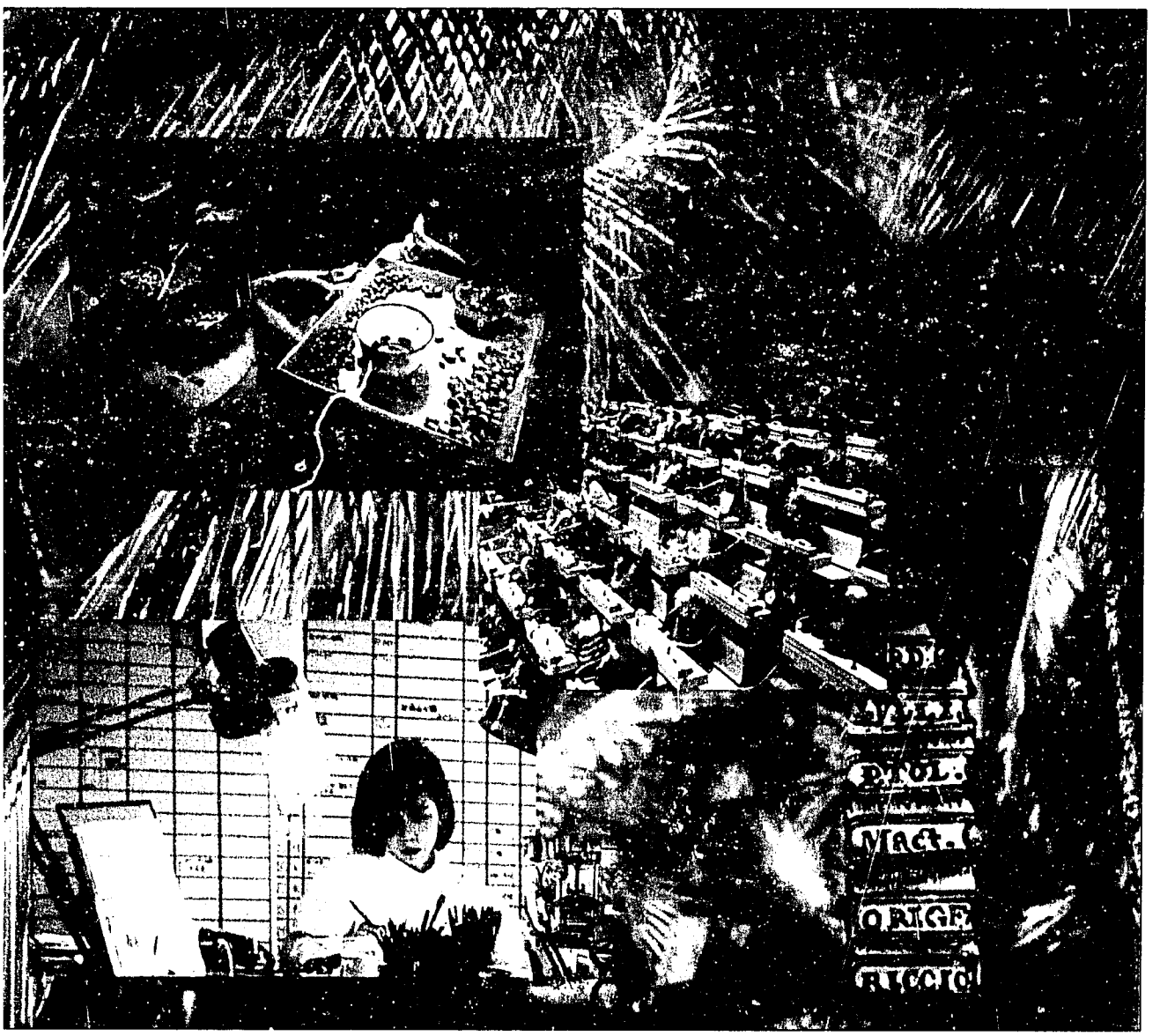
● **Chayote** (*Sechium edule*) is exported in large quantities from Central America. Its vast genetic diversity is not well represented in genebanks. It has recalcitrant seeds and several field collections were lost during the last years.

All photos by Joachim Keller

formation coming from the ICPPGR Country Reports, to produce a guide of relevance to national programmes worldwide.

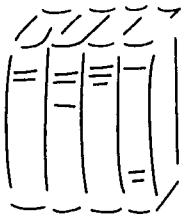
Neglected crops

In November 1993 IPGRI and IPK initiated a 3-year project entitled 'Genetic resources of neglected crops with good development potential: their conservation, use and breeding status.' Within this project, monographs will be developed which will strongly focus on aspects of conservation of genetic resources and their use. In addition, network activities among genetic resources' scientists were supported. During 1994 a preliminary list of crops was drafted (see the panel on the opposite page). Coordinators for crop monographs were identified for many of the species after visits to institutes and discussions with scientists in 17 countries of Africa, Asia, Latin America and Europe. For most of the species selected, some kind of network activity exists, ranging from regular national and regional conferences to networks at different levels (informal, formal, etc.). Information on these activities was gathered from different sources: network newsletters, conference proceedings and announcements, as well as information from crop experts. Joint network activities on several neglected crops were underway with IPGRI's Regional Offices and NARS.



Abbreviations - see pp. 105-106

Documentation, information and training



The Group filled all its vacant staff positions during the latter part of 1994. Five local recruitments strengthened, in particular, the areas of editorial and publications management and documentation. Three international staff from the Group attended a workshop held at ISNAR in the Hague on 'The future of information activities in the CGIAR', where two papers were presented on behalf of IPGRI. The workshop proposed a CGIAR system-wide information strategy which will have important implications for the work of the Group in the future. One key component of the strategy is the development of an Integrated Voice and Data Network. Scheduled for implementation in 1995, this system was given high priority because it is essential for the effective development of a number of other system-wide initiatives. The network will provide an enhanced electronic communications infrastructure among the CGIAR centres, linking them to each other and to the Internet by high-speed communication lines that carry both voice and data transmissions.

The Group submitted a number of IPGRI's publications and public awareness products to the critique and awards programme of the Agricultural Communicators in Education based in the USA. This international professional organization seeks to help its members achieve professional excellence through constructive criticism. In the 1994 awards involving some 400 entrants, IPGRI was awarded four medals for *Geneflow*, *People and Plants*, *Diversity for Development* and the 20th anniversary posters.

Documentation

Development of standards for germplasm documentation

IPGRI encourages the exchange of germplasm data in the least ambiguous manner possible. One way is through the development of a series of crop descriptor lists. Over 70 of these have been printed and distributed over the last 15 years. With the assistance of crop experts, IPGRI compiles a comprehensive list of descriptors to a standardized format. This is reviewed by an in-

- Expansion of IPGRI's knowledge base and dissemination of data to partners
- System standardization, methodology and tools for the documentation of plant genetic resources
- Development of literature-based and bibliographic resources to serve IPGRI and its collaborators
- Publication and distribution of original research in plant genetic resources in forms targeted at specific audiences
- Development of postgraduate courses on plant genetic resources conservation in developing country universities
- Public awareness for policymakers, donors and those who influence them
- Socioeconomic impact of IPGRI's activities on plant genetic conservation and use
- Vavilov-Frankel Fellowships

ternational group of experts. Some lists contain a large number of descriptors for crop characterization but scientists are encouraged to utilize those descriptors that are important in their own situations. To assist scientists in their work, in 1994 a subset of descriptors was identified and indicated in each list to allow for maximum discrimination between accessions.

Buckwheat, barley, cardamom and walnut descriptors were completed and distributed in 1994. The descriptor list for *Capsicum* (in English and Spanish) was finalized. The list for avocado was reviewed and edited. Manuscripts for yam, black pepper and guava were each sent for review. The list for coffee was worked on with CATIE, that for *Musa* with INIBAP and *Sesbania* with ICRAF.

Capsicum

Patrizia Tazza

Apart from cooking, derivatives of *Capsicum* have many uses. Capsaicin can be used in anti-fouling compounds for ship bottoms, for repelling cats and dogs, and for stopping rats gnawing electric cables. The derivatives are reputed to be used in some toothpastes which "keep the mouth refreshed and free from bad breath and fur".

Information from Peter Buck, The Patent Office, Newport, Gwent, UK, as reported in *New Scientist* 25 March 1995, p. 54

Documentation training

In 1994, IPGRI's Documentation, Methodology and Application programme assisted the APO Regional Office to organize a 3-week training course in Kuala Lumpur, Malaysia. The course was attended by 27 trainees from 16 Asian countries and covered most aspects of *ex situ* genebank documentation.

In 1994, the *Guidebook for genetic resources documentation*, the genebank management system software and the GMS *User's Guide* continued to be in demand. The *Guidebook* puts forward a self-teaching approach that will develop a user's documentation expertise in a local situation. The GMS software was used and evaluated by many organizations and individuals. Feedback from users provided IPGRI with information to resolve problems in the use of the prototype version and prepare a new release of the software.

Assistance to national programmes

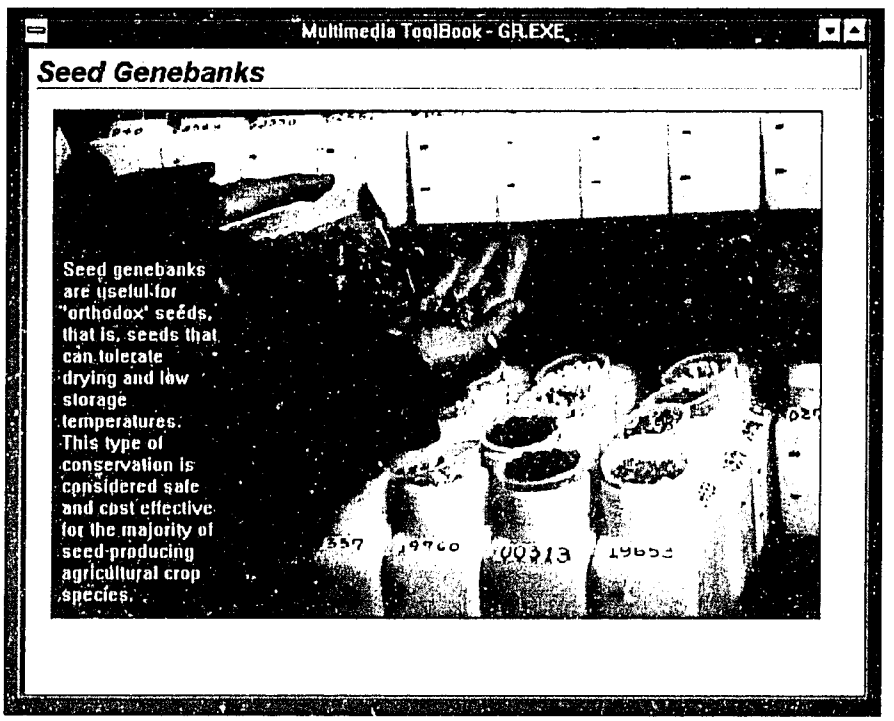
IPGRI places a high priority on providing documentation assistance to national programmes. To help identify problems that may exist in documentation activities, a newsletter, *Documentation Forum*, along with a discussion document and questionnaire, were distributed to over 500 genebank managers and documentation staff. The questionnaire asked for information on problems that exist and solicited opinions on their solutions. The results of the questionnaire will be examined by IPGRI's regional documentation staff and used to determine follow-up contacts with respondents.

New methodologies

IPGRI continued a project at the University of Naples, Italy to develop an expert genebank management system that will assist users in 'intelligent' ways. The system will categorize data that

can be described better with an image than with a qualitative or quantitative value. The second phase of the project was completed with the development of a rough prototype of an open-ended image database that uses 'iconic-selection' for descriptor states.

Access to genetic resources information is, in some respects, growing faster than the ability to manage it. IPGRI worked to develop methods and applications to manage text databases containing data that cannot be reduced to fixed-length fields. Investigations were started on methods of distributing entire documents, including images, in electronic format through communications networks. IPGRI also explored the use of video and sound in the documentation of genetic resources or related data, such as indigenous knowledge.



● An electronic page from ELADA, which uses images, text and data to describe aspects of biodiversity relating to country responsibilities under Agenda 21 and the Convention on Biological Diversity.

In 1994, IPGRI became a partner in an IDRC-funded project to develop a multimedia electronic atlas (ELADA) to assist policymakers and educators in understanding the biodiversity-related aspects of Agenda 21. It will provide limited geographical information system capabilities. IPGRI was given responsibility for providing the complete genetic resources scenario for this project. A demonstration version of ELADA was shown at the first meeting of the Conference of the Parties of the CBD in the Bahamas, in November 1994, where IPGRI's contribution provoked much positive comment.

Documentation technology

Memory and disk space of IPGRI's two local area network servers in IPGRI at HQ were upgraded to enhance network performance. A computer services review gained an understanding of staff's priorities for current and future operations, to quantify training needs, and to establish a programme of work over the coming months.

Information management and dissemination

IPGRI responds to a large number of specific queries covering a vast array of topics related to plant genetic resources. IPGRI also seeks to stimulate collaboration in the management and use of germplasm collections by publishing crop directories compiling information on germplasm holdings worldwide.

In 1994, in coordination with FAO and IPGRI's Regional Offices, updated information was sought on root and tuber crops and oil crops. With increasing access to computers it was logical to consider providing this type of information in electronic format, offering easier and more flexible means to distribute and access the information. Accordingly, the develop-

ment was started of a software application to provide an alternative to printed directories.

Library and Information Services

The IPGRI Library continued its support to IPGRI projects by adding to its holdings and improving services to staff. In 1994, requests for documents increased by more than 70% over 1993 requests, demonstrating the increased use of library services by staff. To complement the electronic current awareness service provided to HQ staff and to provide a more efficient service to regional staff, the first issue of a monthly printed *Library Bulletin* was produced in September 1994. The Bulletin includes information on new books, current articles, IPGRI reports and, occasionally, information on particular subject areas. To assist users to manage their bibliographic data, library staff also provided training in the use of personal bibliographic software.

A significant proportion of time and resources is spent on meeting the needs of IPGRI's Regional Offices, since the Library strives to provide a comparable service to both HQ and regional staff. Almost all the regional and subregional offices use PlantGenCD, which is a database of abstracts on plant genetic resources, produced jointly with CABI and distributed on CD-ROM. Feedback on its use was positive. With the increasing use of PlantGenCD and a regular current awareness service, document supply to the regional offices doubled compared with 1993, and accounting for over 50% of documents supplied by the library. The Library also assisted the Regional Offices with their book and journal purchases and provided other standard information services.

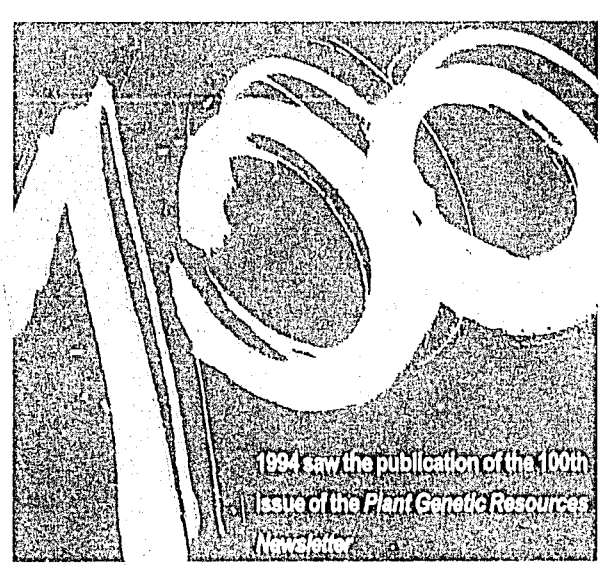
Assistance to the plant genetic resources community

Improved chapter headings were incorporated into the 1994 issues of *Plant Genetic Resources Abstracts*, a quarterly abstracts journal which has been produced in collaboration with CABI since 1992. A reader survey, compiled by IPGRI and CABI staff, was sent to recipients of sponsored subscriptions of the journal to evaluate its impact and usefulness to them. Preliminary results from this survey indicate the positive contribution of *Plant Genetic Resources Abstracts* to their work.

Training on PlantGenCD was included in the documentation workshop which took place in Malaysia in September 1994 (see above). Staff from CABI provided this training and IPGRI used the event to assess the information needs of participants' institutions. Information support such as provision of basic text books of plant genetic resources and PlantGenCD has been included in relevant IPGRI project proposals; the University of Zambia has already received a consignment of text books as reference material for its MSc course students.

The IPGRI Library also provides assistance to visiting scientists and IPGRI-sponsored trainees. For example, during a visit to IPGRI the Librarian of the Nordic Gene Bank examined the way IPGRI Library and Information Services is set up to gather ideas for a plant genetic resources information service at the NGB.

The Library and Information Services Officer was also involved in a project to publish synthesized literature on local crop development together with ODI, CPRO-DLO (see the Genetic Diversity Group report, pp. 50-51). During the year IPGRI became a member of AGRIS, with the responsibility for entering bibliographic data on IPGRI publications into the AGRIS database.



IPGRI publications - 1994

IPGRI Annual Report, 1993
FAO/IBPGR Plant Genetic Resources Newsletter Nos. 94/95 and 96
Plant Genetic Resources Newsletter Nos. 97, 98, 99 and 100
Europe Regional Newsletter Nos. 1, 2 and 3
Newsletter for the Americas, Vol. 1, No. 1
Boletin de las Americas, Vol. 2, No. 1
APO Regional Newsletter Nos. 14 and 15 (English and Chinese)
WANA Regional Newsletters Nos. 1, 2 and 3
SSA Regional Newsletter Nos. 4 and 5
Descriptors for Cardamom
Descriptors for Walnut
Descriptors for Barley
Descriptors for Buckwheat
Issues in Genetic Resources No. 1 Material transfer agreements in genetic resources exchange - the case of the International Agricultural Research Centres
Issues in Genetic Resources No. 2 A multilateral system for plant genetic resources: imperatives, achievements and challenges
FAO/IPGRI Technical Guidelines for the Safe Movement of Small Fruit Germplasm
FAO/IPGRI Genebank Standards (Arabic, Chinese, English, French and Spanish
International Crop Network Series No. 11 International *Beta* Genetic Resources Network
Proceedings of a joint FAO/IPGRI Workshop on *Ex situ* Germplasm Conservation
Sesame Biodiversity in Asia. Conservation, Evaluation and Improvement
Report of a Pilot *In Vitro* Active Genebank
In Defence of Diversity
In Defence of Diversity (Focus on Asia, the Pacific and Oceania)
Les Hommes et les Plantes: Programme pour le developpement
El Hombre y las Plantas: La agenda para el desarrollo
Keeping Faith With the Future
Forests and Their Genetic Resources
Garder Foi en l'Avenir
Les Forêts et Leurs Ressources Génétiques
Fe en el Futuro
El Bosque y Sus Recursos Geneticos
Geneflow 1993 (French)
Geneflow 1994
1994 Calendar

Editorial and Publications

In the latter half of the year, the Editorial and Publications Management unit was brought up to full strength through local recruitment. Thus by the end of 1994, staff comprised the manager, editor/proofreader, layout/designer, publications assistant, publications clerk and part-time programme assistant. New systems for handling, printing and distributing material were developed at the same time. More than 30 publications were produced in 1994 and over 50 000 copies of these titles distributed globally.

Plant Genetic Resources Newsletter

With IBPGR's transformation into IPGRI, new arrangements were made with FAO to continue collaborating on the joint publication, the *FAO/IBPGR Plant Genetic Resources Newsletter*, which serves a valuable information function, particularly in developing countries. In September 1994 a Memorandum of Understanding was signed by IPGRI and FAO on the publication, which was given the new title *Plant Genetic Resources Newsletter*. Both organizations reaffirmed their commitment to the publication. IPGRI was confirmed as having main editorial responsibility for day-to-day production matters, under the supervision of an FAO/IPGRI Advisory Committee. The signing of the Memorandum also provided an opportunity to revise the style of the serial. Issue No. 97, the March 1994 issue, was the first to show the new design, which was received very positively. The process of refining the publication was continued with the introduction of review articles. A decision was taken to conduct a readership survey to obtain feedback which will help ensure that the Newsletter continues to meet the needs of its target audiences.

Abbreviations - see pp. 105-106

Publications Committee

A Publications Committee was formed in 1994 to formalize management control of IPGRI's rapidly increasing publications output across the wide geographic spread of IPGRI offices and staff. The Committee seeks to ensure that the reputation of IPGRI as a pre-eminent organization in its field is safeguarded. It maintains an overall view of the printed output of IPGRI to ensure that institutional material falls in line with IPGRI's strategic directions, and is produced and distributed in an integrated, efficient and effective manner. IPGRI's Policy and Procedures for Publications was issued in November. The basic philosophy behind this document is that any material emanating from within the Institute will have had both scientific evaluation and *de facto* senior management authorization. The Publications Committee issued the first version of the *IPGRI Style Guide* in December. This straightforward manual is intended to assist staff in preparing documents with clarity and simplicity. The principles set out in the *Guide* should contribute to increasing the impact of documents generated by IPGRI staff.

Copies of the *Style Guide* are available free of charge from Editorial and Publications Management, IPGRI

Training in scientific writing

Good communication techniques and writing skills are essential for scientists. In October 1994 the Editorial and Publications Manager was sponsored by CTA to work as a resource person on a 2-week workshop on science writing, organized by WARDA, SAFGRAD and IIRAD at the IITA Biological Control Station in Cotonou, Benin. This was the third such workshop that has been held, and plans were made to expand this extremely valuable and effective training programme throughout Africa by concentrating on developing training materials. This will allow other people to take over the role of trainers. Earlier in the year, CTA had sponsored the Manager to work on a course on science communication that he organized in Trinidad with the Ministry of Agriculture, Fisheries and Water Resources.

Meeting information needs

Work continued on assessing and meeting the information needs of developing country partners. Regions and individual countries within them have very different requirements for information, with the nodal approach (choosing selected institutions in individual countries to act as centralized receivers and repositories of information) emerging as valid. It is obvious that IPGRI needs to use a blend of techniques for information dissemination with traditional methods of book and newsletter publishing continuing to play an important role, supplemented by advanced technology such as transmission of information via electronic mail and the Internet. Electronic document production was investigated for suitability of use in IPGRI.

