Annual Report 1988

IBPGR

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

International Board for
Plant Genetic Resources

Annual Report
1988

International Agricultural Research Centers of the CGIAR

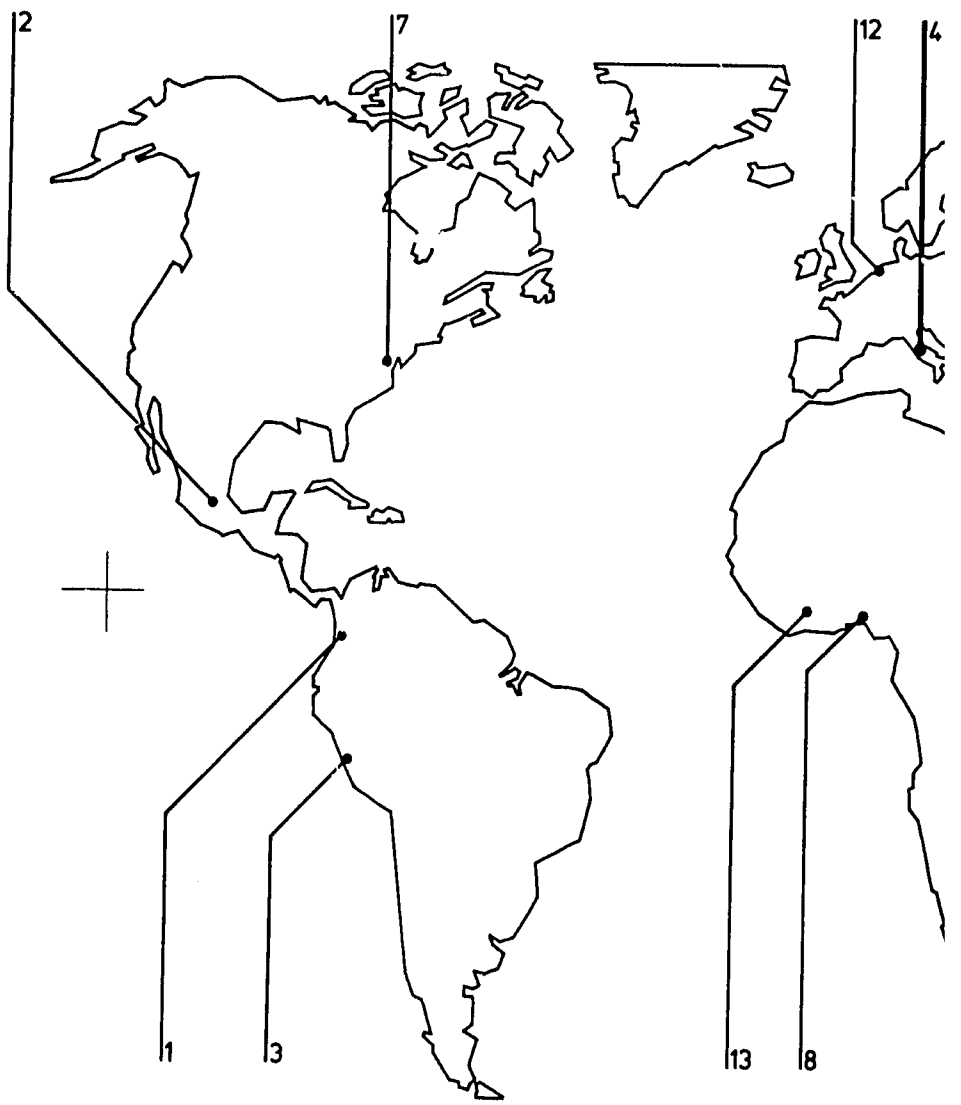
The Consultative Group on International Agricultural Research (CGIAR) was set up in 1971 to help coordinate the efforts of countries, public and private institutions, international and regional organizations and representatives from developing countries to support a network of 13 International Agricultural Research Centers.

CGIAR provides a mechanism for mobilizing financial support for the Centers. Its overall goal is, through international agricultural research and related activities, to develop technology and cooperate with national research systems in developing countries with the aims of alleviating hunger and poverty, improving the management of natural resources and increasing employment and income, particularly of the lower income groups.

Each CGIAR Center is autonomous with its own Board of Trustees or governing body. Each develops its own budget for core funds mobilized by CGIAR.

CGIAR is cosponsored by the Food and Agriculture Organization (FAO), the United Nations Development Programme and the World Bank. The World Bank provides CGIAR with its chairman and secretariat, while FAO provides a secretariat for the group's Technical Advisory Committee. This regularly reviews the scientific and technical aspects of all the Centers.

An overview of the work of CGIAR carried out by the Centers listed here may be found in the CGIAR Annual Report.