Following up 1993's meeting of all staff concerned with producing the Regional Newsletters, the EPM visited the Nairobi

Regional Office and trained staff there in techniques of newsletter production, to facilitate the writing, design, layout and printing of the English and French versions of the Regional Newsletter of SSA. Work continued on developing a library of images in HQ that could be used by the regions in preparing their publications.

Commercial publication

In October an agreement was concluded with CABI to publish the IPGRI-FAO-IUCN-UNEP publication *Collecting Plant Diversity: Technical Guidelines*. Arrangements were made with UK publishers John Wiley to publish the proceedings of the workshop on core collections held in 1993. IPGRI concluded an agreement with Cambridge University Press, UK on behalf of the CGIAR to publish a book dealing with the status of collections of mandate crops, to be known as *Biodiversity in Trust*.

Training

IPGRI's Training Strategy received Board of Trustees endorsement in early 1994. This reaffirms the institute's strong commitment to training as a means of enhancing our developing country partners' capacity to conserve and utilize their genetic resources effectively and to become effective collaborators in research. Importantly, it is seen as a crucial means of equipping them to fulfil their obligations under the Convention on Biological Diversity. The strategy indicates that a variety of approaches should be used in training, as reflected in activities over the year, in which IPGRI supported both individual and group training on a wide range of topics and made further progress in the devolution of training.

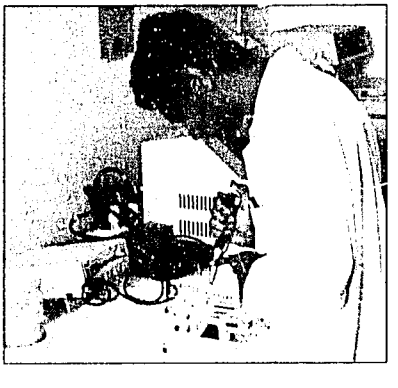
Individual training

Within the Italian-funded Individual Training Scheme (see Annual Report 1993, p. 53), six scientists from developing countries undertook either Research Fellowships or Special Skills Training during 1994.

Dr. M. Tahir from Pakistan completed his Research Fellowship on the biochemical evaluation of wheat genetic resources at the University of Tuscia, Viterbo (see below). Dr Levi Akundabweni from Kenya embarked upon a Research Fellow-

Pakistani research fellow trains in Italy

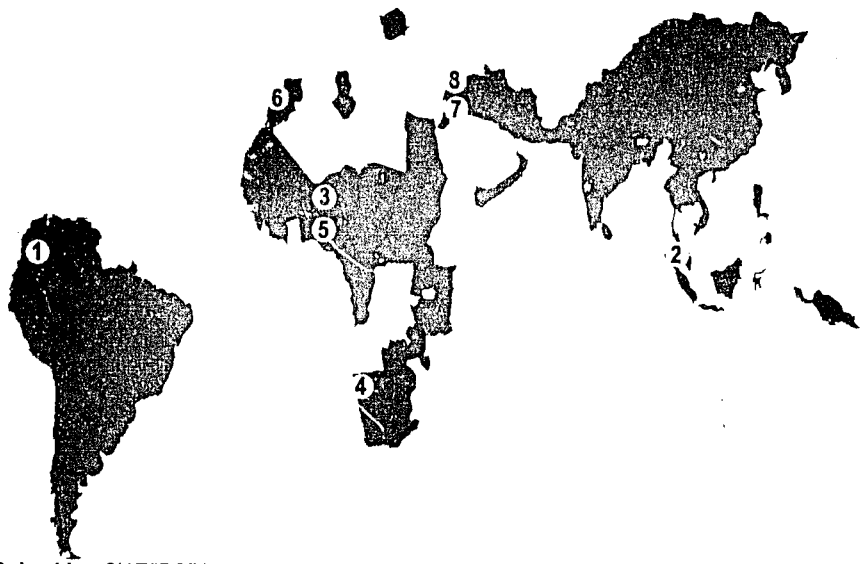
Wheat is a very important staple crop in Pakistan where *per capita* consumption is among the world's highest. It occupies nearly 40% of the total cropped area of Pakistan. The majority of the wheat is used for making chapati, a type of bread which requires a particularly strong flour. The precise breadmaking properties of the flour derive from its protein content. Normally, this is determined empirically by growing the wheat, harvesting and milling the grain to produce flour and then carrying out a dough test, a process that takes several months to complete. Biochemical analysis through the electrophoresis of high molecular weight glutenin, a class of protein, extracted from the seed, provides a much more rapid, exact and objective test. Dr. M. Tahir did the first such test on the Pakistani wheat collection. His findings shed light on the basis of selection in past breeding efforts and indicate a narrow genetic base for commercial wheat varieties. Examination of a number of Pakistani landraces has yielded important data that should help create a better understanding of the genetic make-up of these traditional genotypes and highlight their potential as contributors to breeding programmes. Dr. Tahir hopes to put his newly acquired research expertise to work by providing training to local scientists and plant breeders. This should encourage wider and more effective use of national collections of plant genetic resources.



L.A. Withers

Training summary - 1994

(Short courses and Italian-funded individual training scheme. See also Group reports. Countries of origin of trainees in orange)



Short Courses

1 **Colombia** - CIAT/IPGRI - Plant Genetic Resources Documentation; 16 participants from: Argentina (1), Bolivia (2), Brazil (1), Chile (1), Colombia (3), Ecuador (1), Paraguay (1), Peru (3), Uruguay (1), Venezuela (2).

2 **Malaysia** - MARDI/IPGRI - Documentation for Genebank Managers; 27 participants from: Bangladesh (2), China (1), DPR Korea (2), Fiji (1), India (2), Indonesia (1), Republic of Korea (1), Laos (1), Malaysia (6), Mongolia (1), Nepal (1), Papua New Guinea (2), Philippines (1), Sri Lanka (1), Thailand (2), VietNam (2).

3 **Niger** - UNEP/IPGRI - Concepts and Strategies for the Development of National Plant Genetic Resources Programmes; 14 participants from: Burkina Faso (2), Cameroon (1), Central African Republic (1), Chad (1),Congo (1), Côte d'Ivoire (1), Gabon (1), Guinea (1), Mali (1), Mauritania (1), Niger (1), Senegal (1), Togo (1).

4 **Namibia** - Darwin Initiative for the Survival of Species/University of Birmingham/IPGRI/SPGRC - Exploration and Conservation Strategies; 12 participants from: Botswana (2), Kenya (1), Lesotho (1), Namibia (1), South Africa (2), Sudan (1), Tanzania (1), Zambia (2), Zimbabwe (1).

5 **Nigeria** - IITA/IPGRI/FAO - Crop Genetic Resources Collection, Conservation and Documentation; 18 participants from: Benin 1, Cameroon 1, Central African Republic 1, Guinee 2, Kenya 1, Malawi 1, Mauritania 2, Nigeria 5, Sierra Leone 2, Togo 1, Uganda 1.

6 **Morocco** - IPGRI/Regional Rangeland Seed Information Network - Plant Genetic Resources Documentation; 4 participants from Tunisia (1), Morocco (3).

7 **Jordan** - IPGRI/Regional Rangeland Seed Information Network - Plant Genetic Resources Documentation; 3 participants from Jordan (1), Syria (1), Iraq (1).

8 **Syria** - ICARDA/IPGRI - Plant Genetic Resources; 10 participants, one each from: Egypt, Iran, Jordan, Lebanon, Morocco, Oman, Pakistan, Syria, Tunisia and Yemen.

Individual Training in Italy

Place	Subject	Participant
Bari	seed conservation	Syria
Bari & Naples	seed conservation/*in vitro* conservation	Romania
Naples	characterization of *Capsicum* germplasm	Colombia
Naples	germplasm evaluation for environmental stress resistance in cowpea	Kenya
Bari	survey, exploration and collecting	Cameroon
Viterbo	biochemical evaluation of wheat genetic resources	Pakistan

Abbreviations - see pp. 105-106

ship at the University of Naples, Portici, involving evaluation for environmental stress resistance in cowpea, an important source of protein and a valuable animal feed in the humid and semi-arid tropics. In his research he is studying the regulation of nuclear gene expression under stress conditions (e.g. heat shock), analysis of endogenous hormone levels in response to stress, and assessment of tolerance to heat and drought using chlorophyll fluorescence. Ms Mary Api Ngu from Cameroun began a Research Fellowship at the Germplasm Institute, Bari on the survey, exploration and collecting of plant genetic resources.

In the area of Special Skills Training, Ms. Silvia Strajeru from Romania and Dr. Ahmed Sawas from Syria received training in seed conservation in the Germplasm Institute, Bari. Ms. Strajeru also undertook training in *in vitro* conservation at the University of Naples, Portici, where Ms. Yolanda Palacios from Colombia studied characterization and evaluation of *Capsicum* germplasm. Further placements are being developed and a number of applications from all the IPGRI regions are under consideration.

Two IPGRI-nominated scientists, from Vietnam and Nepal, completed advanced training on MSc and Diploma courses respectively at University College Cork, Ireland.

MSc courses

IPGRI provided trainers for the MSc course on Conservation and Use of Plant Genetic Resources offered by the University of Birmingham, UK. IPGRI staff gave lectures on conservation strategies, international activities on conservation and *in vitro* conservation. IPGRI also collaborated closely with course staff in the development of devolved courses in regional locations. A consultant from Birmingham visited universities in West Africa to investigate the potential for establishing courses in that subregion. The Training Officer visited Lebanon on a similar mission.

Progress continued to be made in the implementation of Masters level courses in the Universities of Zambia and Nairobi, and the University of the Philippines in Los Baños. In connection with the latter course, IPGRI collaborated with the University in conducting a market survey for advanced training in Southeast Asia at the end of 1994.

Short courses

IPGRI helped to organize eight short courses during 1994. These were held in Colombia, Jordan, Malaysia, Morocco, Namibia, Niger, Nigeria and Syria. Futher details are given opposite and in the relevant Regional Group reports. As well as being directly involved in courses, IPGRI assisted several developing country scientists to secure places and funding for training by other institutes. These included training offered by DSE in Germany. IPGRI collaborated with DSE during 1994, advising on curricula and providing literature and trainers.

L.A. Withers

Participants on a short course in Namibia

Vavilov-Frankel Fellowships

During 1994, the 1993 Fellows Robin P orius from the University of Amsterdam, the Netherlands and Igor Loskutov from the N.I. Vavilov Institute of Plant Industry, St. Petersburg, Russia conducted research on the history of plant genetic resources, with completion expected early in 1995. One Fellowship was awarded in 1994 to Awegechew Teshome of Ethiopia to study 'Factors Maintaining Sorghum Landrace Diversity in Shewa and Welo Regions of Ethiopia.' Mr. Teshome is collaborating with the Seeds of Survival for Africa programme, run by the Unitarian Services Committee of Canada and based in Addis Ababa, Ethiopia. He was enrolled in a joint PhD programme with Carleton University and the University of Ottawa in Canada. His research focusses on the knowledge and skills of the farmers who

are responsible for the generation and maintenance of crop diversity in their respective regions. Mr. Teshome is particularly interested in how resource-poor farmers select and maintain their extraordinary crop diversity from degraded and often drought-affected land. In the course of his research he studied farmers' practices and their decision-making processes, covering a total of 300 farms and more than 50 landraces.

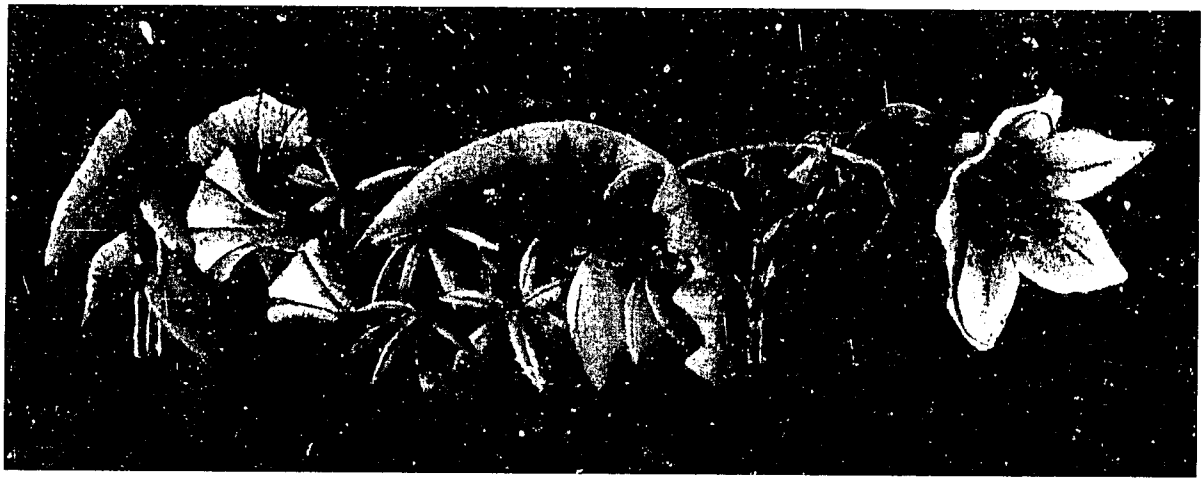
Public awareness

Identifying key targets and partners is a fundamental aspect of IPGRI's public awareness programme. In 1994, as part of a continuing effort, IPGRI sponsored the development of databases of NGOs and media contacts in Europe and Sub-Saharan Africa. Public awareness materials were prepared and distributed to key target audiences. Many had a regional focus (e.g. brochures concentrating on IPGRI's work in the regions, a French language version of *Geneflow* for Sub-Saharan Africa, a special issue of *Geneflow* for West Asia and North Africa, regional posters, a calendar with regional focus) to provide outposted staff with tools that are relevant to their particular needs and those of their partners. Work also began on a public awareness training manual for regional offices and national programme staff. The IPGRI audio-visual production was finished in 1994. The 17-minute presentation was distributed on video and translated into Italian.

IPGRI coordinates a number of activities on behalf of the CGIAR system. In 1994, the CGIAR Public Awareness and Resources Committee and the System-wide Programme on Genetic Resources approved funding to support the development stage of a series of films on the subject of genetic resources, as a contribution to the public awareness activities of the CGIAR system-wide programme on genetic resources. The videos will focus on the importance of genetic diversity as a means of ensuring sustainable agricultural production. They will examine various historical, biological, human and policy issues relating to the conservation and use of genetic resources. IPGRI was given the role of coordinating the CGIAR's input to the project. The second phase will develop a number of educational films, using some of the scenes from the first series, accompanied by written material.

IPGRI coordinated a pilot project to increase awareness of international agricultural research in Germany on behalf of the CGIAR Public Awareness and Resources Committee. Brochures describing system-wide activities relating to Agenda 21 and forestry genetic resources were produced in a number of languages.

The 1994 Calendar was one of several IPGRI publications that won awards in the annual competition organized by Agricultural Communicators in Education, USA



Patrizia Tuzzi

Writing began on the text for a brochure on the role of women in genetic resources conservation and use, supported by DANIDA and the CGIAR Gender Programme.

IPGRI also coordinated CGIAR public awareness activities at meetings of the IGCCBD and the First Conference of the Parties to the CBD. These included producing information materials and conference displays and holding press conferences.

Impact assessment

This project looks at the socioeconomic impact of IPGRI/IBPGR activities on germplasm conservation and use. In 1994, two distinct levels of impact assessment were identified to explore: (a) the effect of the activities of IPGRI on conservation and use of plant genetic resources, and (b) the effect of conservation and use of germplasm on socioeconomic development through agricultural development. The distinction is fundamental since the effect on germplasm conservation is direct. The effect on socioeconomic development, for example through the adoption of modern varieties in agriculture, is indirect.

This project addressed point (a) by carrying out research in the institute's records and other sources. A paper entitled 'From IBPGR to IPGRI: twenty years of conservation and agricultural development' summarized how IPGRI contributed to the development of national conservation institutions, provided inputs in the areas of collecting, conservation, training and information dissemination, contributed to the creation of links between institutions through the development/fostering of networks, and influenced the international debate on plant genetic resources conservation.

Determining how conservation and use influenced socioeconomic development took the study into different areas, particularly in terms of data collection. Economic data on agricultural production, adoption of modern varieties, pricing policy and social surveys were used. The assumption was made that germplasm that had been collected and conserved had been used to create a modern variety. This would have resulted in a quantifiable improvement in production. When used in two missions carried out by the project coordinator in Syria and Colombia, this approach had serious limitations. It underestimated the value of conservation efforts put into characterization and evaluation of material that had yet to be used, and the value of accessions that would otherwise have disappeared from cultivation. Also, it provided evidence of positive impact only for major economic crops, disregarding work on minor and underutilized crops, for which there may be no market price.

In seeking to develop an approach to deal with these limitations, the project studied methodologies that could fairly reflect the effects of conservation. A round-table meeting was to be arranged for 1995 in collaboration with IFPRI and ISNAR, and under the aegis of the SGRI to explore policy options as well as other avenues of socioeconomic research for genetic resources conservation and use.

Abbreviations - see pp. 105-106

Abbreviations - see pp. 105-106

Over the last 10-15 years, international concern for bananas and plantains has been increased by two developments: a growing appreciation of their role in nutrition and household food security over a significant part of the world; and the menace posed by the global spread of black Sigatoka disease. Black Sigatoka (*Mycosphaerella fijiensis*), sometimes referred to as black leaf streak, was first identified in the mid-1960s in the Pacific and spread to Latin America, with devastating consequences. Its arrival in Africa was one of the factors which sparked the creation of INIBAP. Depending on the ecoregion, *Fusarium* wilt, Moko and blood diseases, banana bunchy top virus and banana streak virus, nematodes and weevil borers all pose dangers to productivity.

Besides the biological problems there are difficulties with banana and plantain production systems. Support and guidance is required to cope with unsustainable *Musa* production in slash-and-burn areas and in situations where susceptible cultivars are devastated by disease.

Musa breeding presents special difficulties. Most cultivars are highly sterile triploids and hybridization cannot be carried

- *Musa* Germplasm Conservation Network
- *Musa* Germplasm Exchange System
- *Musa* Germplasm Information System
- Breeders' Network
- Strategic research
- International *Musa* Testing Programme and National Evaluation Programmes
- Information and documentation/ communications
- Regional research and training on *Musa* in Latin America and the Caribbean
- Regional research and training on *Musa* in Asia and the Pacific
- Regional research and training on *Musa* in Africa

IPGRI/INIBAP integration

The CGIAR decided during the Mid-Term Meeting in May 1993 to bring INIBAP under the governance and administration of IPGRI. The Board Chairs of the two institutions and the Chair of the INIBAP Support Group signed the Memorandum of Understanding accomplishing this task in May 1994 in New Delhi, India. The INIBAP Board then handed over its responsibilities to the IPGRI Board. The Director of INIBAP became a member of IPGRI's Management Committee. INIBAP will continue to exist as a legal entity, at least until the External Programme and Management Review of IPGRI in 1996-97. The INIBAP Programme will retain its major operational base in Montpellier, France.

The goals of INIBAP

The operational goals of INIBAP are:

to organize a global research effort on banana and plantain, aimed at the development, evaluation and dissemination of improved cultivars and the conservation of *Musa* diversity;

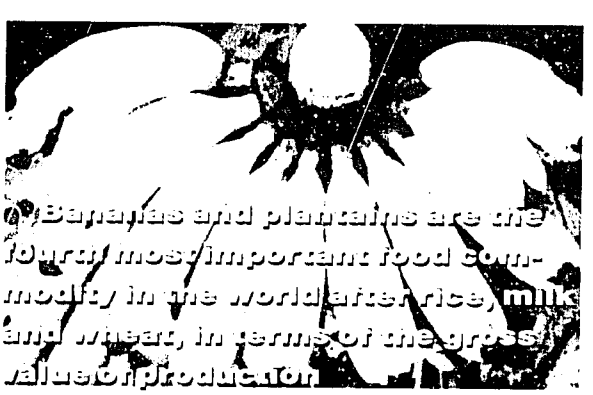
to promote regional research efforts to deal with region-specific problems and to assist the regions to contribute towards, and benefit from, the global research effort;

to strengthen the ability of NARS to conduct research on bananas and plantains;

to arrange for the exchange of information and documentation amcng researchers.

out easily. Furthermore, until the late 1970s, international research interest was limited to the export-type banana. Plantains and bananas for loca' consumption received attention from only a handful of scientists. As a result, banana and plantain are the least researched among all the major food commodities, despite having been under attack from a number of virulent diseases and pests.

What makes *Musa* research complex are the numbers of different *Musa* types that provide basic food, grow in different ecoregions and are attacked by different diseases and pests: the true plantain (AAB genome) of Central and South America and West Africa; the highland banana (AAA) of eastern Africa and some parts of Latin America; the cooking banana (ABB/BBB) of Southeast Asia and the Americas; the Pacific Maia Maoli/Popoulu types (AAB), the internationally known Cavendish (AAA) commercial dessert banana; and many other types locally preferred in various countries around the world.



(Review of CGIAR Priorities and Strategies Part 1, section 5.3.5)

Selected project activities

Musa Germplasm Conservation Network

INIBAP's collection of *Musa* germplasm is conserved *in vitro* under slow-growth conditions. During 1994, 19 new accessions were acquired by the INIBAP Transit Center at the Katholieke Universiteit Leuven, Belgium, to include in the INIBAP germplasm collection. At the end of 1994, the active *in vitro* collection included 1050 accessions representing a large proportion of the genetic diversity within the genus *Musa*. INIBAP sponsored the development of cryopreservation protocols for efficient, economic, long-term storage methods at KUL which can be applied to embryogenic cell suspensions but, above all, to meristems.