1 CIAT Centro Internacional de Agricultura Tropical
Cali, Colombia

2 CIMMYT Centro Internacional de Mejoramiento de Maiz y Trigo
Mexico City, Mexico

3 CIP Centro Internacional de la Papa
Lima, Peru

4 IBPGR International Board for Plant Genetic Resources
Rome, Italy

5 ICARDA International Centre for Agricultural Research in the Dry Areas
Aleppo, Syria

6 ICRISAT International Crops Research Institute for the Semi-Arid Tropics
Hyderabad, India

7 IFPRI International Food Policy Research Institute
Washington DC, USA

8 IITA International Institute of Tropical Agriculture
Ibadan, Nigeria

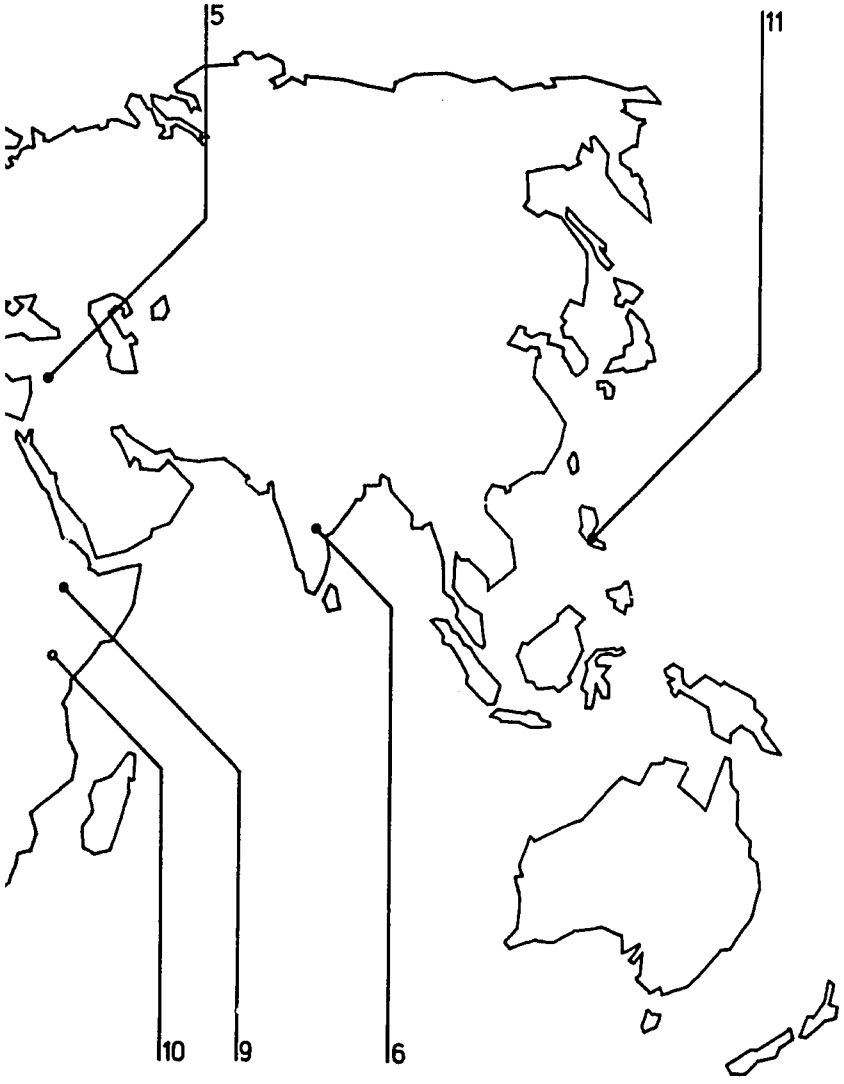
9 ILCA International Livestock Centre for Africa
Addis Ababa, Ethiopia

10 ILRAD International Laboratory for Research on Animal Diseases
Nairobi, Kenya

11 IRRI International Rice Research Institute
Los Baños, Philippines

12 ISNAR International Service for National Agricultural Research
The Hague, Netherlands

13 WARDA West Africa Rice Development Association
Bouaké, Côte d'Ivoire.



Contents

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The International Board for Plant Genetic Resources is an autonomous international scientific organization under the aegis of the Consultative Group on International Agricultural Research. IBPGR was established by CGIAR in 1974. The basic function of IBPGR is to promote and coordinate an international network of genetic resources centres to further the collecting, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. Financial support for the core programme is provided by the Governments of Australia, Austria, Belgium, Canada, China, Denmark, France, FRG, India, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and the USA, as well as the United Nations Environment Programme and the World Bank.

Foreword

In the 1960s and early 1970s, the scientific community envisaged a simple organizational framework for the conservation of plant genetic resources. A large number of 'active' collections would grow out accessions which would be described and documented, and the materials held in medium-term stores would be made available to breeders and other scientists. A smaller number of long-term storage facilities would act as 'base' collections. Subsequent experience has shown the need to modify this concept. Individual nations initiated their own programmes of genetic resources, often closely related to development needs: over 100 such programmes of varying strengths have developed, linked to more than 700 germplasm collections. The organizational framework for genetic conservation does not include the working collections of plant breeders. These collections, although differing conceptually from active collections, have become in practice the same entities. The result – a compartmentalized system that bears little resemblance to the original concept – has prompted IBPGR to re-examine long-held principles. A more useful approach has been identified, involving mutual collaboration based on individual crops and compatible with international and local priorities.

During 1988, IBPGR finalized the concept of crop networks of genetic resources and began to re-orient parts of its programme in this direction. At the same time, IBPGR continued to work with its collaborators. As its seven Regional Offices became operational,

the decentralization of IBPGR increased the Center's ability to work with scientists around the world. This mechanism permits maximum consultation with scientists and administrators and allows a continual modification of the functions of IBPGR.

Many years of much-needed gathering and conserving of crop germplasm have resulted in substantial collections. IBPGR is currently directing some of its energies towards promoting better scientific standards in conservation and to solving problems faced by curators and genebank technicians in their day-to-day work. This change in emphasis has come about as IBPGR begins to tackle research issues such as plant health in germplasm movement, *in vitro* conservation and problems in long-term, low-temperature seed storage.

This Annual Report looks back to outline the progress made during the past year. However, in 1988, IBPGR was also able to look ahead. In 1988, a revised strategy for the next 10 years was presented to CGIAR with a medium-term programme and budget for the years 1989 to 1993; both documents were approved by CGIAR.

It is a pleasure to be able to express thanks to the donor community for their continuing support in 1988 to further work on genetic resources, and to applaud the spirit of the scientists in the National Programmes in their commitment to the conservation of plant genetic resources.

J.T. Williams
Director, IBPGR

Introduction

1989 will mark IBPGR's 15th Anniversary. There can be no more appropriate time than this to reflect on the Center's achievements since 1974 and, more importantly, to take stock of the progress that has been made in the field of plant genetic resources during these years.

The loss of genetic diversity - genetic erosion - in the wider genepools of crop species was perceived as early as the 1940s, but it was not until the 1960s that most plant scientists began to realize just how serious the situation had become. International technical meetings organized by FAO in the 1960s and early 1970s recommended that an international network be established to conserve plant genetic resources. IBPGR was created as a result of these recommendations.

From the very first, IBPGR's activities were ambitious and wide ranging: the identification of needs to collect, conserve, describe and document plant genetic resources, with particular reference to crops of major economic importance and their wild and cultivated relatives. In practice, special emphasis was placed on initiating and fostering a worldwide system of institutions, organizations and national programmes to undertake these tasks. Over the years IBPGR has sought to draw together diverse and independent activities into an effective and cooperative global system for the conservation of endangered plant germplasm. Only a global approach will guarantee the protection and availability of this vital genetic material. The development of the global operations has involved cultivating the abilities of National Programmes in developing countries to participate in plant genetic resources work, and also stimulating institutions in the developed world, as well as the IARCs, to take an effective and coordinated approach to these activities. This approach has been further reinforced as IBPGR has moved its activities away from a regional orientation to one that is more crop-centred.

During its first 10 years, IBPGR focused on collecting threatened germplasm, establishing facilities for long-term conservation of collected material, and improving methods of storage to ensure its safety. As operations expanded in many countries the need arose to widen the scope of the Center's activities. In 1986, CGIAR approved an extended mandate that allows IBPGR to concentrate its effort on whatever activities may be required to strengthen and sustain genetic resources programmes in all parts of the world. The result has been a change in focus from broad, generalized collecting to selective missions with greater emphasis on wider genepools. In addition, IBPGR has given increased support for research.

In accordance with the terms of its mandate, IBPGR's activities in 1988 concentrated on reinforcing programmes already in place, especially through support of National Programmes, the lynchpin of the system. To this end, the Center undertook the further decentralization of its own work. This year, IBPGR:

- opened an Office for South and Southeast Asia in NBPGR, New Delhi, India in July 1988;
- opened an Office in CIMMYT, Mexico City, Mexico in July 1988 to support the Latin American activities of IBPGR's Office in CIAT, in Cali, Colombia;
- opened an Office for East Asia in Beijing, China in October 1988. At the same time a comprehensive Memorandum of Understanding was signed which formalized collaboration with China;

- moved the Office for Europe, North Africa and Southwest Asia to Headquarters while retaining facilities in ARI, Nicosia, Cyprus, to house two specialized IBPGR Collectors; and
- further expanded its efforts to train personnel nominated by National Programmes. 20% of these Programmes are now headed by scientists trained by IBPGR.

In 1988, IBPGR strengthened existing research work on *in vitro* conservation and seed storage, expanded research on genetic diversity, and initiated projects on pathology and quarantine in germplasm movement. The Research Programme's strategy is based on identifying priorities and supporting research projects using the most appropriate mix of expertise, facilities and geographic locations. Particular emphasis has been given to encouraging the participation of scientists from countries especially concerned with the problems being researched, and those best placed to adapt research results as appropriate technologies for National Programmes.

IBPGR shares common objectives with most other CGIAR Centers concerned with the genetic resources of particular crops. Expanding the research and training elements of IBPGR's programme created new opportunities for inter-Center collaboration within the CGIAR. In 1988, IBPGR:

- collaborated with CIAT, CIMMYT, CIP, ICARDA, ICRISAT and ILCA on developing methods to 'capture' genetic diversity. Cooperation ranged from cosponsorship of workshops to joint collecting efforts;
- formalized its collaboration with IRRI by signing a Memorandum of Understanding;
- worked with CIP and IITA to develop technical guidelines for the safe movement of selected tropical root and tuber crops;
- worked with ILCA to develop *in vitro* culture methods for storage, transfer and collecting of tropical forage grasses;
- started work with CIMMYT to establish a global maize germplasm database;
- continued to cooperate with CIAT on a joint pilot *in vitro* active genebank, and on cryopreservation research with particular reference to cassava; and
- agreed to work with CIAT, CIP and CIMMYT on a pilot public awareness campaign on genetic resources for Latin America.

Perhaps the most significant development in 1988, in terms of inter-Center collaboration, was CGIAR's approval in October of a policy statement on plant genetic resources.

> *"It is the CGIAR policy that collections assembled as a result of international collaboration should not become the property of any single nation, but should be held in trust for the use of present and future generations of research workers in all countries throughout the world".*

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Member of Executive Committee
Member of Programme Committee
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[1] Vice-Chairman until July 1988
[2] Vice-Chairman from July 1988

Highlights

Introduction

1988 was a pivotal year in IBPGR's existence. The broadening of the Center's mandate - approved by the CGIAR in 1986 - was reflected this year in the activities of both the Field and the Research Programmes. Offices were opened in China, India and Mexico and a Coordinator for Europe, North Africa and Southwest Asia was posted to Rome. This brings the total number of IBPGR Regional Offices to seven (Offices have long been established in Colombia, Niger and Kenya). The increased decentralization of IBPGR's activities brings with it a clear need for improved planning and coordination. To this end, two meetings – held in Nairobi, Kenya and Torgiano, Italy – brought together all Field Programme Staff in 1988.

The expansion of the Research Programme through the appointment of a Head of Research and two additional scientific officers in late 1987 and early 1988 allowed the introduction of a team approach to the identification of research priorities and the selection of institutions to undertake studies on behalf of IBPGR. An important step in the Center's efforts to foster research collaboration among scientists throughout the world was heralded by the announcement of the IBPGR Visiting Scientist scheme in November 1988.

Administration

Two new Trustees – Prof. J. Spence of Trinidad and Dr M. Touré of Senegal – joined the IBPGR Board in 1988. An amended two-year Headquarters agreement was signed with FAO and a supplemental budget request was accepted by CGIAR. This will cover additional costs for rental and overheads to be charged by FAO from 1989. The Executive Committee agreed to act as a task force to study options for IBPGR's long-term operational base. In late 1988, the Executive Committee requested the Director to seek premises outside the FAO complex for occupancy in early 1989.