A priority for INIBAP is the duplication for safety reasons of the *Musa in vitro* collection held at the ITC. In 1993, the ITC started the duplication of its *in vitro* genebank at TBRI (Taiwan). TBRI maintains duplicates of 414 accessions representing 39% of the ITC collection. Other institutes (IITA, Nigeria; CATIE, Costa Rica) were contacted in 1994 to join this conservation network.

The ITC collection is not yet fully characterized. Further work is required in this area. Preserving genetic integrity of the germplasm held *in vitro* is a matter of concern. The collection may need to be planted out into the field in the near future to ensure

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that materials are true-to-type and also to determine whether they need to be re-introduced to the collection.

Musa is conserved in the field in regional collections such as those in the Philippines (BPI) for Asia and the South Pacific, Honduras (FHIA) for Latin America and the Caribbean, and Cameroon (CRBP) for West Africa.

In 1994, several collecting missions in Vietnam organized by INSA, INIBAP and IPGRI yielded over 107 accessions.

David Jones, INIBAP

Bananas, an important fruit in Vietnam, are commonly seen in suburban markets in Hanoi

Musa Germplasm Exchange System

During 1994, 372 *Musa* accessions were sent in 51 consignments to 37 different institutions in 31 countries. The material consisted of *in vitro* plantlets with rooted shoots (36%) or proliferating shoot-tip cultures (64%). 81 accessions were sent from the ITC to INIBAP's two virus-indexing centres at CIRAD-FLHOR, Montpellier, France and QDPI, Brisbane, Australia. *Musa* virologists at these two centres are indexing germplasm held in the Transit Centre for *Musa* viruses, thus ensuring the dissemination of healthy material.

Musa Germplasm Information System

INIBAP revised the descriptor list for *Musa*. A first draft of a users' manual for characterization was developed as a collaborative project between INIBAP and CIRAD. A form listing pertinent characters was developed and provided to Vietnam and Indonesia for use during collecting missions in 1994. Nine institutions holding a major *Musa* collection were identified as collaborators for a morphotaxonomic study of standard cultivars. The objective is to determine environmental effects on characters, to offer to curators the opportunity to train themselves in characterizing, and to update MUSAID, the identification/characterization expert system, developed by CIRAD-FLHOR.

MUSAID was used in QDPI to characterize the Papua New Guinea germplasm collected by IBPGR (now IPGRI) and QDPI in 1988-1989. At the end of 1994, information was sent to INIBAP in the *Musa*logue format on 244 accessions collected in Papua New Guinea and evaluated at QDPI, South Johnstone Research Station. This information will be published in a special issue of *Musa*logue, the catalogue of evaluated accessions. The *Musa*logue card contains the main characteristics of an accession plus a colour photograph.

INIBAP and CIRAD staff started to develop the *Musa* Germplasm Information Database, which is supported by IDRC, in October 1994, by outlining the system's structure.

Musa testing and evaluation

INIBAP's International *Musa* Testing Programme is a link between banana and plantain breeding programmes and NARS. It provides a mechanism for new hybrids with good agronomic qualities to be screened against important *Musa* diseases at key locations around the world where pathogen diversity is either known or suspected to occur. Resistant germplasm is released for further evaluation at a local level. Wherever possible, INIBAP tries to formalize this local testing by sponsoring the micropropagation of elite germplasm for multilocational trials within countries. These trials are known as national evaluation programmes. The ultimate aim of IMTP is to ensure that im-

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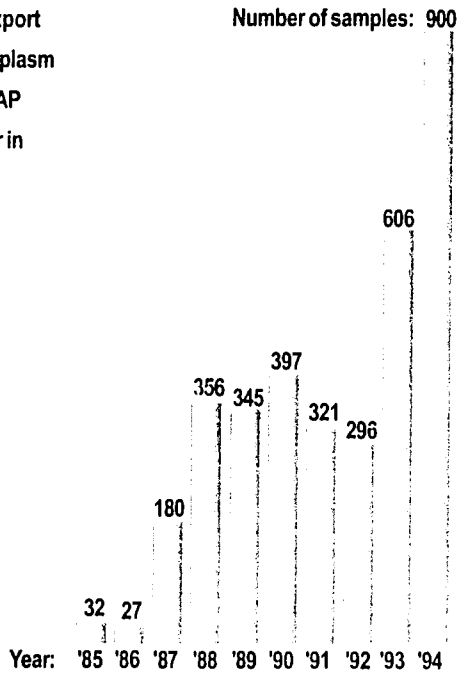
Annual export of *Musa* germplasm from the INIBAP Transit Center in Belgium



proved, healthy *Musa* germplasm is available to smallholders in as short a time after development as possible. IMTP is coordinated by INIBAP with funds from UNDP.

Following their evaluation in IMTP Phase I in 1994, INIBAP distributed improved FHIA hybrids to over 30 NARS, universities and institutes around the world. Agreements to conduct NEPs were formalized with Venezuela, Gabon, Cameroon, India and Western Samoa. A global IMTP conference in Honduras defined protocols and guidelines for Phase II trials in 1995. The proceedings, entitled *The Improvement and Testing of Musa: a Global Partnership*, were published in 1994.

Breeders' network

A network to stimulate cooperation in breeding was advocated at an international conference in 1992. The 1992 INIBAP Annual Report expanded the concept. In 1993 the CGIAR Task Force on Banana and Plantain recommended that INIBAP play a key role in forming and operating a breeders' consortium. By 1994, INIBAP was able to convene the first full meeting of *Musa* breeders in Honduras, and publish the proceedings entitled *Banana and Plantain Breeding: Priorities and Strategies*. Work proceeded after that to identify areas of interaction and projects for multilateral involvement.

IMTP Phase II evaluation sites

- ▲ black Sigatoka
- ▣ yellow Sigatoka
- ✪ *Fusarium* wilt

Information and documentation/communications

Databases

In 1994, 656 new records, provided by CIRAD-FLHOR, UPEB and INIBAP, were added to *MUSALIT*, the trilingual bibliographic database. The database includes now 3222 original records which are regularly published in *Musarama*, the international abstract journal on bananas and plantains in three languages. Three issues of *Musarama* and indexes were produced in 1994; this generated 350 requests for publications and articles.

The Banana Research Information System includes data on researchers, research projects and research institutes. A survey in early 1994 permitted the updating of the database, which includes 573 researchers' records and 200 research projects in progress. A directory of *Musa* researchers was in press and a directory of *Musa* research projects in progress will be published in 1995.

Regional Activities

The regional Latin America and the Caribbean Info/Doc Network at UPEB, Panama provided original bibliographic records for *MUSALIT* and translated, edited, reproduced and distributed the Spanish versions of *Musarama* and INFO*MUSA*. The Network had 390 enquiries for the Question-and-Answer service. The LAC Info/Doc Network now includes 24 institutions in 12 countries in the region. More than 700 INIBAP-ASPNET publications were distributed in 1994 in Asia.

A regional meeting in Uganda in October 1994 proposed two regional Info/Doc nodes in eastern and southern Africa, one at IRAZ, Burundi for French-speaking countries, and one at NARO-KARI, Uganda for English-speaking countries. The databases package was installed at NARO-KARI research station and training on the system offered to the Head of Documentation.

Communications/publications

During 1994, INIBAP produced five global and one regional publication, two Fact Sheets on diseases, a co-publication with UPEB, the translation of a thesis from German to English, two posters and two issues of *INFOMUSA* in three languages.

Regional research and training

Latin America and the Caribbean

The Latin American and Caribbean Regional Network coordinates *Musa* programmes in the region. A Regional Advisory Committee meeting in the Dominican Republic agreed that renewed breeding and evaluation efforts for Sigatoka, *Fusarium* wilt and Moko diseases, as well as for nematodes and weevils, must be

Banana and plantain are grown in about 120 countries, most produced on small farms. Banana and plantain originated in Asia and are from the genus *Musa*. The section Eumusa is the most wide-ranging of the genus and contains the two wild species *Musa acuminata* (A genome) and *Musa balbisiana* (B genome). Most of the banana and plantain known today originated from these two species. Early farmers developed edible bananas by selecting diploid *M. acuminata* that developed fruits without cross fertilization. An important step in the evolution of the banana was the natural crossing that took place between *M. acuminata* and *M. balbisiana* and between AA and AB landraces with *M. balbisiana* to produce AAB and ABB triploid cultivars. This extended the range of plant characteristics and helped spread cultivation from the lowland humid tropics to highland areas and to seasonally drier zones.

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maintained or initiated on a priority basis. The group also called for increased collaboration on biotechnology, crop protection, post-harvest research, information and documentation, and technology transfer.

In 1994, EMBRAPA and INIBAP signed an MOU to help the CNPMF breeding programme at Cruz das Almas in Brazil acquire equipment to conduct research studies on *Fusarium* and to maintain field collections and trials. The LACNET Regional Coordinator participated as scientific coordinator in the eleventh meeting of the Association for Cooperation on Banana Research in the Caribbean and Tropical America, in Costa Rica.

Asia and the Pacific

The Asia and Pacific Regional Network established a duplicate *in vitro* base collection of Asia and Pacific *Musa* germplasm at TBRI, expanded the INIBAP virus indexing activities at TBRI, co-sponsored a conference/workshop on nematodes and weevil borers in Asia and the Pacific, and published the proceedings. INIBAP also started, with the IPGRI APO Regional Office, projects on collecting, characterizing and conserving *Musa* germplasm in Vietnam, and rescuing and conserving a collection of southeast Asian *Musa* established in Davao, the Philippines, but threatened by virus disease.

Africa

INIBAP played an active role in *Musa* research and development in Africa in collaboration with international (IITA), regional (CRBP, IRAZ) and national programmes. As part of the MGIS programme, IITA in Nigeria, CRBP in Cameroon, IRAZ in Burundi and KARI in Uganda volunteered to receive a set of standard varieties to evaluate the characterization descriptors developed by CIRAD-FLHOR and INIBAP. ITC sent 177 accessions to research institutions in Africa in 1994.

During a meeting in Uganda in October 1994, the representatives of countries in eastern and southern Africa established a banana initiative called BARNESA, the Banana Research Network for Eastern and Southern Africa. The main activities of the Network will be to enhance regional collaboration on banana research and development between NARS, IARCs, donors and others; to encourage and facilitate information gathering and exchange; and to strengthen national researchers' capacity by training and exchange visits. Uganda volunteered to organize and host the first meeting of the Network.

Strategic research

KUL, Belgium

Embryogenic cell suspension cultures

Proliferation quality. The quality of the explant (scalp) used to initiate embryogenic cell suspensions is very important. Culturing on a medium with high cytokinin concentration gave many compact, small, whitish, cauliflower-like shoot meristems ideal for explants.

Production of an embryogenic cell suspension from meristematic nodules. All cultivars investigated produced similar meristematic nodules, consisting of three different cell layers. Two different pathways were identified by which meristematic nodules evolve towards embryogenic cell-producing structures. Both pathways formed an embryogenic cell suspension.

A modified initiation method. In the past, embryogenic cell suspensions were initiated in liquid media. Explants or scalps left for 6 weeks on semi-solid medium formed isolated embryos and eventually an embryogenic callus on top of the meristematic nodules. Transferring embryogenic calluses to liquid media gave embryogenic cell suspensions. This seems like a very promising new initiation method.

Protoplast culture

Protoplast from leaves. Research continued on isolating and regenerating protoplasts from young leaf material. Most of the protoplasts survived about a week, but failed to regenerate. There was no cell wall development or division.

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Protoplasts from embryogenic cell suspensions. The protoplast isolation and regeneration protocol which had been found to be successful in experiments with Bluggoe (ABB 'Bluggoe') was further improved. An optimum exists between protoplast density and feeder cell density. Regeneration frequency can be improved if the protoplasts are transferred to a medium without feeder cells after 1-2 weeks. After this time the feeder cells start to compete with the protoplast cells for nourishment. The most important parameter remains the quality of the suspension.

Genetic manipulation

High molecular weight DNA isolated from young Bluggoe leaves showed the presence and integration of introduced foreign genes in the genome. Shoot tip cultures showed the stability of the transgenes in subsequent generations.

New embryogenic cell cultures of other clones, including the dessert cultivars Cavendish 901, Grande Naine and Williams (AAA 'Cavendish'), became available in 1994. Some of these cell cultures were transformed using an optimized particle gun bombardment procedure to express the *gusA* reporter gene at a high frequency.

Cryopreservation

An efficient system for the cryogenic storage of embryogenic banana cell suspensions was optimized using slow cooling and cryoprotection with dimethyl sulfoxide. The capacity of a banana cell suspension to be cryopreserved in liquid nitrogen depends on the quality and amount of embryogenic cells in suspension. In particular, the presence of starch grains adversely affects regrowth potential after freezing.

Four cryopreservation methods, slow freezing, complete vitrification, encapsulation-dehydration and a simple freezing method using sucrose, were tested on *in vitro* proliferating meristems of 11 cultivars. Slow freezing and complete vitrification were not effective. The encapsulation-dehydration method was effective. It involves the encapsulation of 1-mm-sized banana meristems in alginate beads. About 8% of meristems regenerated into normal plants.

A leaf of a 'Cavendish' cultivar on Aituraki Island in the Cook Islands, which has been severely damaged by black Sigatoka disease. Black Sigatoka is caused by the fungus *Mycosphaerella fijiensis*. It was first identified in the mid-1960s in the Pacific, then spread to Latin America with devastating consequences. Its arrival in Africa was one of the factors that sparked the creation of INIBAP. Progress has been made in developing resistant hybrids, but the problem is a long way from being solved.

David Jones, INIBAP

The most promising cryopreservation method for banana meristems involves a 3-week preculture period of proliferating clumps on a sucrose medium then immersing clumps in liquid nitrogen. This simple cryopreservation method resulted in survival rates ranging from 7% to 58%, depending on the cultivar. This is a promising method for storing banana germplasm in the long term because of its simplicity, speed and potential application to many banana accessions.

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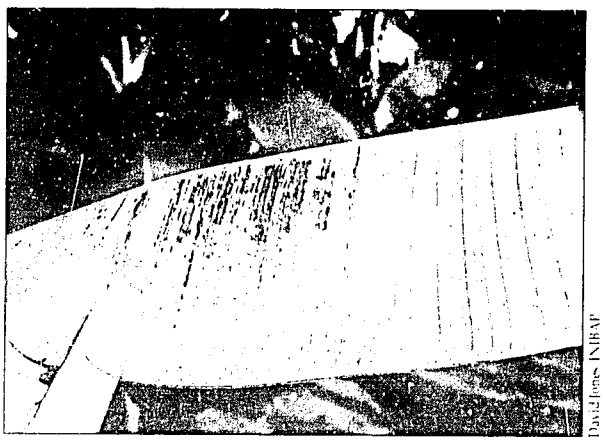

David Jones, INIBAP

Symptoms of banana streak virus on a leaf of a Mysore cultivar in a germplasm collection in Honduras. BSV is a seedborne virus which reduces yield. It has infiltrated several *Musa* breeding programmes.

University of Minnesota

Developing detection methods for banana streak virus

Work began on the INIBAP-sponsored BSV detection project at the University of Minnesota, USA, in 1994. One of the most significant achievements was the production of a new polyclonal antiserum that detected a wider range of BSV isolates than did previous antisera.

University of Gembloux

Identification and characterization of viruses associated with banana bunchy top virus

Isolates of bunchy top were acquired from different geographic regions. The presence of BBTV-ssDNA was confirmed. PCR, using primers designed from published sequences of the Australian strain of BBTV, was successfully applied. Dot blot experiments using digoxigenin-labeled amplified fragments as probes revealed specific hybridization. This allow the detection of BBTV from plant crude extracts.

Different large-spectrum detection approaches were evaluated to determine whether virus agents other than BBTV-ssDNA particles were present in plants showing symptoms of bunchy top. No new particle was found.

International collaboration

The most significant collaborative event in 1994 was the signing on 26 October of the Agreements between CGIAR and FAO bringing the CGIAR in-trust germplasm collections under the auspices of FAO. The 12 Agreements were signed by Dr. M.S. Zehni on behalf of FAO and by Mr. I. Serageldin, the CGIAR Chairman, who had been authorized by the 12 CGIAR centres to sign the Agreements on their behalf.

CGIAR/IARCs

Establishing the System-wide Genetic Resources Programme (see below) was an important step in improving the coordination of genetic resources work in the CGIAR.

Also in 1994, at ICW94, the CGIAR Chairman established a CGIAR Genetic Resources Policy Committee under the Chairmanship of Dr. M.S. Swaminathan, with IPGRI providing the Secretariat.

CGIAR's System-wide Genetic Resources Programme

The centres of CGIAR constitute the world's largest international effort to conserve and use agricultural biodiversity. However, the division of this effort among independent centres, each pursuing its own objectives and strategies within its own policy framework, restricted programme effectiveness and limited the CGIAR's ability to attract more secure funding. The CGIAR had been moving toward a system-wide programme on genetic resources for a number of years. In late 1993/early 1994, the TAC Stripe Study on Genetic Resources in the CGIAR strongly endorsed the development of such an approach. The Study recognized that integrating activities would greatly enhance the impact of the CGIAR at a time when the benefits of international cooperation on genetic resources were receiving increasing attention in the follow-up to the coming into force of the Convention on Biological Diversity.

The CGIAR Mid-Term Meeting in New Delhi in 1994 decided on a model for a system-wide programme on genetic resources. All centres, with the exception of IIMI, participate in SGRP. Both *in situ* and *ex situ* conservation activities are included, and the programme covers crops and their wild relatives, forage, forestry and agroforestry species, livestock and aquatic genetic resources. The inclusion of microbial genetic resources was still under discussion at the end of 1994. The programme encompasses research on *in situ* and *ex situ* conservation policies, strategies and technologies, *ex situ* conservation in genebanks, documentation, information and training. Evaluation and genetic enhancement are outside the scope of the programme. The issue of germplasm health was under discussion. IFPRI and ISNAR contribute to the SGRP from the point of view of policy and national programme support.

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The Inter-Centre Working Group on Genetic Resources acts as the steering committee of SGRP. It has an independent chair elected by the group. IPGRI is the convening centre for SGRP and the Director General of IPGRI has been designated as the SGRP Programme Leader. IPGRI hosts a Secretariat and at the end of 1994 was in the process of recruiting a full-time coordinator for the Programme. Each participating centre is responsible for managing those components of the programme that fall within its institutional mandate. Governance and oversight of these components are the responsibility of the respective boards of trustees. Advice on policy issues of system-wide concern is provided to the CGIAR by the newly constituted Committee on Genetic Resources Policy, chaired by Dr. M.S. Swaminathan, which acts in close consultation with the ICWG-GR and other appropriate committees within the CGIAR.

In addition to the independently managed components of SGRP, the CGIAR allocated some additional funds to ensure adequate co-ordination of the programme and to enable certain high-priority collaborative activities to be initiated. The TAC report, 'Review of Proposals for System-wide and Ecoregional Initiatives' recommended an allocation of US$800 000 for 1994, US$1.74 million for 1995 and US$1.0 million annually for the period 1996-98 for these activities, referred to as the 'System-wide Genetic Resources Initiative' (SGRI). The SGRI is thus an integral component of the overall SGRP, the 'glue' that holds it together, and a primary interface between the CGIAR and the many collaborating partner institutions around the world on genetic resources. Many inter-centre collaborative activities had already been agreed on by ICWG-GR as SGRI activities for 1995.

A key recommendation of the TAC Stripe Study Panel on Genetic Resources in the CGIAR was that the System take steps to coordinate its genetic resources documentation and information systems to ensure an appropriate level of compatibility among the databases of the various centres and to provide international access to the information. Initial design work for the proposed system-wide information network, known as SINGER, started, and a full-time project leader was to be recruited to spearhead the effort. The development of SINGER will be closely linked to the development of the CGIAR Integrated Voice and Data Network.

FAO

Collaboration between IPGRI and FAO is regulated by a Memorandum of Understanding on Programme Cooperation, signed in 1990 between FAO and IBPGR, but remaining valid despite administrative separation from FAO.

In 1994, this general Memorandum of Understanding was supplemented by two other MOUs with FAO:

one signed in September detailing the arrangements for the joint publication by FAO and IPGRI of the *Plant Genetic Resources Newsletter*; and

one signed in October, describing IPGRI's role in, and support to, the International Conference and Programme on Plant Genetic Resources.

Details of the year's various joint activities are desribed in the various programme sections of this Annual Report.

IPGRI also assisted in preparing the papers for, and represented other CGIAR centres in, the extraordinary meeting of the FAO Commission on Plant Genetic Resources, which was held in Rome from 7 to 11 November 1994. The major focus of this meeting was the start of discussions to revise the International Undertaking on Plant Genetic Resources, to bring it in line with the Convention on Biological Diversity.

Intellectual property rights

The Crucible Project

The Crucible Group consists of 28 participants from the developed and developing world representing a cross-section of opinions, interests and expertise. Participants include DGIS, IDRC, IPGRI, RAFI and SAREC. IPGRI's Director General holds the Chair. Major donors are IDRC, SAREC, DGIS, ACIAR and SDC. In 1994 the group studied the potential impact of recent trends in legislation on intellectual property rights in plant genetic resources conservation and plant breeding. The final report, entitled *People, Plants and Patents*, contained policy options (see opposite for extracts) of particular interest to decision-makers in developing counties faced with writing legislation on intellectual property in response to GATT and the Convention on Biological Diversity.

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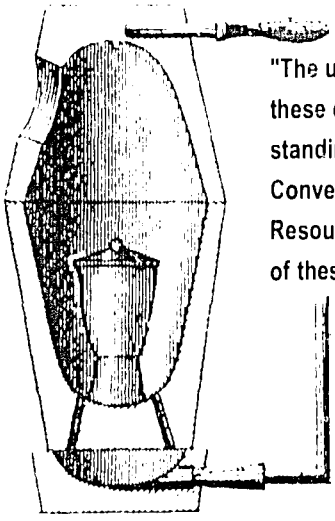
● The Crucible Group

The Crucible Group stresses the primacy of specific national conservation strategies for plant genetic resources that invite the participation of local communities as well as private companies. Holders of *ex situ* germplasm collections should develop equitable partnerships with indigenous and rural societies and make their collections available to them.



"The uncertainty regarding the status of *ex situ* biomaterial collections must be addressed in these early days of the Convention. Similarly, the Crucible Group recommends that the outstanding issues of Farmers' Rights and of intellectual property be clarified. The Biodiversity Convention may find that the Fourth International Technical Conference on Plant Genetic Resources (Berlin, June 1996) offers the best negotiating process and forum for the resolution of these issues.

"The Crucible Group agrees that innovation strategies should promote decentralization, diversity, and democracy at all levels, rather than only promoting centralization, uniformity, and control. Current intellectual property systems are ineffective in supporting community-level innovation.

Crucible (kru sib'l), *sb.* 1460 [med.L. *crucibulum* night-lamp, f. L *crux, cruc-* Cross *sb.*] 1. A vessel, usually of earthenware, made to endure great heat, used for fusing metals, etc.; a melting-pot.

"The Crucible Group recommends the development of national innovation strategies for the use of biomaterials that are tailored to national needs and opportunities. The outstanding challenge is to create equitable policies and initiatives that facilitate collaboration between formal (public and private institutions) and informal (community) sectors. The creative contribution of private initiatives (cooperative or company) should not be neglected.

"The Crucible Group notes that it is not necessary to establish patent legislation for plant varieties to meet GATT requirements or the needs of plant breeders. It recommends that those pursuing a patent model ensure that the research exemption is strong and clear. It also advises that gene flows between plant populations are often uncontrollable and that patent regulation could prove difficult.

"Another means of meeting GATT requirements is with the adoption of PBRs through either the 1978 or 1991 UPOV Conventions. the Crucible Group agrees that UPOV 1978 gives countries greater flexibility."

Quotes from '*People, Plants and Patents. The impact of intellectual property on trade, plant biodiversity, and rural society*'

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The Crucible Group continued to organize various meetings (Nairobi, June; Bahamas, November) to inform policy makers of the various options available. These include *sui generis* approaches to intellectual property protection, the implications of GATT-TRIPS, UPOV, and the use of Material Transfer Agreements in distributing designated germplasm.

Material Transfer Agreements

In the Agreement with FAO (see above) the CGIAR centres accepted responsibility to ensure that the recipients of transferred germplasm and its related information are bound by the same conditions as the centres themselves, i.e. not to claim ownership over the designated germplasm or to seek any intellectual property rights over that germplasm or information. To fulfil this commitment, the centres and IPGRI worked towards a CGIAR system-wide material transfer agreement, in consultation with FAO.

The Convention on Biological Diversity makes it essential for CGIAR centres to clarify the status of any newly acquired germplasm before they can designate it as part of the in-trust collections. The nature of germplasm acquisition might well evolve over the coming years, as a result of the implementation of the Convention on Biological Diversity. Nevertheless, a simple acquisition agreement was felt to be immediately necessary. In cooperation with the ICWGR-GR a first draft was developed specifying the conditions under which countries would release germplasm. These conditions closely followed the Agreement between FAO and the CGIAR centres and established a temporary basis for the sharing of the germplasm by countries with the centres.

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Office of the Director General

IPGRI/IBPGR/INIBAP Trustees: Prof. Holm-Nielsen stepped down as Board Chair after the March 1994 Board meeting and he was succeeded by Dr. Wanda Collins. In March, the Board appointed a new Board Member, namely Dr. M. de Nucé de Lamothe (France). In September the Board nominated Dr. Marcio de Miranda Santos (Brazil) as Board Member-elect to take up his assignment in April 1995. With the retirement from FAO of Dr. Papasolomontos, the position of FAO appointee became vacant in July and this was filled by the appointment of Dr. M.S. Zehni in January 1995. In March, Prof. Monti, who was already a Board Member, was appointed by Italy as the official Italian representative on the Board.

The IPGRI Board and Committees met twice in Rome, on 21-25 March 1994 and on 12-16 September 1994. In addition, the Executive Committee met in Washington DC on 10-11 December 1994.

In February, FAO, IPGRI and IBPGR signed an Agreement for the administrative separation of IBPGR from FAO and the transfer of assets and liabilities to IPGRI. Staff resigned from FAO IBPGR and joined IPGRI. Assets and liabilities were all transferred to IPGRI during the first six months of 1994, with the Separation Agreement fully implemented by 30 June. Since IBPGR was still formally operational, the IBPGR Board (which had the same composition as the IPGRI Board) met in Rome on 25 March 1994.

The original INIBAP Board met in Montpellier from 14 to 15 March 1994 and agreed on the terms and conditions of handing over the governance and administration of the INIBAP programme to IPGRI. This was laid down in a Memorandum of Understanding regarding the operation of INIBAP, which was signed on 23 May in New Delhi by the IPGRI Board Chair, the INIBAP Board Chair and the Chairman of the INIBAP Support Group. The new INIBAP Board (which has the same composition as the IPGRI Board) met in Rome on 16 September 1994.

IPGRI's Establishment Agreement

The open period of signature of the IPGRI Establishment Agreement ended on 31 May 1994. Before that date another 14 countries signed the Agreement in a number of ceremonies as follows:

representatives of the Governments of Ecuador, Costa Rica and the Ukraine signed the Agreement on 15 February 1994;

representatives of the Governments of Burkina Faso, Mauritania, Côte d'Ivoire, Israel, Slovak Republic, Czech Republic, Panama, Benin and Peru signed the Agreement on 12 May 1994.

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the representative of the Government of Morocco signed the Agreement on 27 May 1994;

the representative of the Government of Sudan signed the Agreement on 31 May 1994.

Countries can still accede to the Agreement, but this now requires prior approval by the IPGRI Board by simple majority. Using this procedure, an additional three countries acceded to the Agreement as follows:

the Congo on 14 October;

Australia on 20 October;

Tunisia on 1 December.

INTAGRES

As the CGIAR office working to develop public support for the CGIAR system in Europe, INTAGRES organized four national Italian conferences, on safeguarding biodiversity, reafforestation in Europe, plant biodiversity in the bible, and plant biodiversity in periurban spaces. These produced a series of press and television reports. Contributions were made to regional and international meetings, and five articles were placed in Italian newspapers. The INTAGRES office also organized visits to IPGRI by Italian policymakers, scientists, etc. and provided continuous liaison with relevant Italian ministries, universities, etc.

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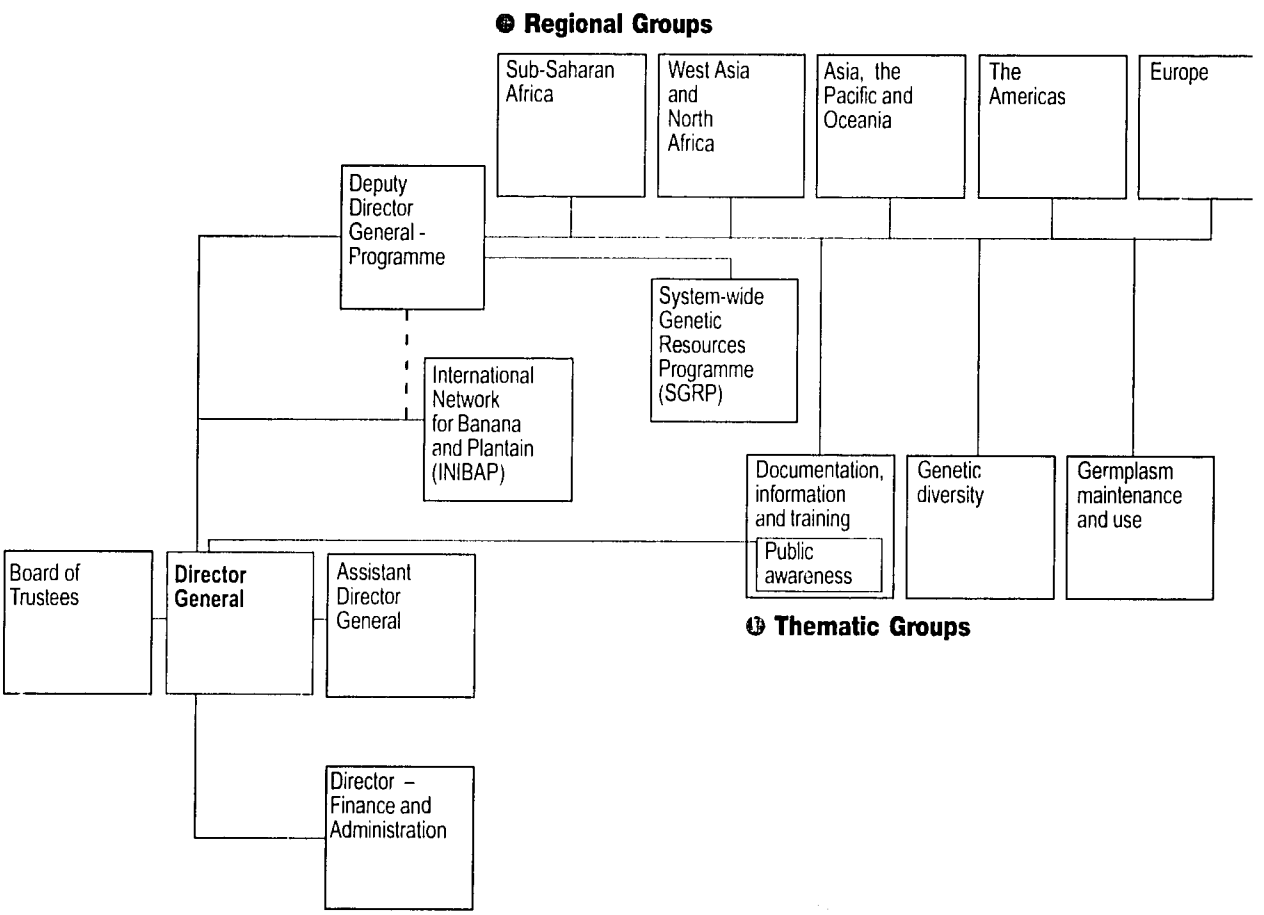

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Abbreviations - see pp. 105-106

Financial report

Statements of Grant Revenue*

For the year ended 31 December 1994, in US dollars 000s.

Unrestricted Core

Donors	Grant
Australia	213
Austria	50
Belgium	250
Canada	399
China	90
Denmark	857
France	148
Germany	303
India	50
Italy	400
Japan	1,658
Korea	50
Netherlands	831
Norway	301
Spain	50
Sweden	464
Switzerland	537
UK	866
USA	750
World Bank	804
Subtotal	**9071**

Restricted Core

Donors	Grant
ADB	94
France	8
Italy	100
Sweden	2
Switzerland	115
UK	207
Subtotal	**526**

Complementary

Donors	Grant
Belgium	120
CGIAR	50
CIFOR	0
CTA	11
DANIDA/Denmark	0
EEC	50
ECP/GR Donors	128
FAO	53
France	53
GTZ	507
ICARDA	20
IDB	51
IDRC	102
Italy	582
Japan	145
Netherlands	34
Spain	17
Sweden	29
Switzerland	71
UK/ODA	42
UNDP	0
UNEP	25
USAID	195
Various Donors	0
Closed projects	0
Subtotal	**2285**

Total Grants **11882**

Audited financial statements for the year ended 31 December 1994 providing further information are available from the Office of the Director General

Abbreviations - see pp. 105-106

Expenditure by region

(by percentage)

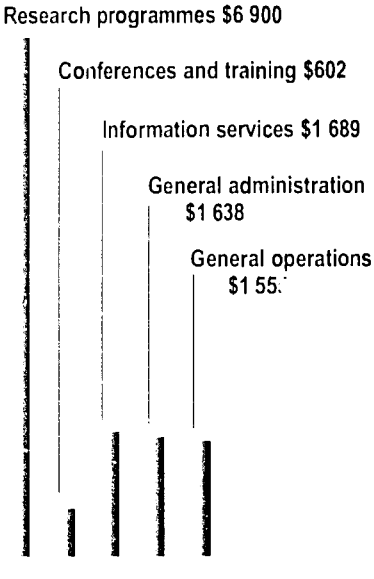
Core			Complementary	
Region	Actual	Target	Region	Actual
SSA	26	26	SSA	16
WANA	21	22	WANA	14
APO	24	26	APO	21
Americas	22	22	Americas	20
Europe	7	4	Europe	29

TAC activity distribution

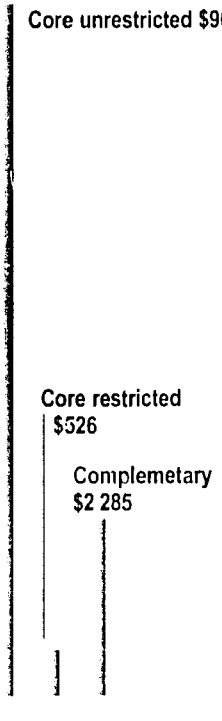
(by percentage)

Activity	Core	Complemetary
1. Increasing productivity	7	4
2. Protecting the environment	7	7
3. Saving biodiversity	34	47
4. Improving policies	12	1
5. Fortifying national programmes	40	41

Operating expenses



Summary total of grants



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Abbreviations - see pp. 105-106

Financial report, *continued* -

INBAP - summary of grant revenue

See INIBAP Annual Report 1994 for further details

Unrestricted Core 1166 **Restricted core 692** **Complementary 1007**

Expenditure by region

(by percentage)

Region	Core	Complementary
SSA	30	30
WANA	0	0
APO	35	35
Americas	35	35
Europe	0	0

TAC activity distribution

(by percentage)

Activity	Core	Complemetary
1. Increasing productivity	48	84
2. Protecting the environment	0	0
3. Saving biodiversity	23	4
4. Improving policies	0	0
5. Fortifying national programmes	29	12

Abbreviations - see pp. 105-106

Complementary funded activities

In addition to core funding, a number of the activities in the IPGRI Project Set are supported through complementary funding. This section lists, in alphabetical order by donor, the complementary funded activities for which funds were disbursed or pledged in 1994.

Activity	Donor	1994 Funding (received 1994 or to be received in early 1995)
Studies on breeding systems: *Phaseolus lunatus*	Belgium (BADC)	BF 4 800 000
Study of diversity in *Colletotrichum* and its host *Stylosanthes*	Belgium (BADC)	BF 9 467 000
Proceedings of 1992 CTA/IBPGR/KARI/UNEP Seminar	CTA	US$ 45 000
ECP/GR Phase V	European countries	US$ 263 000
EUFORGEN	European countries	US$ 60 000
European Union - Cocoa project	EU	US$ 49 000
Support to Stantech Workshop (COGENT)	Germany (GTZ)	DM 101 000
Refinement of cryopreservation techniques for potato	Germany (BMZ/GTZ)	DM 250 000
Effective pollination control methods in the regeneration of germplasm	Germany (BMZ/GTZ)	DM 153 000
Spatial and temporal distribution of genetic diversity in wild forage species under stress conditions	Germany (BMZ/GTZ)	DM 50 000
Genetic resources of neglected crops with good development potential: their conservation, use and breeding status	Germany (BMZ/GTZ)	DM 430 000
Diversity, conservation and sustainable use of native fruit tree germplasm of tropical America	IDB	US$ 250 000
Strengthening of the national plant genetic resources programme of Viet Nam	IDRC	CD 102 000
Genetic resources component in IDRC's electronic atlas of Agenda 21 (ELADA)	IDRC	C$ 35 000
Conservation and use of genetic resources of underutilized Mediterranean species	Italy	US$ 170 000

continued overleaf

Abbreviations - see pp. 105-106

Activity	Donor	1994 Funding (received 1994 or to be received in early 1995)
Genetic diversity of the world collection of some *Triticum* and *Aegilops* species	Italy	US$ 30 000
Documentation of genetic resources utilizing image processing	Italy	US$ 30 000
Impact assessment of IPGRI activities on plant genetic resources conservation and use	Italy	US$ 95 000
European Information Service (INTAGRES)	Italy	US$ 140 000
Support to Collecting Manual	IUCN	US$ 3 000
Collecting vegetables, legumes and cereals in CIS and Vietnam	Japan	US$ 129 000
Conservation and use of bamboo and rattan	Japan	US$ 248 000
Crucible project Phase 2	Netherlands (DGIS)	Dfl 100 000
Investigation of an ultradry seed packaging method	Spain (INIA)	US$ 16 950
Strengthening the scientific basis of *in situ* conservation	Switzerland (SDC)	US$ 180 000
Determination of recalcitrance in seeds (Holdback Funding)	UK (ODA)	US$ 8 000
The use of RAPD to detect of types of banana and plantain generated in *vitro* (Holdback Funding)	UK (ODA)	US$ 87 000
Support to the Eastern Europe initiative (VIR and other countries in Eastern Europe)	UNDP	US$ 25 000
Establishment of rangelands seed regional information network	UNDP	US$ 59 000
Support for two short training courses on plant genetic resources	UNEP	US$ 20 000
Support to the Eastern Europe (VIR) initiative	USA (USAID)	US$ 400 000

INBAP - complementary funded activities

BBTV studies at Gembloux	BADC	BF 3 300 000
Musa research at KUL	BADC	BF 11 000 000
Musa Germplasm Information System	IDRC	US$ 82 000
Technology transfer in Latin America and the Caribbean	IDRC	US$ 42 500
Asian rescue collecting	ODA	US$ 13 000
FHIA breeding programme	UNDP	US$ 262 000
BSV studies at Minnesota	UNDP	US$ 42 000
Info*Musa* and *Musa*rama publications	CTA	US$ 30 000
Database services for publications	CIRAD	FF 270 000

Abbreviations - see pp. 105-106

Abbreviations and acronyms

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
AIC	Agricultural Inputs Corporation, Nepal
AFTSC	ASEAN Canada Forest Tree Seed Centre, Thailand
APO	Asia the Pacific and Oceania
ARC	Agricultural Research Council
ASPNET	Regional Network for Asia and the Pacific, INIBAP, Philippines
AVRDC	Asian Vegetable Research and Development Centre, Taiwan
BADC	Belgian Administration for Development Cooperation, Brussels, Belgium
BANBOARD	Banana Board of Jamaica
BARI	Bangladesh Agricultural Research Institute, Bangladesh
BFRI	Bangladesh Forest Research Institute, Bangladesh
BRIS	Banana Research Information System, INIBAP
BARNESA	Banana Research Network for Eastern and Southern Africa
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit, Germany
CAAS	Chinese Academy of Agricultural Sciences, China
CABI	CAB International, UK
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 - CGIAR
CIFOR	Centre for International Forestry Research - CGIAR
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo - CGIAR
CIP	Centro Internacional de la Papa - CGIAR
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France
CMPGR	Caribbean Committee for the Management of Plant Genetic Resources
CNIC	Centro Nacional de Incestigaciones Cientificos, Havana, Cuba
CNPMF	Centro Nacional de Pesquisa de Mandioca e Fruticultura (EMBRAPA)
CNR	Consiglio Nazionale delle Riccerche
COGENT	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
CSIRO	Commonwealth Scientific and Industrial Research Organization, Australia
CTA	Technical Centre for Agricultural and Rural Cooperation, The Netherlands
DANIDA	Danish International Development Agency
DAST	Department of Agricultural Science and Technology, Hanoi, Vietnam
DGIS	Directorate-General for International Cooperation the Hague, the Netherlands
DIT	Documentation, Information and Training
EAP	Escuela Agrícola Panamericana Zamorano Tegucigalpa, 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
EIADA	Electronic Atlas of Agenda 21
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária, Brazil
ESTIA	Escuela Técnica Superior de Ingenieros Agronomos, Madrid, 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
GEVES	Groupe d Etude et de Contrôle des Variétés et des Semences, France
GMS	Genebank Management System
GMU	Germplasm Maintenance and Use
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HIA	Higher Institute of Agriculture, Tirana, Albania
IBPGR	see IPGRI
ICARDA	International Center for Agricultural Research in the Dry Areas, Aleppo, Syria - CGIAR
ICGR	Institute of Crop Germplasm Resources, China
IGCCBD	Inter-Governmental Committee on the Convention on Biological Diversity