Technical services

IBPGR's public affairs strategy, developed at the In-house Review on Public Affairs held in early 1988, was approved by the Board at its 15th meeting in February. Implementation of the strategy began in 1988. At the first meeting of the CGIAR Public Awareness Association at CIMMYT in June, IBPGR agreed to take the lead role in a public awareness campaign concerned with genetic resources activities in Latin America. The entire IBPGR staff – both Headquarters and outposted – attended the 1988 In-house Review of Publications in December. The review emerged with a draft strategy for publications, which will be discussed at the Board's 1989 Meeting.

Global genetic resources network

From the first, IBPGR has sought to integrate diverse programmes into an effective and cooperative network for the conservation of plant genetic resources. In 1988, a pilot project was started to integrate base and active collections, institutions and scientists into networks based on specific crops.

IBPGR experts continued to visit institutions holding base collections in 1988 to provide advice on meeting acceptable and preferred scientific standards. In 1988, IBPGR provided technical advice to governments and institutions in ten countries with regard to the construction or the improvement of conservation facilities. In addition, equipment for improving storage facilities was provided to seven countries.

During 1988, two regional meetings, organized by CNR, IBPGR, IITA and UNEP, were convened in Africa to promote the conservation of the continent's wealth of genetic diversity and to forge greater cooperation between national and regional programmes, private institutions and international organizations operating in Africa.

RECSEA, which represents National Programmes in Indonesia, Malaysia, Papua New Guinea, the Philippines and Thailand, met in Singapore in December 1988, assisted by the IBPGR Coordinator for South and Southeast Asia.

Three Memoranda of Understanding were formalized during 1988. One, with CAAS, paved the way for the opening of IBPGR's Office for East Asia in Beijing. Another, with IUCN, will lead to greater collaboration between IBPGR and the

conservation organization. Finally, an agreement signed by IRRI and IBPGR should lead to improved interaction between the two CGIAR Centers.

Germplasm acquisition

This year's collecting activities reflected earlier decisions to concentrate greater attention on priority targets. In 1988, IBPGR organized or assisted in ten missions to collect landraces and primitive cultivars and 22 missions to collect wild relatives of crops, including seven that concentrated on forages.

Training

The Center provided fellowships to seven trainees from developing countries to attend an MSc course at the University of Birmingham, UK for the academic year 1987/88. Seven additional trainees have been funded for 1988/89. Fifty four students, representing 34 countries, received support for their participation in IBPGR-sponsored short technical courses. In addition, the Center sponsored four individual training programmes and seven internship projects for pre- and post-doctoral scientists.

IBPGR's training programme came under review in 1988. The review's recommendations were endorsed late in the year by IBPGR's Programme Committee. IBPGR's survey of ex trainees was all but completed in 1988.

***In vitro* culture research**

The operational aspects of *in vitro* conservation continued to receive IBPGR's attention in 1988. A pilot *in vitro* active genebank, developed last year in collaboration with CIAT, continued to test standards of operation for *in vitro* conservation of cassava, in which germplasm is maintained as shoot cultures under slow-growth conditions.

Part of 1988's *in vitro* research effort concentrated on finding the means to make *in vitro* collecting viable, regardless of the crops involved. For example, a collaborative IBPGR-IRHO project in Côte d'Ivoire, which refined methods for collecting coconut embryos, was completed in 1988. The *in vitro* technique for coconut developed in Côte d'Ivoire has since been successfully applied in an IBPGR project in west Java, carried out by the Research Institute for Estate Crops, Bogor, Indonesia. A further spin-off from the coconut embryo project involves the collaboration of ORSTOM and IRHO-CIRAD in the development of culture and cryopreservation methods for immature coconut embryos.

Plant pathology and quarantine research

IBPGR initiated a number of projects in 1988 concerned with aspects of plant pathology and quarantine. In addition, the Center, in collaboration with the Plant Protection Service of FAO, launched a programme for the efficient and safe movement of germplasm. Three related meetings cosponsored by IBPGR and FAO were held in 1988: on *Musa* (in collaboration with INIBAP), on cocoa (in collaboration with ACRI), and on sweet potato, yams and edible aroids (in collaboration with IPO). Crop-specific technical guidelines, developed during the meetings, will start to be copublished with FAO early in 1989.

Genetic diversity research

The study of species relations and patterns of variation within crop genepools – although a component of IBPGR research for some years – is still in its infancy as a formal, integrated component of the IBPGR Research Programme. In 1988 progress was made towards the assessment and consolidation of the genetic diversity work supported by IBPGR since its foundation, in preparation for a review of the genetic diversity programme in 1989. In addition, two important ecogeographic surveys, concerned with *Vigna* in south – central Africa and wild species of Triticeae in China, continued in 1988.

Seed conservation research

A review of past work and current policies in this area of research was conducted in June 1988. A ground-breaking embryo conservation workshop, with emphasis on recalcitrant seeds, was held immediately after the review. IBPGR-sponsored research examined such topics as: ultra-low moisture content, preservation of recalcitrant seeds, genetic stability and seed dormancy – with excellent results.

FIELD PROGRAMME

Global genetic resources system

The term 'Global Genetic Resources System' describes one of IBPGR's most fundamental objectives: the development of a global recognition of the threat to genetic material, and encouragement and support of mankind's efforts to meet that threat at all levels and in all regions. In developing countries, IBPGR has worked to strengthen the ability of National Programmes to carry out collecting, conservation, documentation, training and other activities. IBPGR has also sought to coordinate the efforts of other IARCs and of institutions in the developed world.

This activity, together with those concerned with germplasm acquisition, germplasm characterization and training, comprises IBPGR's Field Programme.

The major goals of the Field Programme are the development of, and scientific support to, National Genetic Resources Programmes, especially in developing countries, and the development of, and support to, networks of institutions and/or scientists worldwide on the basis of the genetic resources of specific crops.

Development of IBPGR's Field Programme

The year 1988 saw a period of consolidation of the field staff and programmes based at Headquarters (Germplasm Acquisition, Documentation/ Characterization, Training), and a period of substantial change in outposted operations. New Field (that is, Regional) Offices were opened in China, India and Mexico and the position of Coordinator for Europe, North Africa and Southwest Asia was filled and the office moved to Rome.