ICLARM	International Center for Living Aquatic Resources Management - CGIAR
ICRAF	International Council for Research in Agroforestry - CGIAR
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics - CGIAR
ICW	International Centres Week
ICUC	International Centre for Underutilized Crops, UK
IDB	Inter-American Development Bank, USA
IDRC	International Development Research Centre, Canada
IFPRI	International Food Policy Research Institute, Washington DC, USA
IGER	Institute for Grasslands and Environmental Research, UK
IHAR	Plant Breeding and Acclimatization Institute, Radzikow, Poland
IICA	Instituto Interamericano de Cooperacion para la Agricultura, Costa Rica
IIMI	International Irrigation Management Institute, Sri Lanka - CGIAR
IITA	International Institute of Tropical Agriculture, Nigeria - CGIAR
INBAR	International Network for Bamboo and Rattan
INIA	Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria, Spain
INIBAP	International Network for the Improvement of Banana and Plantain
INIFAT	Instituto de Investigaciones Fundamentales en Agricultura Tropical, Cuba
INTAGRES	International Agricultural Research - European Service
IPGRI	International Plant Genetic Resources Institute (formerly IBPGR), Rome, 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
ISNAR	International Service for National Agricultural Research, the Hague, 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
KARI	Kawanda Agricultural Research Institute, NARO, Uganda
KUL	Katholieke Universiteit Leuven, Belgium
LACNET	Regional Network for Latin America and Caribbean Network, INIBAP, Costa Rica
MAFF	Ministry of Agriculture, Fisheries and Forests, Japan
MARDI	Malaysian Agricultural Research and Development Institute
MOU	Memorandum of Understanding
MSSRF	M.S. Swaminathan Research Foundation, Madras, India
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
NBRI	National Botanical Research Institute of Namibia
NCARTT	National Center for Agricultural Research Training and Technology, Baq'a, Jordan
NEP	National Evaluation Programme, INIBAP
NGB	Nordic Gene Bank, Sweden
NGO	Non-governmental Organization
NIAR	National Institute for Agrobiological Research, Tsukuba, Japan
NRS	Nigerian Research Service
NSSL	National Seed Storage Laboratory, USA
ODA	Overseas Development Administration, UK
ORSTOM	Institut Français de Recherche Scientifique pour le Développement en Coopération, France
PGRC/E	Plant Genetic Resources Centre, Ethiopia
PGRI	Plant Genetic Resources Institute
PPRC	Programme Planning and Resources Committee
PROCIANDINO	Programa Cooperativo de Investigacion y Transferencia de Tecnologia Agropecuaria para la Subregión Andina, Ecudor
PROCITROPICOS	Programa Cooperativo de Investigacion y Transferencia de Tecnologia Agropecuaria para los Tropicos Suramericanos, Brazil
PROCISUR	Programa Cooperativo para el Desarrollo Tecnológico Agropecuario del Cono Sur, Argentina
PROINFO	Corporación Procesos Integrados de Informacion, Colombia
PSARI	Plant Science Agricultural Research Institute, Mongolian National Agricultural University, Darkhan, Mongolia
QDPI	Queensland Department of Primary Industries, Australia
RAFI	Rural Advancement Foundation International
RAPD	Random amplified polymorphic DNA
RBG	Royal Botanic Gardens, Kew, UK
RECSEA	Regional Committee for Southeast Asia
REDARFIT	Andean Plant Genetic Resources Network
REMERFI	Central American Plant Genetic Resources Network
RFD	Royal Forest Department, Bangkok, Thailand
RIAH	Research Institute of Animal Husbandry, Mongolian National Agricultural University, Darkhan, Mongolia
RICP	Research Institute of Crop Production, Prague, 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
SARD	Scientific and Agricultural Research Directorate, Douma, Syria
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SDC	Swiss Development Cooperation
SIDA	Swedish International Development Authority, Sweden
SNTC	Swaziland National Trust Commission, Swaziland
SPC	South Pacific Commission, Fiji
SPII	Seed and Plant Improvement Institute, Karadj, 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
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UPEB	Union of Banana Exporting Countries, Panama
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPM	Universiti Pertanian Malaysia
UPOV	International Union for the Protection of New Varieties of Plants, Geneva, Switzerland
USAID	United States Agency for International Development
VIR	N.I. Vavilov Institute of Plant Industry, Russia
WANA	West Asia and North Africa
WANANET	WANA Plant Genetic Resources Network
WARDA	West Africa Rice Development Association - CGIAR
WCMC	World Conservation Monitoring Centre, UK

Summary of 1994 activities

The International Plant Genetic Resources Institute (IPGRI) began formal operations as the successor to the International Board for Plant Genetic Resources on 1 January 1994. At the Consultative Group on International Agricultural Research (CGIAR) Mid-Term Meeting in New Delhi in May 1994, it was agreed to establish the System-wide Genetic Resources Programme (SGRP) with IPGRI as convening centre and providing the Secretariat. The Inter-Centre Working Group on Genetic Resources (ICWG-GR) was designated as the programme's steering committee. Initial design work started for the development of a System-wide Information Network on Genetic Resources (SINGER) in November. IPGRI represented the CGIAR at the first session of the Conference of the Parties to the Convention on Biological Diversity in the Bahamas. A statement was made to the Ministerial Session, offering the CGIAR's support to the work of the Parties. The Institute played a principal role in developing the agreements to place the CGIAR in-trust germplasm collections under the auspices of the Food and Agriculture Organization of the United Nations (FAO). The agreements were signed at International Centres Week in Washington in October 1994. Following the signing of an agreement in May 1994 by the Boards of IPGRI and the International Network for the Improvement of Banana and Plantain (INIBAP), as well as the INIBAP Support Group, steps were taken to begin the process of bringing the INIBAP programme under the governance and administration of IPGRI.

Programme activities

IPGRI operated under its project system for the whole of 1994. At the end of 1994, the IPGRI project set consisted of 56 projects

Sub-Saharan Africa

The year was marked by the signing of the formal agreement with the Kenya Government for the operation of the regional office in Kenya. A project on improving the conservation and use of forages and fodder species in Africa studied the spatial and temporal distribution of genetic diversity within five annual forage grass and legume species in Niger. To assist in National Programme development it is particularly important to raise public awareness of genetic resources in subregions where activities are still beginning. National fora attended by crop scientists, activists, policymakers, etc. were organized in Cameroon, Congo, Ghana and Côte d'Ivoire. Each established a national committee for the coordination of plant genetic resources and a national plan of action. Support was provided to research concerning on-farm conservation of yam germplasm in its natural environment in Côte d'Ivoire. Three regional crop working groups, forage and fodder, food crops, and *in situ* and underutilized plants, were constituted and set priorities for future activities.

West Asia and North Africa

The structure of the West Asia and North Africa Plant Genetic Resources Network was consolidated. The number of countries with formal national committees on genetic resources increased to 10. 23 National Programme staff from 10 countries were trained. Ten scientists attended an advanced course dealing with genetic resources management. A Regional Rangeland Seed Information Network was established, with two Sub-Regional Documentation Units, in Jordan and Morocco. Each unit held training courses on information handling and computer use. A project on the conservation and use of fruit trees and nut species cooperated with National Programmes in Jordan, Iran and Pakistan collecting wild and domesticated germplasm of almond. An *in vitro* collection was started by the Jordan University for Science and Technology. An inventory of genebanks in Iran, Syria and Turkey was made. An in-country training course, on different aspects of plant genetic resources of fruit trees, was held in cooperation with the Iranian National Programme. National seminars were organized and co-sponsored in Jordan, Morocco and Pakistan.

Asia, the Pacific and Oceania

A full-time coordinator for the Coconut Genetic Resources Network enabled this network to expand during the year. The Office collaborated in a survey to identify priority fruit species for research and development in Asia, and finalized regional priorities for genetic resources work on the major (mango, citrus and rambutan) and minor (jackfruit, durian and litchi) fruits. In support of the development of National Programmes, staff visited 18 countries to provide specific advice and facilitate activities. A 3-week documentation course trained 27 genebank managers from 12 countries on computer and database systems for *ex situ* genebank management. The International Coconut Genetic Resources Network increased its membership to 24. The Network's database was expanded to contain information on 500 coconut accessions. A workshop was held aimed at standardizing coconut-breeding techniques. The Office collaborated with partners to develop a bamboo and rattan genetic resources working group, facilitate germplasm exchange, assist Vietnam to collect *Musa* genetic resources, and evaluate *Musa* germplasm. Efforts were made to redevelop the okra network. A data interchange protocol was initiated with National Programmes that have well-developed documentation systems.

Americas

The Americas Group finished establishing subregional networks to deal with plant genetic resources' activities. Staff implemented a project on Sapotaceae and Passifloraceae in association with National Programmes in Mesoamerica and the Andes, and the Mesoamerican and Andean Networks on Plant Genetic Resources. Work on the extent and distribution of genetic diversity in crop genepools looked at breeding systems and its consequences for germplasm conservation, and theories of co-evolution. Support to National Programmes mainly focused on strengthening the subregional networks on plant genetic resources. Actions in the Caribbean included a meeting to develop a plan of action for 1994. Fruit trees, food legumes and root crops were considered a priority. Other assistance to National Programmes included supporting genebanks in Peru and the University of Costa Rica to upgrade their conservation equipment. The main training event organized was the First Course on Documentation of Plant Genetic Resources; 16 participants from 10 countries studied the tools and techniques to effectively manage germplasm collections in genebanks, and prepared projects to apply this knowledge in their countries.

Europe

New staff augmented the level of interaction with the region's National Programmes in 1994. Phase V of the European Cooperative Programme for Crop Genetic Resources Networks initiated an expanded programme of work. The European Forest Genetic Resources Programme became operational with the organization of the first Network meeting on *Populus nigra*. Some east European countries required emergency action to secure unique collections, and safety duplication of the European *Allium* collection in Olomouc, Czech Republic, continued in 1994. A series of joint missions opened contacts with the Newly Independent States of the Caucasus, Central Asia and the three Baltic countries. Technology transfer received increased attention through training, research collaboration and informal contacts. A meeting on the conservation and utilization of indigenous underutilized species of the Mediterranean established a number of crop-oriented networks focusing on the genetic resources of einkorn, emmer, spelt, *Pistacia* spp., rocket, and medicinal and aromatic species. A regional Newsletter for Europe was launched and three issues were published in 1994.

Genetic diversity

New staff members developed projects on the socioeconomic and cultural aspects of conservation and the *in situ* conservation of crop plants, particularly ethnobotany and human aspects of plant genetic resources. The value of the core collection approach was widely recognized and the various problems involved in developing such collections explored. A number of international collaborative efforts were initiated, such as the international barley core collection and a sesame core collection. A project on appropriate collecting strategies developed methodologies for ecogeographic surveys and indicators for genetic erosion. Work on the effectiveness of targeted collecting in the recovery of specific genes and gene complexes concluded that certain areas can be targeted for *ex situ* collecting of germplasm rich in particular characters. IPGRI collaborated with other centres and partners to identify agreed areas of interest in a comprehensive programme of conservation of tropical humid and dryland forests, timber and non-wood forest products. A database called TREESOURCE was developed that provides an overview of the holdings and locations of forest genetic resources on a global basis. A research project was initiated in southeast Asia to design effective *in situ* conservation strategies for tropical forest ecosystems.

Germplasm Maintenance and Use

The Group's activities focussed on research into optimum moisture contents for seed storage and *in vitro* slow growth protocols that individual genebanks can adapt to their specific requirements. A compendium and a database were prepared on seed storage behaviour for about 6000 species from over 200 families. Early work on low-input techniques for the drying of seed showed that sun- and shade-drying of maize, millet and groundnut seed did not reduce the subsequent longevity of the seed. Projects focusing on conserving recalcitrant seeds continued, in particular using cryopreservation techniques. Embryonic axes of tea and jacktruit were successfully cryopreserved. The Technical Guidelines for the Safe Movement of Germplasm series, produced by a joint FAO/IPGRI programme, published guidelines for small fruits. A first version of a computer programme to aid the design of seed genebank facilities, sized according to predicted storage needs, was produced. Studies on the legal aspects of germplasm exchange and international arrangements for the conservation and use of plant genetic resources were published. Coordinators for crop monographs were identified in a project on neglected crops.

Documentation, Information and Training

Three staff attended a workshop that proposed a CGIAR system-wide information strategy. Descriptors were printed for four crops, a subset of descriptors being identified in each list to give maximum discrimination among accessions. A questionnaire on problems in documentation activities, was distributed to over 500 genebank managers and documentation staff. Work began on developing a software application as an alternative to printed crop directories. Requests to the IPGRI Library for documents increased by more than 70% over 1993. Over 40 publications were produced and over 50 000 copies distributed. New arrangements were made with FAO to continue collaborating on the *Plant Genetic Resources Newsletter*. Three public awareness products received awards from Agricultural Communicators in Education. Projects were initiated to produce a series of films on genetic resources as part of the System-wide Genetic Resources Programme, and to increase awareness of international agricultural research in Germany on behalf of Public Awareness Resources Committee. Five scientists from developing countries undertook training in Italy with support from the Italian government. Progress was made in the implementation of Master's level courses in universities in Zambia, Kenya and the Philippines and the potential for establishing courses in West Africa was investigated. A project on the socioeconomic impact of germplasm conservation and use activities generated a paper summarizing activities over the 20-year lifetime of the Institute.

International Network for the Improvement of Banana and Plantain

Important steps in 1994 programme development included the first meeting of the *Musa* breeders' network, the first global International *Musa* Testing Conference and a workshop on nematodes and weevil borers in the Asia/Pacific. The impact of improved and disease-resistant germplasm released with network partners began to show. A safety duplicate of the Asia/Pacific *in vitro Musa* germplasm collection was established. The *Musa* Germplasm Information System, to rationalize information on *Musa* genetic resources and make it available to collaborators, began to operate. The Network played a key role in regional *Musa* training and research, including priority setting and collaborative activities. Information and documentation activities continued strengthening links within the *Musa* community.

1994年活动概述

国际植物遗传资源研究所(IPGRI)接替国际植物遗传资源委员会后，于1994年1月正式开始运作，1994年5月在新德里举行的国际农业研究磋商小组(CGIAR)中期会议上，同意设立全系统遗传资源计划(SGRP)，以国际植物遗传资源研究所为主办中心，为其提供秘书处，中心间遗传资源工作小组(ICWG-GR)定为该计划之指导委员会，于11月份开始为开展全系统遗传资源信息网(SINGER)进行初步设计，国际植物遗传资源研究所代表国际农业研究磋商小组出席在巴哈马召开的生物多样性公约缔约方会议第一次会议，在部长级会议上作了发言，表示国际农业研究磋商小组对各方工作的支持，国际植物遗传资源研究所在制定把国际农业研究磋商小组委托的种质收集品归由联合国粮农组织(FAO)领导的各项协定中发挥了主要作用，这些协定是于1994年10月在华盛顿的国际中心周上签署的，按照国际植物遗传资源研究所和国际香蕉、芭蕉改良协作网(INIBAP)的管理局以及国际香蕉、芭蕉改良协作网的支持小组在1994年5月签定的一项协议，开始采取措施逐步将国际香蕉、芭蕉改良协作网的计划纳入国际植物遗传资源研究所的领导和管理之中。

● 计划活动

国际植物遗传资源研究所按其1994年全年的项目安排来开展工作，至1994年底，国际植物遗传资源研究所设立的项目有56项。

非洲撒哈拉以南地区

这一年的突出点是肯尼亚政府正式签署了在肯尼亚设立区域办事处的协定，一项改善非洲饲料及饲草品种保存及利用的项目在尼日尔研究五种一年生饲草及豆科品种遗传多样性的空间和时间的分布，为协助国家计划的发展，极为重要的一点是在那些活动的开展还处于萌芽状态的分区域地区提高公众对遗传资源的认识，在喀麦隆、刚果、加纳及科特迪瓦分别主办了由作物科学家、活动家、政策制定者等参加的国家级讨论会，每个国家都建立了国家植物遗传资源协调委员会及国家行动计划，支持在科特迪瓦进行关于薯蓣种质在自然环境中的大田保存的研究，建立了饲草、粮食作物以及原生境植物和欠利用植物的三个区域作物工作小组，并为将来开展活动制定了重点。

西亚和北非地区

西亚北非植物遗传资源协作网的机构得到加强，拥有正式国家遗传资源委员会的国家增至10个，对10个国家的23名国家项目人员进行培训，10位科学家参加了涉及遗传资源管理的高级进修班，建立一个在约旦和摩洛哥设立二个分区域文献资料组的区域草场种子信息网，在各文献资料组开办信息管理及计算机使用的培训课程，一项有关果树和坚果品种的保存及利用的项目在约旦、伊朗及巴基斯坦与各国的国家计划合作收集野生的和培植的杏仁种质，离体种质收集工作由约旦科技大学

发起，在伊朗、叙利亚及土耳其建立了基因库的种质名单，与伊朗的国家计划合作，举办有关果树遗传资源不同内容的国内培训班，在约旦、摩洛哥及巴基斯坦组织并共同主办了国家研讨会。

亚洲、太平洋及大洋洲

椰子遗传资源协作网设一专职协调员，保证了协作网的工作在这一年度中得到发展。区域办事处协助进行一项调查，找出适于在亚洲研究和发展的主要水果品种，并确定本地区主要水果（芒果、柑橘和红毛丹）和次要水果（木菠萝、榴莲和荔枝）的遗传工作重点，为支持国家计划的发展，办事处工作人员访问了18个国家，提供专门咨询并促进各项活动的开展，为12个国家的27位基因库经理举办了为期三周的，关于非原生境基因库管理的计算机和数据系统应用方面的文献资料管理培训。国际椰子遗传资源协作网的成员增至24个，该协作网的数据库扩至含有500项椰子信息，举办了旨在促进椰子育种技术标准化的讲习班，区域办事处与合作伙伴协作，建立一个竹藤遗传资源工作小组，促进种质交换，协助越南征集芭蕉属遗传资源及评估芭蕉种质，为重新发展秋葵协作网努力工作，从已具有很完善的文献资料系统的国家计划开始进行数据交换的协作。

美　洲

美洲小组完成了设立开展植物遗传资源活动的分区域协作网的工作，工作人员在中美洲、安第斯山脉地区国家计划和中美洲、安第斯山脉地区植物遗传资源协作网联合实施了一项关于山榄科和西番莲科的植物遗传资源项目，有关作物基因库中遗传多样性的范围及分布方面的工作着眼于：育种系统及其对种质保存的影响和共同进化的理论，对国家计划的支持主要集中在加强分区域协作网植物遗传资源方面的工作，在加勒比海地区开展的活动包括召开一次会议，制定出1994年的行动计划，果树、食用豆类及块根植物皆为重点考虑对象，对国家计划的其它协作有：支持在秘鲁和哥斯达黎加大学的基因库更新保存种质的仪器，组织的主要培训活动有植物遗传资源文件资料管理的初级课程；10个国家的16位学员学习了有效管理基因库的手段和技术，并制定将这种知识应用于本国项目之中。

欧　洲

由于配备了新的工作人员，1994年与区域国家计划相互作用的水平得到提高。欧洲作物遗传资源协作网合作计划第五期开始实行一项扩大的工作计划。欧洲森林遗传资源计划以组织召开第一次锯天杨协作网会议开始展开工作。一些东欧国家要求采取紧急行动保护独特的收集品，而且在1994年继续对捷克共和国奥洛穆茨地区的欧洲葱属收集品进行安全复制。一系列联合考察组与高加索地区新独立的国家、中亚三个波罗的海国家进行接触，通过培训、合作研究及正式联系，提高了人们对技术转让的重视。关于地中海地区当地欠利用品种的保存及利用的会议建立了一些以作物为主的协作网，重点是单粒小麦、二粒小麦、斯佩耳特小麦、黄连木属、芝麻菜及药用和芳香品种的遗传资源工作。1994年欧洲简讯出版发行，并印发了三期简讯。

遗传资源多样性

新的工作人员制定出有关作物保存的社会经济、文化方面以及原生境保存的项目，尤其是人种植物学和人类植物遗传资源方面的项目。核心收集品的方法的价值得到广泛认识，因此对开发这种收集品存在的各种问题进行了探索，开始展开一些国际性合作，如进行国际大麦核心收集品及芝麻核心收集品的工作。一个关于制定适当的收集战略的项目提出了生态地理学

调查和遗传丧失的指标的方法，关于在特种基因和基因复合体复原中有效确定收集目标的工作得出结论：可把某些地区确定作为特定特性表现明显的种质的非原生境收集工作的目的地。国际植物遗传资源研究所与其它中心和合作伙伴协作，从热带湿地和旱地森林保护及木材和非木材产品的一项综合计划中确定共同感兴趣的领域，建立了一个名为THREESOURCE的数据库，该数据库提供全球森林遗传资源储备受位置的概况。在东南亚开始实施一项研究项目，为热带森林生态系统制定有效的原生境保存战略。

种质的保存和利用

国际农研小组的工作重点是研究种子保存的最佳湿度以及使各个基因库能适应特殊需要的离体慢速生长处理形式，制定和建立了有关200多种的6000个物种种子保存表现情况的简编及数据库，早期进行的有关种子干燥使用低投入技术方面的工作表明，晴干和阴干玉米、小米及落花生种子不需过种子随后的寿命期，以保存难处理的种子为重点的项目在继续工作，尤其是使用低温保藏技术，用低温保存茶叶和木薯芽的胜况取得成功，由联合国粮农组织和国际植物遗传资源研究所合作计划编写的《种质安全转移技术指南》丛书出版了小米果指南，编制了用计算机程序按预计的储存需要决定其大小辅助设计种子基因库设施的第一个版本，出版了关于种质交流及植物遗传资源保护和利用的国际安排的法律方面的研究文集，在一个关于受忽视的作物的项目中确定了作物专论协调员。

文献记载、信息和培训

三位工作人员参加了制定国际农业研究磋商小组全系统信息收集战略的讲习班，印发了四种作物的描述符，在每种作物名单中标明描述符的子项，以便在收集品中作出最大程度的区分，将关于文献记载工作中存在问题的调查表分发给500多位基因库经理和从事文献记载的工作人员，开始了开发一种应用软件作为取代印刷的作物名录的工作，向国际植物遗传资源研究所图书馆索取文件资料的要求比1993年增加了70%之多，编制出40多种出版刊物，共分发了50000多册，与联合国粮农组织作出新的安排，继续合作出版植物遗传资源简讯，三种提高公众认识的出版物受到农业教育通讯的嘉奖，开始实施制作遗传资源系列影片的项目，这是作为全系统遗传资源计划工作的一部分，也是代表公众意识资源委员会增强人们对德国国际农业研究的认识，在意大利政府的支持下，来自发展中国家的五位科学家在意大利参加了培训，在赞比亚、肯尼亚及菲律宾几所大学内开办硕士水平的课程取得进展，并探讨了在西非开设课程的可能性，有关种质保存及利用工作对社会经济影响的项目写出了一份概述国际植物遗传资源研究所20年来开展活动的论文。

国际香蕉、芭蕉改良协作网

在1994年计划制定当中采取的重要步骤有：在亚洲太平洋地区举办了芭蕉育种员协作网的第一次会议、首届全球国际芭蕉测试会议及关于线虫、象鼻虫蛀虫的讲习班，与协作网合作伙伴共同发放改良种质和抗病种质，已开始显示出效果，亚洲太平洋离体芭蕉种质收集品的安全复制已成功进行，为合理处理芭蕉遗传资源信息并向合作人员提供信息而成立的芭蕉种质信息系统开始开展工作，该协作网在包括确定重点和合作活动在内的区域芭蕉培训和研究中起着很重要的作用，信息及文献工作继续加强着芭蕉界内部的联系。

Résumé des activités de 1994

L'Institut international des ressources phytogénétiques a pris officiellement la succession du Conseil international des ressources phytogénétiques le 1er janvier 1994. A sa réunion de mai 1994 à New Delhi, le Groupe consultatif sur la recherche agricole internationale (GCRAI) a décidé de créer le Programme mondial des ressources phytogénétiques (PGRP) dont l'IPGRI est le centre de coordination et fournit le Secrétariat. Le Groupe de travail inter-centres sur les ressources phytogénétiques (CWG-GR) a été désigné comme comité directeur du programme. En novembre, le travail préparatoire pour la conception d'un réseau d'information mondial sur les ressources phytogénétiques (SINGER) a démarré. L'IPGRI a représenté le GCRAI à la première session de la Conférence des parties à la Convention sur la diversité biologique aux Bahamas. Une déclaration a été faite à la session ministérielle pour proposer le soutien du GCRAI aux travaux dans ce domaine. L'Institut a joué un rôle majeur dans l'élaboration des accords visant à placer sous les auspices de l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO) les collections de matériel génétique dont le GCRAI est dépositaire. Les accords ont été signés lors de la Semaine des centres internationaux en octobre 1994. Après la signature d'un accord en mai 1994, par le Conseil d'administration de l'IPGRI et celui du Réseau international pour l'amélioration du bananier et du plantain (INIBAP) et par le groupe de soutien de l'INIBAP, des mesures ont été prises pour entamer le processus qui placera le Programme INIBAP sous l'administration et le contrôle de l'IPGRI.