An improved mechanism for planning the activities of the Field Programme was put in place. A meeting of all staff in the Field Programme – the first ever – was held in the IBPGR Office for East and southern Africa, Nairobi, Kenya, from 1 to 5 February 1988. Field Staff met for a second time in Torgiano, Italy from 5 to 7 December 1988. These meetings were extremely effective in facilitating the planning and coordination of the Field Programme. From 1989, these meetings will be held annually, towards the end of the calendar year.

The organizational structure for genetic conservation has been revised and a major drive was under way in 1938 to develop a structured approach to the development of crop networks. These will consist of institutes and scientists with interest in a particular crop and will encompass all genetic resources activities for that crop. A joint effort of all staff, in cooperation with the Programme Committee, resulted in the formulation of a conceptual framework and the start of the implementation of a pilot project on eight crops. In future years this will expand into a series of networks that will aggregate into an overall global system for crop genetic conservation.

IBPGR Regional Offices

During 1988, IBPGR finalized arrangements for its seven Field (= Regional) Offices. In line with the recommendations of the Second External Review, these Offices are now strategically located, either with sister IARCs, or at strong National Programmes, to provide the scientific interaction that is needed to make the operations of the Offices successful. These Offices are staffed by a Coordinator, who is generally recruited internationally, and locally recruited

The first ever meeting of all the staff in the Field Programme – in Nairobi, Kenya, 1–5 February 1988.

support staff. To strengthen these Offices further, additional scientists are being recruited locally as Associate or Assistant Coordinators. This process started in 1987 and a full complement of local scientific staff should be reached during 1989.

Meso-America/ Caribbean

IBPGR finalized arrangements for establishing its new Office at CIMMYT Headquarters in Mexico early in 1988 and Luis G. Gonzalez took up the post of Coordinator for Latin America in July 1988. His activities temporarily cover the whole of Latin America. A Coordinator for South America (to be based at IBPGR's Office in CIAT) will be appointed in 1989. An Assistant Coordinator for Meso-America and the Caribbean will be appointed early in 1989.

South America

The office at CIAT, in Cali, Colombia, has been the only IBPGR Office in Latin America since 1982. After Dr M. Holle, the Coordinator for Latin America, returned to the National Progamme of Peru in May 1988. IBPGR appointed an Associate Coordinator for South America, Dr L.E. Lopez J. An internationally recruited Coordinator will be stationed at the Office in CIAT in 1989.

Europe/North Africa/ Southwest Asia

In the past, this Office was located at ARI, Nicosia, Cyprus, which continues to serve as a base for two IBPGR Collectors dealing with priority crops in the region. For practical and logistic reasons, the Regional Office itself was moved to Headquarters and Dr Yawooz Adham took up the post of Coordinator on 13 May 1988. Initial emphasis has been to stimulate and coordinate activities in North Africa and Southwest Asia. The majority of European countries are currently being serviced through the ECP/GR Special Project (see Appendix I).

West Africa

In 1987, this Office was moved from Ouagadougou in Burkina Faso to its present location at the ICRISAT Sahelian Centre, Niamey, Niger. The office is staffed by a Coordinator, Ms Jane A. Toll. The Collector for the Sahel (Ms Victoria Watt) left in August. The arrangement of placing a junior staff member in this office will continue.

East and Southern Africa

This is the oldest established IBPGR Office in the developing world and is serviced by a Coordinator, Mr A.F.Y. Attere, and an Assistant, Mr H. Kamau. Both the Coordinator and the Assistant were deeply involved in the Pan-African Workshop in Nairobi in September 1988.

South and Southeast Asia

In November 1987, IBPGR signed a Memorandum of Understanding with ICAR. The Memorandum included a clause establishing an IBPGR Office for South and Southeast Asia in India, located at NBPGR in New Delhi. The Coordinator, Dr Jan M.M. Engels, took up his post in July 1988. To further strengthen the functions of this office an Associate Coordinator for South Asia (a national scientist of India based at IBPGR's Office in New Delhi) will be appointed. In addition, a national scientist will be based at the Office of the Chairman of RECSEA as Associate Coordinator for Southeast Asia. These two appointments will take effect very early in 1989.

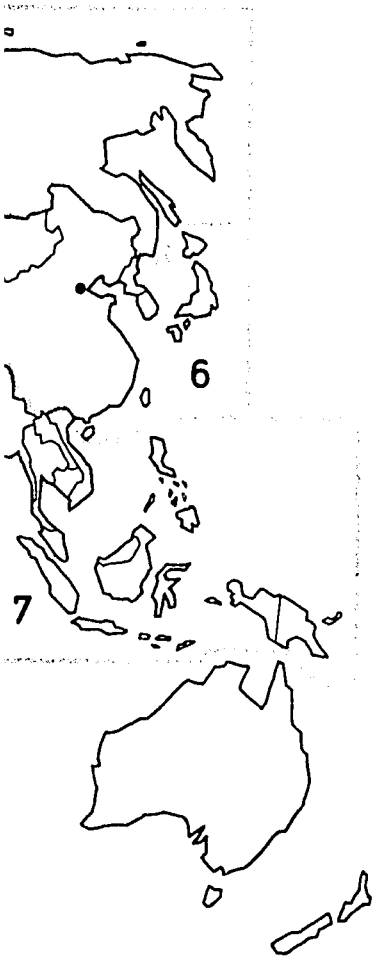
East Asia

IBPGR developed a Memorandum of Understanding during 1988 with CAAS to establish an IBPGR Office for East Asia in Beijing. The Memorandum was

IBPGR regions and regional offices.

signed in Beijing on 8 September 1988 and two national scientists were selected as Coordinator (Ms Zhou Ming-De) and Assistant Coordinator (Mr Cui Yun-Xing). They took up their positions on 1 October 1988.

1988 saw the further decentralization of IBPGR's Field Programme. While considerable effort went into this reorganization, work also continued in building up IBPGR's capacity to provide necessary support to the National Programmes. One successful means of providing information to these Programmes has been through the publication of regional bulletins. IBPGR envisages issuing editions for the Americas; Europe, North Africa and Southwest Asia; SubSaharan Africa; and Asia and the Pacific. Two of these were already in production; during 1988 the Bulletin for SubSaharan Africa produced numbers 2 and 3, and numbers 2, 3 and 4 of the Europe, North Africa and Southwest Asia Bulletin appeared.



1 MESO-AMERICA/CARIBBEAN Office: CIMMYT, Mexico City, Mexico

The Bahamas	Dominica	Haiti	Nicaragua	Tobago
Barbados	El Salvador	Honduras	Panama	Trinidad
Costa Rica	Grenada	Jamaica	St. Lucia	
Cuba	Guatemala	Mexico	St. Vincent	

2 SOUTH AMERICA Office: CIAT, Cali, Colombia

Argentina	Chile	French Guinea	Peru	Venezuela
Bolivia	Colombia	Guyana	Suriname	
Brazil	Ecuador	Paraguay	Uruguay	

3 EUROPE/NORTH AFRICA/SOUTHWEST ASIA Office: IBPGR, Rome, Italy

Afghanistan	FRG	Lebanon	Romania	Yemen Arab
Albania	GDR	The Libyan Arab	Saudi Arabia	Republic
Algeria	Greece	Jamahiriya	Spain	People's
Austria	Hungary	Luxembourg	Sweden	Democratic
Belgium	Iceland	Malta	Switzerland	Republic of
Bulgaria	Iran	Morocco	Syria	Yemen
Cyprus	Iraq	Norway	Tunisia	Yugoslavia
Czechoslovakia	Republic of	Oman	Turkey	
Denmark	Ireland	Pakistan	United Arab	
Egypt	Italy	Poland	Emirates	
Finland	Jordan	Portugal	UK	
France	Kuwait	Qatar	USSR	

4 WEST AFRICA Office: ICRISAT Sahelian Centre, Niamey, Niger

Benin	Chad	Ghana	Mauritania	Senegal
Burkina Faso	Congo	Guinea	Niger	Sierra Leone
Cameroon	Côte d'Ivoire	Guinea-Bissau	Nigeria	Togo
Cape Verde	Equatorial Guinea	Liberia	São Tomé and	
Central African	Gabon	Mali	Principe	
Republic				

5 EAST AND SOUTHERN AFRICA Office: ILRAD, Nairobi, Kenya

Angola	Ethiopia	Mauritius	Sudan	Zambia
Botswana	Kenya	Mozambique	Swaziland	Zimbabwe
Burundi	Lesotho	Rwanda	Tanzania	
Comoros	Madagascar	Seychelles	Uganda	
Djibouti	Malawi	Somalia	Zaire	

6 EAST ASIA Office: CAAS, Beijing, China

China	Democratic People's	Republic of	Mongolia
Japan	Republic of Korea	Korea	Taiwan, China

7 SOUTH AND SOUTH EAST ASIA Office: NBPGR, New Delhi, India

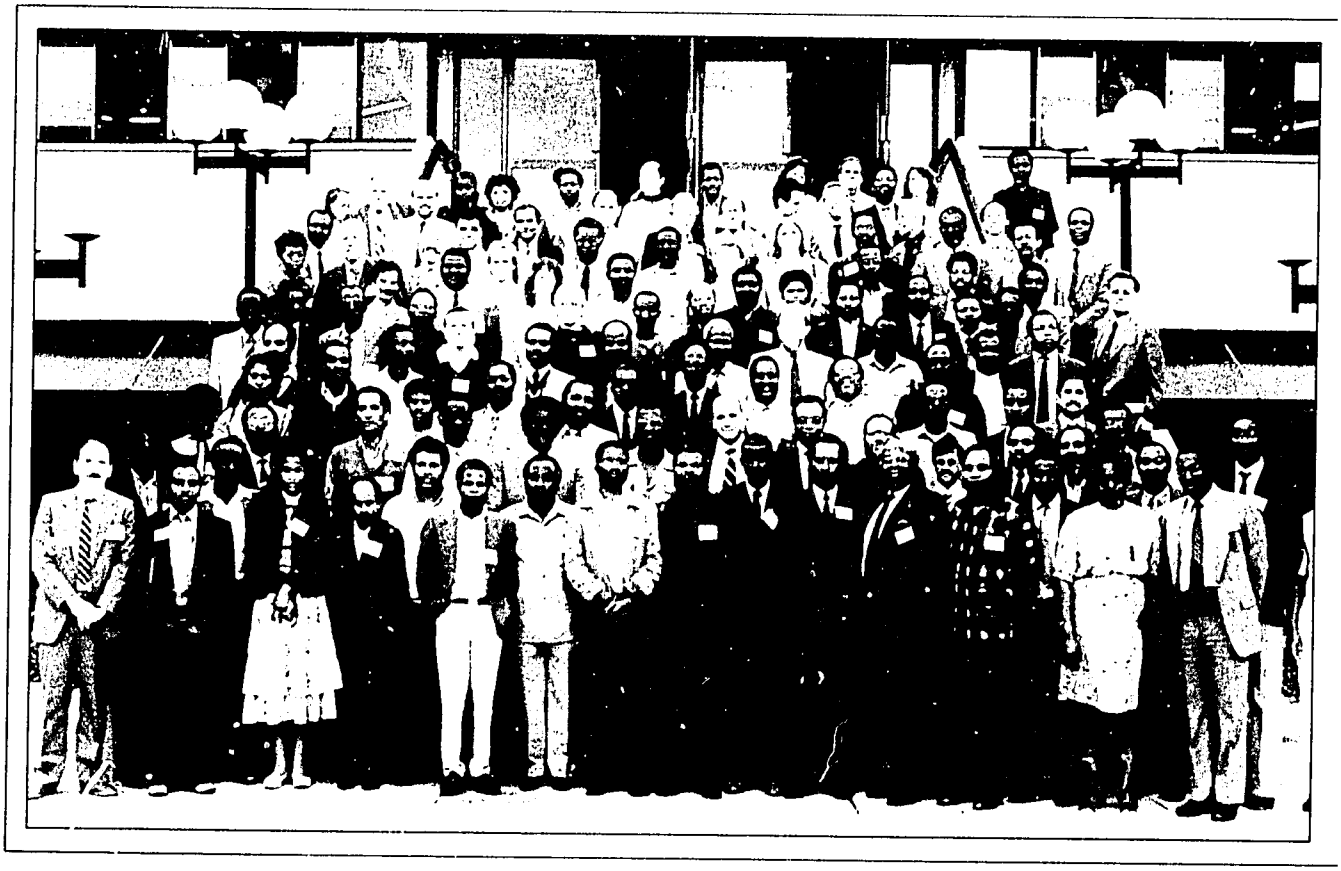
Bangladesh	Cambodia	Malaysia	Guinea	Thailand
Bhutan	India	Maldives	Philippines	Vietnam
Brunei	Indonesia	Nepal	Singapore	
Burma	Laos	Papua New	Sri Lanka	