Exécution du programme

L'IPGRI a opéré dans le cadre de son cycle de projets pendant toute l'année 1994. Fin 1994, son programme comprenait 56 projets.

Afrique sub-saharienne

L'année a été marquée par la signature de l'accord officiel avec le Gouvernement kényan pour la mise en route du bureau régional au Kenya. Un projet pour l'amélioration de la conservation et de l'utilisation des espèces pastorales et fourragères en Afrique a étudié la répartition dans le temps et l'espace de la diversité génétique pour cinq espèces de plantes herbacées et de légumineuses fourragères annuelles au Niger. Pour contribuer au développement d'un programme national, il est particulièrement important de sensibiliser l'opinion publique au sujet des ressources phytogénétiques dans les sous-régions où les activités sont encore à leur début. Des colloques rassemblant à l'échelle nationale des agronomes, des militants, des décideurs, etc., ont été organisés au Cameroun, au Congo, au Ghana, et en Côte d'Ivoire. Chacune de ces instances a créé un comité national pour la coordination des ressources phytogénétiques et défini un plan national d'action. Un soutien a été fourni à la recherche dans le domaine de la conservation *in horto* du matériel génétique de l'igname dans son environnement naturel en Côte d'Ivoire. Trois groupes de travail régionaux, pour les espèces fourragères et pastorales, les cultures vivrières et les plantes sous-utilisées *in situ* ont été constitués et ont fixé les domaines prioritaires de l'activité future.

Asie occidentale et Afrique du Nord

La structure du réseau d'Asie occidentale et d'Afrique du Nord pour les ressources phytogénétiques a été consolidée. Le nombre des pays dotés d'un comité national des ressources phytogénétiques est passé à dix. Vingt-trois fonctionnaires, affectés au programme national de 10 pays, ont reçu une formation. Dix scientifiques ont participé à un cours de spécialisation en gestion des ressources phytogénétiques. Un réseau régional d'information sur les semences de parcours a été créé avec deux services sous-régionaux de documentation en Jordanie et au Maroc. Chaque service a tenu des cours de formation en gestion et traitement informatisé de l'information. Un projet sur la conservation et l'utilisation des arbres fruitiers et des espèces à noyau a coopéré avec les programmes nationaux en Jordanie, en Iran et au Pakistan pour la collecte de souches sauvages et cultivées d'amandiers. Une collection in vitro a été constituée par l'Université des sciences et de technologie de Jordanie. Un inventaire de banques de gènes en Iran, Syrie et Turquie a été réalisé. Un cours de formation de portée nationale, sur différents aspects des ressources génétiques des arbres fruitiers a eu lieu en coopération avec le Programme na-

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tional iranien. Des séminaires nationaux ont été organisés en co-parrainage en Jordanie, au Maroc et au Pakistan.

Asie, Pacifique et Océanie

Un coordinateur à plein temps pour le Réseau des ressources génétiques du cocotier a permis à ce réseau de s'élargir pendant l'année. Le Bureau a collaboré à une étude pour identifier les espèces fruitières devant bénéficier en priorité des efforts de recherche et développement en Asie et a mis au point des priorités régionales pour le travail sur les ressources génétiques des principaux fruits (mangue, agrumes et ramboutan) et de certains fruits d'importance secondaire (jaquier, durian et litchi). En appui aux programmes nationaux, des fonctionnaires se sont rendus dans 18 pays pour fournir des avis ponctuels et faciliter les activités. Un cours de documentation de 3 semaines a permis de former 27 gestionnaires de banques de gènes, venant de 12 pays, aux systèmes informatiques et de base de données pour la gestion des banques de gènes *ex situ*. Les membres du Réseau international des ressources génétiques du cocotier sont passés à 24. La base de données du réseau a été élargie pour contenir des informations sur 500 souches de cocotier. Un atelier a été consacré à la standardisation des techniques de sélection pour le cocotier. Le Bureau régional a collaboré avec des partenaires pour mettre en place un groupe de travail sur les ressources génétiques du bambou et du rotin, faciliter les échanges de matériel génétique, aider le Viet Nam à collecter des ressources génétiques de *Musa* et évaluer le matériel génétique de *Musa*. Des efforts ont été déployés pour réactiver le réseau pour le gombo. Un protocole d'échange de données a été lancé auprès des programmes nationaux possédant déjà de bons systèmes de documentation.

Amériques

Le Groupe Amériques a achevé la mise en place de réseaux sous-régionaux pour étayer les activités en matière de ressources phytogénétiques. Le personnel a mis en œuvre un projet sur les Sapotacées et les Passifloracées en association avec les programmes nationaux des pays d'Amérique centrale et latine, et avec le Réseau centre-américain et andin sur les ressources phytogénétiques. Les travaux sur l'étendue et la répartition de la diversité biologique dans les pools génétiques des cultivars ont porté sur l'étude des systèmes de sélection et de leurs conséquences sur la conservation du matériel génétique, et les théories de la co-évolution. Le soutien aux programmes nationaux a consisté principalement à renforcer les réseaux sous-régionaux sur les ressources phytogénétiques. Les activités dans les Caraïbes ont inclus notamment une réunion qui a servi à élaborer un plan d'action pour 1994. Les arbres fruitiers, les légumineuses alimentaires et les plantes à racines ont été considérés comme prioritaires. D'autres activités de soutien au programmes nationaux ont permis d'aider des banques de gènes au Pérou et à l'Université du Costa Rica à améliorer leur équipement de conservation. La principale activité de formation a été l'organisation du premier cours sur la documentation en matière de ressources phytogénétiques; seize participants venant de 10 pays se sont familiarisés avec les outils et les techniques requis pour gérer efficacement les collections de matériel génétique dans les banques de gènes et ont conçu des projets destinés à appliquer ces connaissances dans leur pays.

Europe

Le renforcement des effectifs a accru l'interaction avec les programmes nationaux en 1994. La Phase 3 du Programme de coopération européen pour les réseaux sur les ressources génétiques des cultures a lancé un programme de travail élargi. Les activités du Programme européen des ressources génétiques forestières ont démarré par l'organisation de la première réunion de réseau sur *Populus nigra*. Quelques pays d'Europe orientale avaient besoin d'une intervention d'urgence pour sauvegarder des collection uniques, et la duplication de la collection européenne d'*Allium* à Olomouc, en République tchèque, s'est poursuivie en 1994. Une série de missions conjointes a permis de nouer des contacts avec les nouveaux états indépendants du Caucase, d'Asie centrale et les trois pays baltes. Le transfert de technologie a été promu grâce à la formation, à la collaboration en matière de recherche et aux contacts officieux. Une réunion sur la conservation et l'utilisation des espèces autochtones sous-exploitées de la Méditerranée a abouti à la création de divers réseaux consacrés aux ressources génétiques de certaines plantes cultivées, notamment l'engrain, l'amidonnier, l'épeautre, le pistachier, la roquette et d'espèces médicinales et aromatiques. Un Bulletin régional pour l'Europe a été lancé, dont 3 numéros sont sortis en 1994.

Diversité génétique

Du personnel nouvellement recruté a élaboré des projets sur les aspects socio-économiques et culturels de la conservation et sur la conservation *in situ* des espèces cultivées, en particulier sur l'ethnobotanique et les aspects humains des ressources phytogénétiques. L'utilité des collections noyau a été largement reconnue et les divers problèmes rencontrés lors de l'établissement de telles collections étudiés. Un certain nombre d'activités internationales de collaboration ont été lancées, telles que la collection noyau internationale de l'orge et une collection noyau pour le sésame. Un projet sur les stratégies appropriées de collecte du matériel génétique a défini des méthodes d'enquête éco-géographique et des indicateurs pour mesurer l'érosion génétique. En conclusion des travaux sur l'efficacité de la collecte ciblée pour

récupérer des gènes spécifiques et des complexes de gènes, il a été indiqué que certaines régions peuvent être désignées pour la constitution de collections ex situ de matériel génétique présentant une abondance de certains caractères. L'IPGRI a collaboré avec d'autres centres et partenaires pour identifier de commun accord les régions propices dans le cadre d'un programme intégré de conservation des forêts tropicales humides et des forêts de zones sèches et des produits ligneux et non ligneux. Une base de données dénommée TREESOURCE a été créée pour fournir un aperçu des sites et des collections de ressources génétiques forestières à l'échelle mondiale. Un projet de recherche a démarré en Asie du Sud-Est pour élaborer des stratégies efficaces de conservation *in situ* pour les écosystèmes forestiers tropicaux.

Conservation et utilisation du matériel génétique

Les activités du groupe ont été axées sur la recherche concernant la teneur optimale en eau pour la conservation des semences et l'élaboration de protocoles de croissance ralentie *in vitro*, adaptables aux exigences particulières de chaque banque de gènes. Un inventaire et une base de données sur le comportement des semences pour leur conservation ont été préparés pour environ 6000 espèces appartenant à plus de 200 familles. Des travaux préliminaires sur la recherche de techniques simples de dessiccation des semences ont montré que le séchage des graines de maïs, de mil et d'arachide par exposition à l'ombre et au soleil n'a pas entamé leur longévité. Les projets de conservation des semences récalcitrantes ont été poursuivis et, dans ce domaine, les techniques de cryoconservation ont permis, par exemple, de conserver avec succès des axes embryonnaires de thé et de jaquier. Dans la série des Directives techniques pour le mouvement sans risque du matériel génétique, produite dans le cadre d'un programme conjoint FAO/IPGRI, des directives pour les petits fruits ont été publiées. Une première version d'un logiciel servant à projeter les installations des banques de gènes en adaptant la capacité aux besoins d'entreposage, a été mise au point. Des études sur les aspects juridiques des échanges de matériel génétique et des arrangements internationaux pour la conservation et l'utilisation des ressources phytogénétiques ont été publiés. Des coordinateurs responsables de monographies sur certaines cultures négligées ont été désignés.

Documentation, information et formation

Trois membres du personnel ont assisté à un colloque qui a proposé une stratégie d'information pour l'ensemble du système du GCRAI. Des descripteurs ont été imprimés pour quatre espèces, avec définition d'un sous-ensemble de descripteurs pour chaque liste afin de fournir le maximum de discriminants entre les souches. Un questionnaire relatif aux problèmes rencontrés dans les activités de documentation a été distribué à plus de 500 directeurs de banques de gènes et agents travaillant à la documentation. Le travail a commencé par la mise au point d'un logiciel destiné à produire des répertoires de cultures pour remplacer le support imprimé traditionnel. Les demandes de documents à la Bibliothèque de l'IPGRI ont augmenté de plus de 70% par rapport à 1993. Plus de 40 publications ont été produites et plus de 50 000 exemplaires ont été distribués. De nouveaux arrangements ont été pris avec la FAO pour poursuivre la collaboration au Bulletin sur les ressources phytogénétiques. Trois produits destinés à sensibiliser l'opinion publique ont reçu la distinction d'*Agricultural Communicators in Education*. Des projets ont été lancés pour produire une série de films sur les ressources génétiques, dans le cadre du Programme des ressources génétiques du GCRAI, et pour promouvoir, auprès du public en Allemagne, une meilleure connaissance de la recherche agricole internationale, avec le concours du Comité pour la sensibilisation de l'opinion. Cinq scientifiques de pays en développement ont entrepris une formation en Italie, avec le soutien du Gouvernement italien. Des progrès ont été accomplis dans la mise en oeuvre de cours de maîtrise dans des universités en Zambie, au Kenya et aux Philippines et une étude a été faite sur la possibilité de programmer des cours en Afrique occidentale. Un projet sur l'impact socio-économique des activités de conservation et d'utilisation du matériel génétique a produit un document résumant les activités de l'Institut au cours de ses vingt années d'existence.

Réseau international pour l'amélioration du bananier et du plantain

Parmi les activités importantes du programme de 1994 figurent la première réunion du Réseau des sélectionneurs du bananier et du plantain, la première conférence internationale sur les essais comparatifs du bananier et du plantain, et un atelier sur les nématodes et les charançons du bananier en Asie/Pacifique. L'impact des échanges, entre membres de réseaux, de matériel génétique amélioré et résistant aux maladies est devenu perceptible. La duplication de sécurité de la collection *in vitro* de matériel génétique du bananier et du plantain pour l'Asie et le Pacifique a été entreprise. Le Système d'information sur le matériel génétique du bananier et du plantain, destiné à rationaliser l'information sur les ressources génétiques du bananier et du plantain et à les mettre à la disposition des divers partenaires, est entré en fonction. Le réseau a joué un rôle primordial dans la formation et la recherche régionales sur le bananier et le plantain, y compris pour l'établissement des priorités et la coopération. Les activités d'information et de documentation ont continué à renforcer les liens au sein de la communauté intéressée par le bananier et le plantain.

Zusammenfassung der Aktivitäten 1994

Das International Plant Genetic Resources Institute (Internationales Institut für pflanzengenetische Ressourcen - IPGRI) hat seine Arbeiten offiziell am 1. Januar 1994 als Nachfolger des International Board for Plant Genetic Resources (Internationaler Ausschuß für pflanzengenetische Ressourcen) aufgenommen. Beim Mid-Term Meeting der Consultative Group on International Agricultural Research (Beratengsgruppe zur Internationalen Landwirtschaftlichen Forschung - CGIAR) im Mai 1994 in New Delhi wurde die Einrichtung eines systemweiten Programmes der Genetischen Ressourcen (SGRP) vereinbart, in dem IPGRI Anlaufstelle werden und das Sekretariat zur Verfügung stellen sollte. Die Inter-Centre Working Group on Genetic Resources (Arbeitsgruppe Genetische Ressourcen - ICWG-GR) wurde zum leitenden Komitee des Programmes ernannt. Die Arbeit begann mit der Entwicklung eines systemweiten Informationsnetzes der genetischen Ressourcen (SINGER). IPGRI vertrat die CGIAR in der ersten Sitzung der 'Conference of the Parties' der Convention zur Biologischen Diversität auf den Bahamas. Während der Ministersitzung wurde die Unterstützung der CGIAR für die Arbeit der Gruppe angeboten. Das Institut spielte eine wichtige Rolle bei des Ausarbeitung der Abkommen, die die der CGIAR anvertrauten Genmaterial-Sammlungen unter die Schirmherrschaft der Organisation für Ernährung und Landwirtschaft der Vereinten Nationen (FAO) stellen sollten.

Die Abkommen wurden während der 'International Centres Week' im Oktober 1994 in Washington unterzeichnet. Nach der Unterzeichnung eines Abkommens im Mai 1994 durch die Aufsichtsräte des IPGRI, und des 'International Network for the Improvement of Banana and Plantain' (Internationales Netzwerk für die Verbesserung von Bananen und Kochbananen - INIBAP) sowie der INIBAP Unterstützungsgruppe, wurden Schritte eingeleitet mit denen das INIBAP-Programm der Kontrolle und Verwaltung der IPGRI unterstellt werden sollte.

Programmaktivitäten

IPGRI's Aktivitäten im Jahre 1994 waren in Projekte gegliedert, deren Zahl am Jahresende 56 betrug.

Afrika südlich der Sahara

Das Jahr war gekennzeichnet durch ein formelles Abkommen mit der Regierung Kenias zur Arbeit des dort ansässigen Regionalbüros. Ein Projekt zur Verbesserung der Konservierung und Nutzung von Futterpflanzenarten in Afrika untersuchte die räumliche und zeitliche Verteilung der genetischen Unterschiede an fünf einjährigen Futtergras- und Hülsenfrüchtenarten in Niger. Für die Unterstützung der Entwicklung nationaler Programme ist es besonders wichtig, das öffentliche Bewußtsein der Bedeutung genetischer Ressourcen in Ländern, in denen sich die Aktivitäten noch in ihrem Anfangsstadium befinden, zu erhöhen.

Nationale Foren, die von Wissenschaftlern, Aktivisten, Politikern, usw. besucht wurden, sind in Kamerun, Kongo, Ghana und der Elfenbeinküste abgehalten worden. Jedes dieser Foren ernannte ein nationales Komitee für die Koordinierung der pflanzengenetischen Ressourcen und entwarf einen nationalen Aktionsplan. An der Elfenbeinküste wurde eine Untersuchung bezüglich der on-farm-Konservierung von Genmaterial der Yamswurzein in seiner natürlichen Umgebung unterstützt. Drei regionale Arbeitgruppen, nämlich 'Futterpflanzen', 'Nahrungspflanzen' und 'nicht ausreichend genutzte heimische Pflanzen' sind eingerichtet worden und legen so die Prioritäten für zukünftige Aktivitäten fest.

Westasien und Nordafrika

Die Struktur des Netzwerks für Pflanzengenetische Ressourcen in Westasien und Nordafrika wurde gestärkt. Die Zahl der Länder mit

formellen nationalen Komitees zu genetischen Ressourcen stieg auf 10 an. 23 Mitarbeiter aus 10 nationalen Programmen wurden ausgebildet, während 10 Wissenschaftler einen Fortgeschrittenenkurs für den Umgang mit genetischen Ressourcen besuchten. Ein regionales Informations-Netzwerk für Weidepflanzen Saatgut mit zwei Dokumentations-Untereinheiten wurden in Jordanien und Marokko eingerichtet. Jede Einheit hielt Kurse über den Umgang mit Informationen und Computergebrauch ab.

Ein Projekt für die Erhaltung und Nutzung von Obstbäumen und Nußarten sammelte Genmaterial wilder und gezüchteter Mandeln in Zusammenarbeit mit den nationalen Programmen in Jordanien, dem Iran und Pakistan. Die Jordanische Universität für Wissenschaft und Technologie begann mit dem Aufbau einer *in vitro* Sammlung. Eine Bestandserhebung der Genbanken im Iran, in Syrien und der Türkei wurde erstellt. Ein Ausbildungskurs zu den verschiedenen Aspekten der pflanzengenetische Ressourcen von Obstbäumen wurde in Zusammenarbeit mit dem nationalen iranischen Programm durchgeführt. In Jordanien, Marokko und Pakistan wurden nationale Seminare organisiert und mitfinanziert.

Asien, Pazifik und Ozeanien

Ein Vollzeit-Koordinator des 'Coconut Genetic Resources Network' trug dazu bei, dieses Netzwerk während des Jahres auszuweiten. Das 'International Coconut Genetic Resources Network' erhöhte seine Mitgliederzahl auf 24. Die Datenbank der Gruppe wurde ausgeweitet und enthält jetzt Informationen über 500 Kokusnuß-Muster. Es wurde ein Workshop abgehalten, mit dem die Zuchttechniken für Kokusnüsse standardisiert werden sollten.Das Büro arbeitete an einer Untersuchung mit, mit der die Prioritäten für Forschung und Entwicklung von Fruchtarten in Asien festgestellt werden sollten. Regionale Prioritäten für Genetikuntersuchungen der wichtigsten (Mango, Zitrusfrüchte und Rambutan) und weniger wichtigen Früchte (Brotfrucht, Zibet (Durian)und Litchi) wurden ebenfalls festgelegt. Zur Unterstützung der Entwicklung nationaler Programme bereisten die Mitglieder der Gruppe 18 Länder, um die nationale Programme zu beraten und die Aktivitäten zu erleichtern.

In einem dreiwöchigen Dokumentationskurs wurden 27 Leiter von Genbanken aus 12 Ländern im Einsatz von Computern und Datenbank-Systemen für ein Management von *ex situ* Genbanken geschult. Die Gruppe arbeitete mit ihren Partnern daran, eine Arbeitsgruppe für die genetischen Ressourcen von Bambus und Rattan zu entwickeln, den Austausch von Genmaterial zu erleichtern, Vietnam bei der Sammlung genetischer Ressourcen von *Musa* zu unterstützen und das Genmaterial von *Musa* auszuwerten. Es wurden Anstrengungen unternommen, um das Okra Netzwerk wieder aufleben zu lassen. Ein Protokoll für den Austausch von Daten wurde mit den nationalen Programmen ausgarbeitet die über ein ausgereiftes Dokumentationssystem verfügen.

Amerika

Die Amerika-Gruppe beendete die Einrichtung subregionaler Gruppen, um sich mit den Aktivitäten der pflanzengenetischen Ressourcen zu beschäftigen. Gemeinsam mit den nationalen Programmen in Mittelamerika und den Anden sowie den entsprechenden Netzwerken wurde ein Projekt über Sapotaceae und Passifloraceae gestartet.