Regional conferences and meetings

In January 1978, the first Workshop on Plant Genetic Resources in Africa was held in Ibadan, Nigeria. It was organized by AAASA and IITA. The main objective of the workshop was to increase awareness of genetic resources conservation among scientists in Africa to promote the conservation of the continent's genetic diversity. Since then, IBPGR, UNEP, bilateral donors and other organizations have worked to stimulate the collecting of many plant species in Africa, the establishment of conservation facilities, the training of research staff and the growth of National as well as regional Programmes. Recognizing the need for even greater intra-Africa scientific and technical cooperation, the African Ministerial Conference on the Environment decided in 1985 to establish eight technical cooperation networks, including a continental network for the conservation and utilization of genetic resources to improve and develop agriculture, forestry, health and environment.

In 1987 UNEP proposed a pan-African workshop on plant genetic resources and requested IBPGR to join forces with them in organizing the event. At about the same time, IITA was planning to convene a workshop in 1988 to mark the 10th anniversary of the first workshop. Early in 1988 CNR, IBPGR, IITA and UNEP agreed to cooperate in both events. The first workshop was to be organized by IBPGR and UNEP, and IBPGR also mobilized cosponsors from Finland (FINNIDA), the Netherlands (DGIS), Norway (NORAD) and Sweden (SIDA). The aim of the workshop was to identify the strengths and weaknesses of national, regional and eventually, continental activities on plant genetic resources in Africa, and to determine means of improvement. The second workshop, organized by IITA and CNR and held on 17-20 October 1988 at Ibadan, Nigeria, was concerned with more technical activities of the plant genetic resources of IITA's mandate crops.

The IBPGR/UNEP/IITA/CNR Workshop on Plant Genetic Resources in Africa took place from 26 to 30 September 1988 at the United Nations Conference



Participants at the IBPGR/UNEP/IITA/CNR Workshop on Plant Genetic Resources, Nairobi, 26–30 September 1988.

Centre, UNEP Headquarters, Nairobi, Kenya. The event was attended by 164 participants, including representatives of most of the important international organizations active in the field of plant genetic resources, and representatives of 40 African nations.

Seven technical sessions were held concerning: genetic diversity; ecogeographical studies; *ex situ* conservation; *in situ* conservation; evaluation and utilization of genetic diversity in cultivated crops; evaluation and utilization of genetic diversity in wild species; and collaborative programmes. The sessions were followed by seven Working Groups, each of which produced a set of recommendations relating to five major areas, namely: strengthening National Programmes; training; surveying existing collections; evaluation of existing collections; and a survey of current National Programmes.

CNR, IBPGR, IITA and UNEP plan to publish the proceedings of the Nairobi and Ibadan workshops as two companion volumes. OAU expressed great interest in the country reports presented at the Nairobi meeting and subsequently agreed to assist in publishing all country reports prepared for both workshops in one volume. The set of three books should prove to be a standard reference work on plant genetic resources in Africa for some time.

RECSEA consists of representatives of National Programmes from Indonesia, Malaysia, Papua New Guinea, the Philippines and Thailand. The Committee met in Singapore on 14 and 15 December 1988 to discuss the future role of RECSEA, the naming of a Chairman and the appointment of an Associate Coordinator for Southeast Asia in 1989. In addition, RECSEA followed up on the activities of crop working groups in southeast Asia, and discussed future work plans and the establishment of IBPGR's Seed Handling Unit in Singapore.

Major recommendations of the Workshop on Plant Genetic Resources:

- **on general issues**
  to create a greater public awareness of the importance of plant genetic resources amongst policy makers and others who influence policy making at a national level;

- **on surveys**
  to collate data on existing collections of germplasm and on the distribution of plant species, in order to give a consolidated picture of the diversity of genetic resources in Africa;

- **on collecting of germplasm**
  to use ecogeographic methods to aid collecting of germplasm, particularly with respect to wild species;

- **on conservation**
  to assess current practices for conserving genetic resources and to seek improved conservation techniques for important species;
  to regenerate germplasm that is inadequately maintained at present and transfer it to centralized genebanks;

- **on training**
  to improve training in all aspects of work on plant genetic resources both *in situ* and *ex situ*. Training should be available at all levels and should cover all aspects of the work, such as taxonomy, experimental botany, ecology, genetics, etc.;
  to make training available in the international languages used in plant genetics work in Africa, namely, Arabic, English, French and Portuguese;

- **on collaboration**
  to exchange germplasm freely between government and private institutions, universities and international institutes, both within and between countries;
  to develop information networks for the exchange of data;
  to prepare comprehensive catalogues for all major crops;
  to stimulate affiliation of centres of excellence in Africa with relevant institutions in other parts of the world.