Eine Arbeit über die Ausdehnung und die Verteilung der genetischen Unterschiede in Nutzpflanzen-Genpools beschäftigte sich mit Züchtungssystemen und deren Auswirkungen auf die Erhaltung des Materials sowie Theorien der Co-Evolution. Die Unterstützung der nationalen Programme war hauptsächlich darauf ausgerichtet, die subregionalen Netwerke zu den pflanzlichen Genetikresourcen zu stärken. Die Aktionen im Karibikraum beinhalteten ein Treffen für die Entwicklung eines Aktionsplanes für das Jahr 1994. Obstbäume, Körnerleguminosen und Gemüsewurzeln erhielten Priorität. Weitere Hilfen für die nationalen Programme schlossen die Unterstützung für die Genbanken in Peru und an der Universität von Costa Rica ein, deren Ausrüstung ergänzt werden sollte. Die wichtigste Ausbildungsveranstaltung, die durchgeführt wurde, war der erste Kurs zur Dokumentation von pflanzengenetischen Ressourcen: 16 Teilnehmer aus 10 Ländern erlernten Methoden, mit denen Material in Genbanken wirkungsvoll gehandhabt werden kann und arbeiteten Projekte aus, mit denen dieses Wissen in ihren Heimatländern angewandt werden kann.

Europa

Neue Mitarbeiter verstärkten die Zusammenarbeit mit den nationalen Programmen im Jahr 1994. Phase V des Europäischen Kooperationsprogramms für Netzwerke zu Nutzpflanzen-Ressourcen leitete ein erweitertes Arbeitsprogramm ein. Das europäische 'Forest Genetic Resources Programme' wurde mit dem ersten Treffen zu *Populus nigra* operativ. In einigen osteuropäischen Ländern waren Notaktionen zu Absicherung einzigartiger Sammlungen erforderlich. Die Sicherheitsduplikation der *Allium*-Sammlung in Olomouc (Tschechische Republik) wurde 1994

weitergeführt. Eine Reihe von gemeinsamen Missionen knüpfte Kontakte zu den unabhängigen Staaten im Kaukasus, in Zentralasien und den drei Baltikrepubliken. Der Technologietransfer erhielt über Ausbildung, Forschungszusammenarbeit und informelle Kontakte eine verstärkte Aufmerksamkeit. Ein Treffen zur Erhaltung und Nutzung von einheimischen, nicht ausreichend genutzten Arten des Mittelmeerraumes gründete eine Anzahl von Nutzpflanzen-orientierten Netzwerken, die sich auf die genetischen Ressourcen hauptsächlich von Einkorn, Emmer, Dinkel, *Pistacia* spp., Rauke sowie auf Medizinal- und Gewürzpflanzen konzentrierte. Drei Ausgaben des regionalen "Newsletter" für Europa wurden veröffentlicht.

Genetische Vielfalt

Neue Mitarbeiter entwickelten Projekte zu den sozio-ökonomischen und kulturellen Aspekten der Erhaltung, sowie *in situ*-Konservierung von Nutzpflanzen, besonders zur Ethnobotanik und den menschbezogenen Aspekten der pflanzengenetischen Ressourcen. Die Vorteile der 'core collection' Methodik wurden weitgehend akzeptiert, und die verschiedenen Probleme, die sich bei der Entwicklung solcher Sammlungen stellen, wurden untersucht. Eine Reihe internationaler Anstrengungen wurden unternommen, zum Beispiel eine internationale Gersten-Sammlung und eine Sesam-Sammlung. Ein Projekt über die richtige Sammlungsweise entwickelte Methodologien für öko-geographische Erhebungen und Indikatoren genetischer Erosion. Aus Arbeiten zur Erhaltung spezifischer Gene und Genkomplexe konnte geschlossen werden, daß gezieltes Sammeln von Genmaterial mit bestimmten Merkmalen in definierten Gebieten effektiv sein kann. IPGRI hat mit anderen Zentren und Partnern zusammengearbeitet, um gemeinsame Interessengebiete in einem umfassenden Programm zur Erhaltung von tropischen Regenwäldern und Trockenlandwäldern, Nutzholz und Holz-Nebenprodukten des Waldes festzustellen. Eine Datenbank mit dem Namen TREESOURCE, die einen Überblick über die Bestände der forstgenetischen Ressourcen auf weltweitem Niveau gibt, wurde entwickelt. In Südostasien wurde ein Forschungsprojekt zur Entwicklung von Strategien zur *in situ*-Konservierung in den Ökosystemen tropischer Regenwälder begonnen.

Konservierung und Nutzung von Genmaterial

Die Aktivitäten der Gruppe konzentrierten sich auf die Erforschung von für die Lagerung optimalen Feuchtigkeitsgehalten der Samen und Methoden, die das Wachstum von *in vitro* Kulturen verlangsamen. Eine Zusammenfassung und eine Datenbank über die Lagerung von etwa 6000 Arten aus über 200 Familien wurde vorbereitet. Eine Vorarbeit zu Techniken mit niedrigem Input für das Trocknen von Saatgut zeigte, daß das Trocknen von Mais, Hirse und Erdnüssen an der Sonne oder im Schatten die Langlebigkeit des Saatgutes nicht beeinträchtigte. Projekte, die sich mit der Konservierung recalcitranter Arten beschäftigen, wurden weitergeführt; dabei wurden besonders Kryopraservationstechniken angewandt. Embryonalachsen von Tee und Brotfrucht wurden mit Erfolg konserviert. Die phytosanitären Richtlinien für den internationalen Austausch von Genmaterial, die in einem gemeinsamen Programm von FAO und IPGRI entwickelt werden, wurden durch die Publikation von Richtlinien für Beerenobst erweitert. Die erste Version eines Computerprogramms zur Planung von Genbanken für Saatgut entsprechend dem voraussichtlichen Raumbedarf wurde entwickelt. Studien zu den rechtlichen Aspekten des Austausches von Genmaterial und internationalen Abkommen zur Erhaltung und Nutzung von pflanzengenetischen Ressourcen wurden veröffentlicht.

In einem Projekt für bisher vernachlässigte Kulturpflanzen wurden Vereinbarungen mit Koordinatoren für Monographien getroffen.

Dokumentation, Information und Ausbildung

Drei Mitarbeiter nahmen an einem Workshop teil, in dem die systemweite Informationsstrategie innerhalb CGIAR vorgeschlagen wurde. Für vier Kulturpflanzenarten wurden 'Descriptors' veröffentlicht. In jeder Liste wurden die Merkmale gesondert gekennzeichnet, die zur besten Differenzierung zwischen verschiedenen Mustern genutzt werden können. Ein Fragebogen zu den Problemen in der Dokumentationsaktivität wurde an 500 Leiter von Genbanken und das für Dokumentation zuständige Personal gesandt. Man begann mit der Arbeit an einer Software-Anwendung als Alternative zu ausgedruckten Nutzpflanzenlisten. Die Anfragen an die Bibliothek der IPGRI nahmen gegenüber 1993 über 70% zu. Es wurden über 40 Publikationen herausgegeben und über 50.000 Kopien verteilt. Man traf neue Vereinbarungen mit der FAO für eine weitere Zusammenarbeit zum 'Plant Genetic Newsletter'. Drei Produkte aus IPGRI's Öffentlichkeitsarbeit erhielten Auszeichnungen von 'Agricultural Communicators in Education'. Eine Serie von Filmen über genetische Ressourcen wird als Teil des 'System-Wide Genetic Resources Programme' produziert. Ein Projekt zur Infor-

mation der Öffentlichkeit über Internationale Agrarforschung wurde in Deutschland gestartet. Fünf Wissenschaftler aus Entwicklungsländern begannen mit Unterstützung der italienischen Regierung in Italien eine Ausbildung.

Fortschritte wurden erzielt in der Verwirklichung von M. Sc. Kursen an Universitäten in Zambia, Kenia und auf den Philippinen; Möglichkeiten für die Einrichtung von Kursen in Westafrika wurden untersucht.

INIBAP

1994 wurde wichtige Schritte in der Programmentwicklung unternommen, darunter auch das erste Treffens des '*Musa*-breeders network', die erste globale 'International Musa Testing Conference' und ein Workshop über Nematoden und Bananenkäfer in Asien und dem Pazifikraum. Erste Auswirkungen des verbesserten und krankheitsresistenten Genmaterials zeigten sich bei den Teilnehmen des Netzwerkes. Ein Duplikat der Asien-Pazifik *in vitro Musa* Sammlung wurde aus Sicherheitsgründen erstellt. Das '*Musa* Germplasm Information System', mit dem die Informationen zu genetischen Resourcen von Musa rationalisiert und den Partnern zur Verfügung gestellt werden sollen, wurde operativ. Das Netzwerk spielte eine Hauptrolle in der regionalen Ausbildung und Forschung zu *Musa*, einschließlich der Festlegung von Prioritäten und der gemeinsamen Aktivitäten. Die Aktivitäten in den Bereichen Information und Dokumentation förderte die Verbindungen zu den Programmen, die über *Musa* arbeiten.

Acontecimientos de 1994

El 1 de enero de 1994 el Instituto Internacional de Recursos Fitogenéticos (IPGRI) comenzó sus actividades regulares como sucesor del Consejo Internacional de Recursos Fitogenéticos. En la reunión de mitad período del Grupo Consultivo sobre Investigación Agrícola Internacional (GCIAI), celebrada en Nueva Delhi, en mayo de 1994, se acordó establecer un Programa de recursos fitogenéticos a nivel de todo el sistema (SGRP), con el IPGRI como centro de convocación y encargado de la constitución de la Secretaría. Como comité directivo del programa se designó al Grupo de trabajo entre centros sobre recursos genéticos (ICWG-GR). En noviembre comenzaron los trabajos preliminares para la organización de una Red de Información sobre recursos genéticos a nivel de todo el sistema (SINGER). El IPGRI representó al GCIAI en la primera reunión de la Conferencia de las Partes en el Convenio sobre la Diversidad Biológica, en las Bahamas. En la reunión ministerial se presentó una declaración, ofreciendo el apoyo del GCIAI al trabajo de las Partes. El Instituto desempeñó un papel importante en la elaboración de los acuerdos para poner las colecciones de germoplasma administradas por el GCIAI bajo los auspicios de la Organización de las Naciones Unidas para la Agricultura y la Alimentación (FAO). Los acuerdos se firmaron en la Semana de los Centros Internacionales, en Washington, en octubre de 1994. Tras la firma de una acuerdo en mayo de 1994 por el Consejo del IPGRI, la Red internacional de mejora del banano y el plátano (INIBAP) y el Grupo de apoyo de la INIBAP, se adoptaron medidas para iniciar el proceso de entrega al IPGRI del gobierno y la administración del programa de la INIBAP.

Actividades del programa

El IPGRI actuó de conformidad con su sistema de proyectos durante todo el 1994. A fines de 1994, el programa del IPGRI se componía de 56 proyectos.

Africa subsahariana

El año se caracterizó por la firma del acuerdo oficial con el Gobierno de Kenya para la puesta en marcha de la oficina regional en Kenya. Un proyecto para el mejoramiento de la conservación y utilización de forrajes y especies forrajeras en Africa estudió la distribución espacial y temporal de la diversidad genética de cinco especies anuales de gramíneas y legumbres forrajeras en el Níger. Para contribuir al desarrollo de los programas nacionales es particularmente importante sensibilizar a la gente sobre los recursos genéticos en las subregiones en las que las actividades se hallan aún en su fase inicial. En Camerún, Congo, Ghana y Côte d'Ivoire se organizaron foros nacionales a los que asistieron, entre otros, científicos, activistas y funcionarios encargados de la formulación de políticas. Cada uno de estos países estableció un comité nacional para la coordinación de las actividades relacionadas con los recursos fitogenéticos, y trazó un plan de acción nacional. En Côte d'Ivoire se prestó apoyo a la investigación para la conservación en la finca de germoplasma de ñame en su ambiente natural. Se constituyeron tres grupos de trabajo regionales por cultivo, a saber, pastos y forrajes, cultivos alimentarios, y conservación *in situ* y plantas subutilizadas, que fijaron las prioridades para las actividades futuras.

Asia Occidental y Africa del Norte

Se consolidó la estructura de la Red de Recursos Fitogenéticos de Asia Occidental y Africa del Norte. El número de países con comités nacionales oficiales de recursos genéticos aumentó a 10. Se capacitó a 23 miembros del personal de los programas nacionales de 10 países. Diez científicos asistieron a un curso superior en gestión de recursos fitogenéticos. Se estableció una Red Regional de Información sobre Semillas de Pastizales, con dos divisiones subregionales de documentación, una en Jordania y otra en Marruecos. Cada división organizó cursos de capacitación en gestión de información y utilización de ordenadores. Un proyecto para la conservación y utilización de árboles frutales y especies de nueces colaboró con los programas nacionales en Jordania, Irán y Pakistán, recolectando germoplasma silvestre y domesticado de almendra. La Universidad Jordana de Ciencia y Tecnología comenzó una colección *in vitro*. Se realizó un inventario de bancos de genes en Irán, Siria y Turquía. En colaboración con el Programa Nacional Iraní, se organizó en el país

un curso de formación en los diferentes aspectos relacionados con los recursos fitogenéticos de árboles frutales. En Jordania, Marruecos y Pakistán se organizaron y copatrocinaron seminarios nacionales.

Asia, el Pacífico y Oceanía

La contratación de un coordinador a dedicación exclusiva para la Red de Recursos Genéticos del Coco permitió que esta red creciera durante el año. La Oficina colaboró en un estudio para identificar especies frutales prioritarias para la investigación y desarrollo en Asia, y fijó las prioridades regionales para las actividades relacionadas con los recursos genéticos de los frutos principales (mango, cítricos y rambutan) y secundarios (jaqueira, durión y lichi). Con el fin de prestar apoyo al desarrollo de los programas nacionales, el personal visitó 18 países para proporcionar consejos específicos y facilitar las actividades. Mediante un curso de documentación de tres semanas de duración, se capacitó en sistemas de computadoras y bases de datos para la gestión de bancos de genes *ex situ* a 27 administradores de bancos de genes de 12 países. El número de miembros de la Red Internacional de Recursos Genéticos de Coco aumentó a 24. Se extendió la base de datos de la Red para incluir información sobre 500 accesiones de coco. Se llevó a cabo un taller de trabajo con el fin de normalizar las técnicas de mejoramiento del coco. La Oficina trabajó con otros colaboradores para constituir un grupo de trabajo sobre recursos genéticos de bambú y ratán, facilitar el intercambio de germoplasma, evaluar el germoplasma de la *Musa*, y asistir a Vietnam en la recolección de recursos genéticos de la *Musa*. Se desplegaron esfuerzos para promover la red ocra. Se inició un protocolo de intercambio de información con los programas nacionales que habían desarrollado sistemas de documentación.

Américas

El Grupo de las Américas concluyó el establecimiento de redes subregionales para las actividades relacionadas con los recursos fitogenéticos. El personal, conjuntamente con los Programas Nacionales de Mesoamérica y los Andes, y las Redes Mesoamericana y Andina de Recursos Fitogenéticos, ejecutó un proyecto sobre Sapotáceas y Pasifloráceas. El trabajo sobre la extensión y distribución de la diversidad genética en acervos génicos vegetales se orientó hacia los sistemas de mejoramiento y sus consecuencias para la conservación del germoplasma, y hacia las teorías de la coevolución. El apoyo a los programas nacionales se centró principalmente en el fortalecimiento de las redes subregionales de recursos fitogenéticos. En el Caribe, las actividades incluyeron una reunión para elaborar un plan de acción para 1994. Se consideraron prioritarios los árboles frutales, las legumbres comestibles y los cultivos de raíces. La ayuda prestada a los programas nacionales incluyó el apoyo a los bancos de genes del Perú y la Universidad de Costa Rica para mejorar sus equipos de conservación. La principal actividad de formación que se organizó fue el Primer Curso sobre Documentación de Recursos Fitogenéticos. Dieciséis participantes de 10 países estudiaron las herramientas y técnicas para administrar eficazmente las colecciones de germoplasma en los bancos de genes, y prepararon proyectos para aplicar estos conocimientos en sus respectivos países.

Europa

Con el nuevo personal aumentó el nivel de interacción con los programas nacionales de la región en 1994. La Fase V del Programa Europeo Cooperativo para el desarrollo de redes de recursos fitogenéticos de cultivos inició un programa ampliado de trabajo. El Programa Europeo de Recursos Genéticos Forestales comenzó sus actividades organizando la primera reunión de la Red sobre *Populus nigra*. Algunos países de Europa oriental pidieron la adopción de medidas de urgencia para asegurar la protección de colecciones únicas, mientras que la duplicación de seguridad de la colección europea de *Allium* en Olomuc, República Checa, prosiguió en 1994. Una serie de misiones conjuntas establecieron contactos con los Estados recientemente independientes del Cáucaso, Asia Central y los tres países Bálticos. Se prestó creciente atención a la transferencia de tecnología mediante cursos de capacitación, la colaboración en actividades de investigación y el establecimiento de contactos oficiosos. Una reunión sobre la conservación y utilización de especies indígenas subutilizadas del Mediterráneo estableció varias redes especializadas en cultivos que se centran en los recursos genéticos de la escaña menor, el trigo almidonero, la escaña mayor, la *Pisiacia* spp., la roqueta y las especies medicinales y aromáticas. Se comenzó a editar un noticiario regional para Europa, del que se publicaron tres números en 1994.

Diversidad genética

Los nuevos miembros del personal ejecutaron proyectos sobre los aspectos socioeconómicos y culturales de la conservación y la conservación *in situ* de plantas cultivadas, en particular sobre los aspectos etnobotánicos y humanos de los recursos fitogenéticos. Se reconoció ampliamente el valor del enfoque de la colección base y se examinaron los diferentes problemas relacionados con el fomento de dichas colecciones. Se emprendieron varios esfuerzos internacionales de colaboración, como la colección internacional base de cebada y una colección base de sésamo. Un proyecto sobre estrategias apropiadas de colección elaboró metodologías para estudios ecogeográficos e identificó indicadores para la erosión genética. El trabajo sobre la eficacia de la colección selectiva en la recuperación de genes específicos y genes complejos llegó a la conclusión de que es posible seleccionar determinadas zonas para

la colección *in situ* de germoplasma rico en caracteres particulares. El IPGRI trabajó con otros centros y colaboradores para identificar esferas de interés común en un programa general para la conservación de los bosques tropicales pluviales y de secano y de los productos leñosos y no leñosos provenientes de las selvas. Se elaboró una base de datos denominada FRESOURCE que proporciona un visión global de las existencias y localizaciones de recursos genéticos forestales. En Asia sudoriental se inició un proyecto para determinar estrategias eficaces de conservación *in situ* para los ecosistemas de bosques tropicales.

Mantenimiento y uso de germoplasma

Las actividades del Grupo se centraron en la investigación sobre el contenido óptimo de humedad para el almacenamiento de semillas y los protocolos de crecimiento lento *in vitro* que los diferentes bancos de genes pueden adaptar a sus necesidades específicas. Se preparó un compendio y una base de datos sobre el comportamiento de semillas almacenadas para unas 6000 especies procedentes de más de 200 familias. Los trabajos iniciales sobre el empleo de técnicas con un consumo reducido de insumos para el secado de semillas demostraron que el secado al sol y a la sombra de maíz, mijo y cacahuete no reducían la longevidad de las semillas. Los proyectos centrados en la conservación de semillas recalcitrantes, en particular utilizando técnicas de crioconservación, prosiguieron sus actividades. Los embriones enteros de té y jaqueira se crioconservaron con buenos resultados. La colección Directrices para el traslado seguro del germoplasma, editada por un programa conjunto FAO/IPGRI, publicó directrices para frutos pequeños. Se elaboró una primera versión de un programa para computadora para proyectar instalaciones de bancos de genes de semillas de dimensiones adecuadas a las necesidades previstas de almacenamiento. Se publicaron estudios sobre los aspectos legales relacionados con el intercambio de germoplasma y los acuerdos internacionales para la conservación y utilización de recursos fitogenéticos. Se identificaron coordinadores para la realización de monografías de cultivos en un proyecto sobre cultivos no aprovechados.

Documentación, información y capacitación

Tres miembros del personal asistieron a un taller de trabajo que propuso una estrategia de información a nivel de todo el sistema del GCIAI. Se publicaron listas de descriptores para cuatro cultivos, indicándose en cada lista una subserie de descriptores para ejercer la máxima discriminación entre las accesiones. Se distribuyó un cuestionario sobre problemas relacionados con las actividades de documentación a más de 500 personas, entre directores y personal de documentación de bancos de genes. Se comenzó a trabajar en la elaboración de un programa para computadoras como alternativa a los directorios impresos de cultivos. Los pedidos de documentos a la biblioteca del IPGRI aumentaron en más de 70 por ciento en 1993. Se editaron más de 40 publicaciones y se distribuyeron más de 50000 copias. Se concertaron nuevos acuerdos con la FAO para que siguiera colaborando con el Noticiario de Recursos Fitogenéticos. Tres documentos destinados a la divulgación pública recibieron premios de los Comunicadores Agrícolas en la Educación. Se emprendieron proyectos para realizar una serie de películas sobre recursos genéticos como parte del programa de recursos genéticos a nivel de todo el sistema, y para divulgar en mayor medida la investigación agrícola internacional en Alemania en representación del Comité de Recursos de Divulgación Pública. Cinco científicos de países en desarrollo siguieron cursos de capacitación en Italia con el apoyo del Gobierno italiano. Se avanzó en la organización de cursos universitarios de postgrado en Zambia, Kenya y Filipinas, y se examinaron las posibilidades de instituir cursos en África occidental. Un proyecto sobre el impacto socioeconómico de las actividades de conservación y utilización de germoplasma, generó un documento que resume las actividades del Instituto en sus 20 años de existencia.

Red Internacional de mejora del banano y el plátano

Entre las importantes medidas adoptadas en la aplicación del programa de 1994 figura la primera reunión de la Red de mejoradores de *Musa*, la primera Conferencia Mundial de Pruebas de *Musa* y un taller de trabajo sobre nematodos y gorgojos en Asia y el Pacífico. Se empiezan a observar los efectos del germoplasma mejorado y resistente a las enfermedades introducido por los colaboradores de la Red. Se estableció una duplicación de seguridad de la colección *in vitro* de germoplasma de *Musa* de Asia-Pacífico. Entró en servicio el Sistema de información sobre germoplasma de *Musa* para racionalizar la información sobre los recursos genéticos de la *Musa* y ponerla a disposición de los colaboradores. La Red desempeñó un papel fundamental en la formación y la investigación sobre la *Musa*, incluidos el establecimiento de prioridades y las actividades de colaboración. Las actividades de información y documentación siguieron reforzando lazos con los círculos especializados en la *Musa*.

موجز لأهم أنشطة عام ١٩٩٤

بدأ المعهد الدولى للموارد الوراثية النباتية (IPGRI) أنشطته الرسمية، كخلف للمجلس الدولي للموارد الوراثية النباتية ، يوم اول يناير/كانون الثانى ١٩٩٤. وخلال الاجتماع النصف سنوى للمجموعة الاستشارية المعنية بالبحوث الزراعية (CGIAR) المنعقد فى نيودلهى فى مايو/أيار ١٩٩٤،تم الاتفاق على اقامة النظام الموسع لبرنامج الموارد الوراثية النباتية (SGRP) بالاشتراك مع المعهد الدولى للموارد الوراثية النباتية (IPGRI) كمركز للاجتماعات مع اضطلاعه باعمال الأمانة. واعتبار المركز المشترك لفريق العمل المعنى بالموارد الوراثية النباتية (ICWG-GR) لجنة البرنامج التوجيهية. وبدأت الأعمال الأولية لوضع تصميم من اجل تطوير النظام الموسع لشبكة المعلومات عن الموارد الوراثية النباتية فى نوفمبر/تشرين الثانى. ومثّل المعهد الدولى للموارد الوراثية النباتية (IPGRI) المجموعة الاستشارية المعنية بالبحوث الزراعية (CGIAR) اثناء الدورة الأولى لمؤتمر الأطراف فى اتفاقية التنوع البيولوجى المنعقدة فى الباهاما. وفى بيان امام الدورة الوزارية، عرضت المجموعة الاستشارية المعنية بالبحوث الزراعية (CGIAR) مساندة أعمال الأطراف. واضطلع المعهد بدور رئيسى لتطوير الاتفاقات بهدف وضع مجموعات الأصول الوراثية فى رعاية المجموعة الاستشارية المعنية بالبحوث الزراعية (CGIAR)، تحت اشراف منظمة الاغذية والزراعة للأمم المتحدة (FAO). وتم توقيع الاتفاقات فى المركز الدولي فى واشنطن فى شهر اكتوبر/تشرين الأول ١٩٩٤. وفى اعقاب توقيع اتفاقية فى مايو/أيار ١٩٩٤، بين مجالس المعهد لدولى للموارد الوراثية النباتية (IPGR) والشبكة الدولية لتحسين الموز والطلح (INIBAP) ، من ناحية، وبين فريق دعم الشبكة الدولية لتحسين الموز والطلح (INIBAP)، من ناحية أخرى، بدأ اتخاذ الخطوات اللازمة للبدء فى اطار عملية وضع برنامج الشبكة الدولية لتحسين الموز والطلح (INIBAP) تحت اشراف وادارة المعهد الدولى للموارد الوراثية النباتية.

أنشطة البرنامج

عمل المعهد الدولى للموارد الوراثية النباتية IPGRI طوال عام ١٩٩٤، وفقا للخطة التى نص عليها نظامه. وفى نهاية ١٩٩٤، كانت خطة المعهد الدولى للموارد الوراثية النباتية IPGRI تضم مجموعة مكونة من ٥٦ مشروعا.

افريقيا الواقعة جنوبى الصحراء الكبرى

تميز العام بتوقيع اتفاق رسمى مع حكومة كينيا بشأن عمليات المكتب الاقليمى فى كينيا. وفى اطار مشروع يستهدف تحسين عمليات الحفاظ على مختلف انواع العلف والكلأ فى افريقيا واستخدامها، جرت دراسة لتوزيع التنوع الوراثى، من حيث الحيّز والزمن، لخمسة انواع سنوية من الكلأ والبقول فى النيجر. ورغبة فى مساندة تطوير البرنامج القطري، قد يكون من الأهمية بمكان تعميق الوعى العام بالموارد الوراثية النباتية فى المناطق الفرعية، حيث ما زالت الأنشطة فى بدايتها. وقد شارك فى الندوات القطرية المنعقدة فى الكاميرون، والكونغو، وغانا وكوت ديفوار، عدد من

العلماء المتخصصين فى المحاصيل، ومن اعضاء المجموعات المعنية، ومن صانعى القرار، الخ..
وقامت كل ندوة بانشاء لجنة قطرية للتنسيق معنية بالموارد الوراثية النباتية، وبوضع خطة عمل. وتم دعم البحوث الجارية فى كوت ديفوار حول الحفاظ على الاصول الوراثية للبام على مستوى المزرعة. كما تم انشاء ثلاثة افرقة عمل اقليمية معنية بالعلف والكلأ، وبالمحاصيل الغذائية، وبالنباتات فى مواقعها الطبيعية *in situ* /او غير المستغلة جيدا، وحددت مجموعة من الأولويات لأنشطتها فى المستقبل.

غربى آسيا وشمال افريقيا

تم تعزيز هيكل شبكة الموارد الوراثية النباتية لغرب آسيا وشمالى افريقيا. وارتفع عدد البلدان التى تضم لجان قطرية رسمية معنية بالموارد الوراثية النباتية الى ١٠. كما جرى تدريب ٢٣ موظفا من البرامج القطرية التابعة لعشرة بلدان. واشترك عشرة علماء فى دورة راقية حول ادارة الموارد الوراثية النباتية. وتم انشاء شبكة اقليمية للمعلومات حول بذور المآلف، مع وحدتي توثيق على المستوى الاقليمى الفرعى، فى كل من الاردن والمغرب. وتنظم كل وحدة دورات تدريبية حول معالجة المعلومات واستخدام الحسوب. كما تعاون مشروع للحفاظ على اشجار الفاكهة واصناف اللوز واستخدامها مع البرامج القطرية فى كل من الاردن، وايران، وباكستان لجمع اصول وراثية برية ومدجنة للوز. وبدأت جامعة الاردن للعلوم والتكنولوجيا تكوين مجموعة in vitro. كما جرى مسح لبنوك الجينات فى ايران، وسوريا، وتركيا. وتم تنظيم دورة تدريبية محلية حول مختلف جوانب الموارد الوراثية النباتية لاشجار الفاكهة، بالتعاون مع البرنامج القطرى الايرانى. وجرى تنظيم ندوات قطرية تحت رعاية مشتركة فى كل من الاردن، والمغرب، وباكستان.

آسيا، والمحيط الهادى، وأقيانوسيا

نجح منسق متفرغ من توسيعن شبكة الموارد الوراثية لجوز الهند خلال العام. وتعاون المكتب فى مسح لتحديد الأولويات بين انواع الفاكهة من اجل البحوث والتنمية فى آسيا. واستكمل الاولويات الاقليمية بشأن الاعمال المتعلقة بالموارد الوراثية للفواكه الرئيسية (كالمانجو، والحمضيات، والنفاليون) والثانوية (كالجاكية، والدوريان، والليتشى). ودعما للنهوض بالبرامج القطرية، زار الموظفون ١٨ بلدا لتقديم نصائح محددة ولتيسير الانشطة. وجرى خلال دورة امتدت لمدة ٣ اسابيع تدريب ٢٧ مديرا لبنوك الجينات من ١٢ بلدا على اعمال الحسوب وقواعد البينات الاساسية لادارة بنوك الجينات فى المواقع الطبيعية. وارتفع عدد اعضاء الشبكة الدولية للموارد الوراثية لجوز الهند الى ٢٤ عضوا. وتم توسيع قاعدة بيانات الشبكة لتتضمن معلومات حول ٥٠٠ برعم اضافى لجوز الهند. وانعقدت ندوة بهدف توحيد تقنيات تهجين جوز الهند. وتعاون المكتب مع شركاء لدعم فريق عمل معنى بالموارد الوراثية للخيزران وأسل الهند (Rattan)، وتسهيل تبادل الاصول الوراثية، ومعاونة فيتنام على جمع الموارد الوراثية للموز ولتقييم اصوله الوراثية. كما بذلت الجهود لتطوير شبكة الباميا. وتم وضع بروتوكول للتبادل المشترك مع البرامج القطرية أدى الى تطوير انظمة التوثيق على نحو طيب.

الامريكتان

انتهت مجموعة الامريكتين من اقامة شبكات شبه فرعية للاضطلاع بالانشطة المتعلقة بالموارد الوراثية النباتية. ونفذ الموظفون مشروعا حول السبوتيات(Sapotaceae) واللالاميات (Passifloraceae) بالاشتراك مع البرامج القطرية فى امريكا الوسطى والأنديز وشبكات الموارد الوراثية النباتية فى كل من هاتين المنطقتين . وتناولت الاعمال المنجزة حول توسيع وتعميم التنوع الوراثى لجينات المحاصيل، انظمة التهجين وآثارها على الحفاظ على الاصول الوراثية وعلى نظريات التطور الذاتى. وتركز الدعم المقدم للبرامج القطرية أساسا، على تقوية الشبكات شبه الاقليمية للموارد الوراثية النباتية.. وتضمنت الأعمال فى الكاريبى عقد اجتماع لتطوير خطة العمل لعام ١٩٩٤. واعتبرت اشجار

الفاكهة، والبقول الغذائية، والجذور من الأولويات. وتضمنت المساعدات الاخرى المقدمة الى البرامج القطرية دعم بنوك الجينات في بيرو وجامعة كوستاريكا لتحديث التجهيزات المخصصة لاعمال الحفظ . اما أهم الاحداث التدريبية، فتمثلت في الدورة الاولى حول التوثيق في ميدان الموارد الوراثية النباتية؛ وبحث ١٦ مشتركا من ١٠ بلدان، ادوات وتقنيات الادارة الفعالة لمجموعات الاصول الوراثية في بنوك الجينات. كما أعدوا مشروعا لتطبيق هذه المعارف في بلدانهم.

اوروبا

ساهم الموظفون الجدد في تعزيز مستوى التعاون مع البرامج القطرية في المنطقة خلال عام ١٩٩٤. وبدأت المرحلة الخامسة لبرنامج التعاون الاوروبي لشبكات الموارد الوراثية النباتية، تنفيذ برنامج عمل موسع. واصبح البرنامج الاوروبي للموارد الوراثية الحراجية تشغيليا بعد تنظيم اول اجتماع للشبكة حول الحور الأسود *Populus Nigra* . وطالبت بعض بلدان شرقي اوروبا باجراء طارئ لحماية مجموعاتهم الفريدة كما استمرت، خلال عام ١٩٩٤، اعمال استخراج نسخة طبق الاصل من المجموعة الاوروبية للثوم في أولوموك (جمهورية التشيك) لحفظها في أمان. وبدأت سلسلة من البعثات المشتركة الاتصال بالدول المستقلة حديثا كالقوقاز، ووسط آسيا، وبلدان البلطيق الثلاثة. ولاقى نقل التكنولوجيا اهتماما متزايدا عن طريق التدريب، والتعاون في الابحاث، والاتصالات غير الرسمية. ووضع اجتماع حول الحفاظ على الانواع المتوسطية، أصيلة النشأة، واستخدامها الأمثل، قائمة بعدد من الشبكات المعنية بالمحاصيل، مع التركيز بصفة خاصة على الموارد الوراثية للحنطة وحيدة الحبة، والحنطة المكتسبة الاصلية والفستق، والجرجير والانواع الطبية والعطرية. وبدأ اصدار نشرة اخبارية لاوروبا، ظهرت منها ثلاثة اعداد في ١٩٩٤.

التنوع الوراثي

طوّر الموظفون الجدد المشروعات المتعلقة بالجوانب الاقتصادية والاجتماعية، والثقافية لعمليات الحفاظ وكذلك للحفاظ في المواقع الطبيعية على المحاصيل النباتية، ولا سيما الجوانب الاحيائية، الإثنية، والإنسانية للموارد الوراثية النباتية. اما فيما يتعلق بقيمة النهج المتبع بشأن المجموعات المركزية، فقد تم الاعتراف به على نطاق واسع. كما تم بحث مختلف المشكلات المتعلقة بتطوير مثل هذه المجموعات. وبدأت سلسلة من الجهود التعاونية الدولية، كالمجموعة الدولية المركزية للشعير، والمجموعة المركزية للسمسم وطوّر مشروع حول استراتيجيات الجمع الملائمة، المنهجيات الخاصة باعمال المسح الايكولوجي الجغرافي، والمؤشرات المتعلقة بالاندثار الوراثي. وانتهت الاعمال المنجزة حول مدى فعالية اعمال الجمع المستهدفة في استرداد جينات محددة ومجموعات من الجينات، الا أنه في الامكان استهداف بعض المناطق لجمع الاصول الوراثية التي تتسم بثراء خصائصها خارج مواقعها الطبيعية *ex situ* . وتعاون المعهد الدولي للموارد الوراثية النباتية IPGRI مع مراكز وشركاء اخرين لتحديد مجالات اهتمام متفق عليها في اطار برنامج شامل للحفاظ على الغابات الاستوائية الرطبة والجافة، والاخشاب، والمنتجات الحراجية غير الخشبية. كما تم تطوير قاعدة بيانات اطلق عليها اسم TREESOURCE تقدم موجزا شاملا باسماء الجهات التي توجد بحوزتها الموارد الوراثية الحراجية وعناوينها. وبدأ مشروع للبحوث في جنوبي شرق آسيا لوضع استراتيجيات فعالة للحفاظ على الانظمة الايكولوجية للغابات الاستوائية في مواقعها الطبيعية.

صيانة الاصول الوراثية واستخدامها

ركزت انشطة المجموعة على البحوث المتعلقة بتخزين الحبوب في الظروف التي تتسم باقصى حد من الرطوبة، وعلى بروتوكولات النمو المخبري البطئ الذي يمكن لبنوك الجينات تطويعه وفقا لاحتياجاتها الخاصة. وقد تم اعداد خلاصة وافية وقاعدة للمعلومات عن النتائج المترتبة على

تخزين الحبوب بالنسبة لنحو ٦٠٠ نوع من بين اكثر من ٢٠٠ فصيلة. ودلت الاعمال التى جرت فيما سبق بشأن التقنيات التى لا تحتاج الى مدخلات كثيرة لتجفيف الحبوب، على ان تجفيف الذرة، والدخن، وفول السودانى فى الشمس الظل، لا تؤدى الى خفض تعمير البذور. وتواصلت المشروعات التى تركز على الحفاظ على الحبوب صعبة المعالجة، لاسيما باستخدام تقنيات الحفظ بالاستصراد. وقد تم بالفعل استخدام تقنية الاستصراد بنجاح للحفاظ على اجنة الشاى والجاكية jackfruit. وصدر عن البرنامج المشترك بين منظمة الاغذية والزراعة والمعهد الدولى للموارد الوراثية الزراعية الذى اصدر: "الخطوط الارشادية التقنية للتحرك الآمن لمجموعات الاصول الوراثية"، خطوط ارشادية بشأن الفواكه الصغيرة. كما صدرت نسخة اولى للحسوب من برنامج للمساعدة على تصميم مرافق البذور لبنوك الجينات، باحجام تتفق واحتياجات التخزين المعلن عنها. كما صدرت الدراسات المتعلقة بالجوانب القانونية لتبادل الاصول الوراثية والترتيبات الدولية للحفاظ على الموارد الوراثية النباتية واستخدامها. وتم تحديد المنسقين المعنيين بالدراسات حول المحاصيل فى اطار مشروع حول المحاصيل المهملة.

التوثيق، والمعلومات، والتدريب

اشترك ثلاثة موظفين فى ندوة عملية اقترحت استراتيجية موسعة للمعلومات تابعة للمجموعة الاستشارية للبحوث الزراعية الدولية CGIAR. وصدر توصيف مطبوع بشأن اربعة محاصيل، مع تحديد مجموعات فرعية من المؤشرات لامكان التفرقة، الى اقصى حد ممكن، بين مختلف العناصر. وتم توزيع استمارة استبيان على اكثر من ٥٠٠ من مديرى بنوك الجينات وموظفى الاعلام بشأن المشكلات الاعلامية. وبدأ العمل من اجل تطوير برنامج للحسوب ليحل محل قوائم المحاصيل المطبوعة. وزاد الطلب على وثائق مكتبة المعهد الدولى للموارد الوراثية النباتية باكثر من ٧٠٪ بالمقارنة الى عام ١٩٩٣. وصدرت نحو ٤٠ نشرة وزعت اكثر من ٥٠٠٠ نسخة. وتم وضع ترتيبات جديدة مع منظمة الاغذية والزراعة FAO للإستمرار فى التعاون فى النشرة الاخبارية للموارد الوراثية النباتية. وحصلت ثلاث منتجات لتعميق وعى الجماهير على جوائز من الابلاغ الزراعى فى التعليم. وبدأ تنفيذ سلسلة من المشروعات بهدف انتاج مجموعة من الافلام السينمائية عن الموارد الوراثية كجزء من برنامج الموارد الوراثية الموسع، ولتعميق الاهتمام بالبحوث الزراعية الدولية فى المانيا نيابة عن لجنة الوعى العام بالموارد. وتلقى خمسة علماء من البلدان النامية تدريبا فى ايطاليا بمساندة من الحكومة الايطالية. وتحقق تقدم فى تنفيذ الدورات الدراسية على مستوى الماجستير فى جامعات زامبيا، وكينيا، والفلبين. كما تمت دراسة امكانية تنظيم دورات مماثلة فى غرب افريقيا. واصدر مشروع لقياس الأثر الاقتصادية والاجتماعية لانشطة الحفاظ على الاصول الوراثية واستخدامها، ورقة عمل تلخص انشطة المعهد على مدار ٢٠ سنة منذ انشائه.

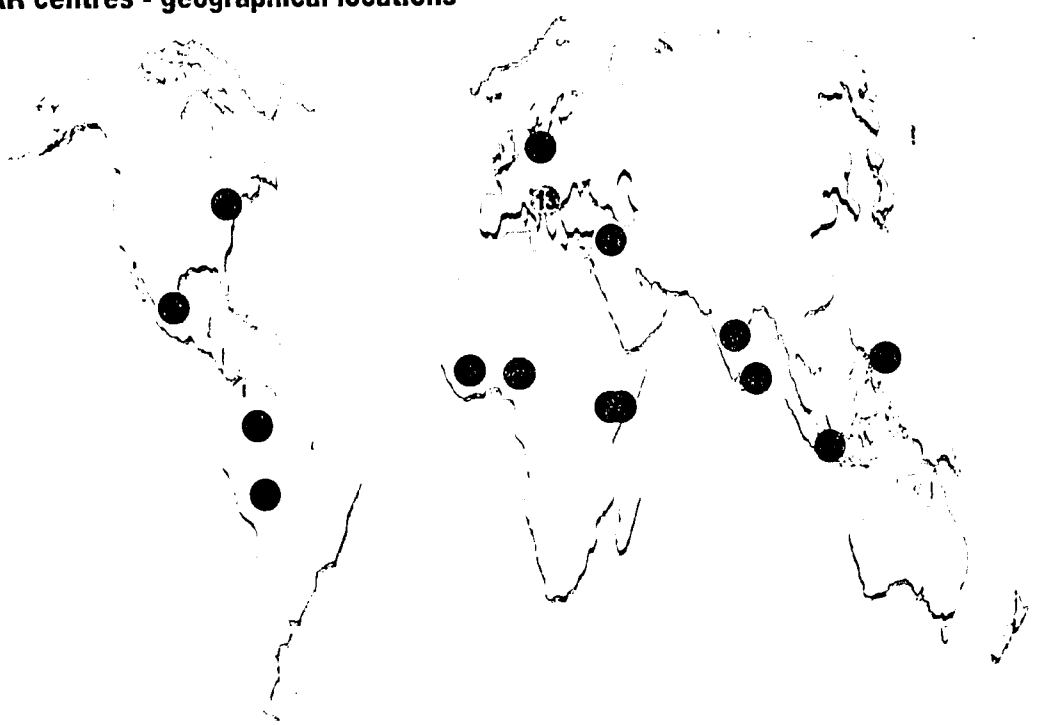
الشبكة الدولية لتحسين الموز والطلح(plantain)

من بين الخطوات الهامة التى تضمنها برنامج التنمية لعام ١٩٩٤، اول اجتماع لشبكة مربى الموز، والمؤتمر الدولى الاول الشامل للموز وندوة عملية حول المتقبات من السلكيات والسوس فى آسيا/ المحيط الهادى وبدأت فى الظهور نتائج الاصول الوراثية المحسنة والمقاومة للامراض، المستنبطة مع الشركاء فى الشبكة. وتم اعداد نسخة طبق الاصل من مجموعات آسيا/المحيط الهادى للاصول الوراثية المعدة فى المختبرات للموز. كما ان نظام الاعلام حول الاصول الوراثية للموز من اجل ترشيد المعلومات عن الموارد الوراثية للموز وتوفيرها للاعضاء، اصبح تشغيلى. وقامت الشبكة بدور رئيسى فى التدريب والبحوث الاقليمية المتعلقة بالموز، بما فى ذلك ترتيب الاولويات والانشطة التعاونية. وواصلت انشطة المعلومات والتوثيق تعزيز الروابط مع المجموعات المعنية بالموز.

IPGRI is an institute of the **Consultative Group on International Agricultural Research**

The **CGIAR** is an informal association of 40 public and private sector donors that supports a network of 16 international agricultural research centres, including IPGRI. The Group was established in 1971 with the mission: "Through international research and related activities, and in partnership with national research systems, to contribute to sustainable improvements in the productivity of agriculture, forestry, and fisheries in developing countries in ways that enhance nutrition and well-being, especially among low-income people."

CGIAR centres - geographical locations



1	CIAT	Centro Internacional de Agricultura Tropical, Cali, Colombia
2	CIFOR	Centre for International Forestry Research, Bogor, Indonesia
3	CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo, Mexico D.F., 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, Africa
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, Netherlands
16	WARDA	West Africa Rice Development Association, Bouaké, Côte d'Ivoire

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