Germplasm conservation

Base and active collections

During 1988 IBPGR continued to reach agreements with IARCs, national centres and other institutions to assume responsibility for the secure long-term conservation of specific crops and forages within base collections (Table 1). IBPGR has developed acceptable and preferred scientific standards for genebanks, many based on very recent developments in seed physiology and technology. IBPGR experts have continued to visit locations that agree to hold base collections. Most of the genebanks meet these standards; those that do not usually take corrective actions in consultation with IBPGR. This surveying of genebanks has provided valuable information that has been built into a continually updated database of genebanks and the standards they use.

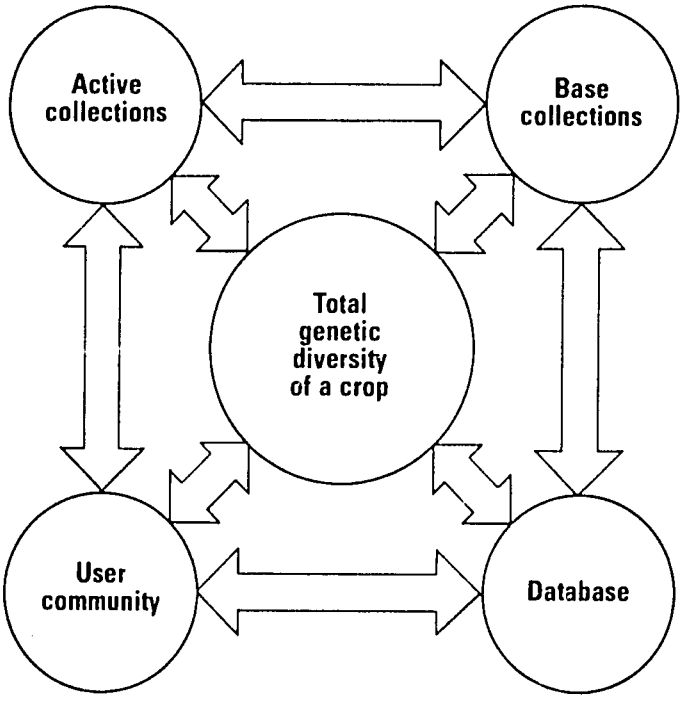
Active collections hold material under storage conditions that are less stringent than those for base collections; the materials are immediately available for research and breeding. For vegetatively propagated crops a number of institutes have accepted responsibility to maintain field genebanks (i.e. active collections) and these are listed in Table 2.

The integration of active and base collections into networks based on specific crops was one of the most important areas of study by IBPGR in 1988; this is discussed opposite under Crop networks.

Support to national genebanks for conservation facilities

Technical and scientific advice to governments and institutions on constructing or improving conservation facilities for plant genetic resources was provided in 1988 to China, Cyprus, Czechoslovakia, Kenya, the Republic of Korea, Poland, Saudi Arabia, Syria, Turkey and PDR Yemen.

IBPGR provides limited support to improve storage facilities and upgrade existing genebanks by providing equipment such as dehumidifiers, electricity



Crop Networks

- IBPGR seeks to guarantee the long-term conservation of plant genetic resources, but must also seek to ensure that these materials are used
- Plant genetic resources activities are rapidly expanding worldwide, including the development of a large number of new National Programmes of plant genetic resources
- The new directions of IBPGR, e.g. in research, and in emphasizing work on wild relatives, potentially involve a much larger group of institutions than hitherto
- Active and research collections must be interlinked with base collections to form a network
- Networks will differ from crop to crop
- Viable crop networks can only be established and maintained with the goodwill and the full participation in the decision-making process of all parties concerned

generators, chest freezers, aluminium laminated bags, bag sealers, seed-testing equipment and seed cleaners. In 1988, such support was provided to: China, Republic of Korea, Peru, Sudan, Syria, Turkey and PDR Yemen.

Crop networks

1988 saw the conceptualization of global crop-specific networks. However, crop networks can only start developing by canvassing opinion from as wide a group of specialists concerned with a particular crop as possible, including national, regional and international institutions, base *and* active collections, special research collections and scientists from the user community. These specialists must obviously be involved in all efforts to conserve and utilize the genetic resources of any crop. IBPGR could bring together relevant workers to advise on the structure and financing of individual networks, and to propose where IBPGR's scientific and financial support could best be utilized. In some cases IBPGR might coordinate the crop networks, but in most instances other institutions would be better placed to play this role.

In late 1988, IBPGR initiated a pilot project to test the concept of crop networks. Eight crops were selected to give a reasonable spread between different crop groups (cereals, forages, fruits, industrial crops, legumes, roots and tubers, vegetables); temperate and tropical crops; seed and vegetatively propagated crops; and crops within and outside the mandate of other Centers of the CGIAR system. The crops chosen are barley, maize, groundnut, sweet potato, banana, okra, *Medicago* and beet. Resources have been redirected to these crops and an initial assessment of the project will be made towards the end of 1989.

IJO-IBPGR: continuing collaboration

The six member countries of IJO – Bangladesh, China, India, Indonesia, Nepal and Thailand – account for about 95% of world jute and kenaf production. In Bangladesh and India, jute has a very high socioeconomic significance because the livelihoods of many millions of small-scale and marginal farming families depend on the crop. Despite this however, no major breakthrough has been achieved in developing high-yielding varieties with improved fibre quality. A major constraint has been a lack of sufficient genetic variability available to breeders. The current varieties have narrow genetic bases, are poorly adapted to diverse agroecological conditions and are susceptible to several diseases and insect pests.

During 1988, IBPGR continued to cooperate with IJO's five-year project: 'collection, conservation, characterization and exchange of germplasm for the development of improved varieties of jute, kenaf and other allied fibres' (see p.11, IBPGR Annual Report 1987 (1988)).

IBPGR assisted with five IJO germplasm-collecting missions to different regions of Kenya and Tanzania in late 1987 and early 1988, and by mid1988 a total of 790 seed samples of *Corchorus, Hibiscus* and related bast fibre-bearing genera had been collected.

This represents a unique reservoir of much-needed new genetic diversity which is now being made available through IJO to jute/kenaf breeders.

Table 1 **Base collections of seed crops, which accepted responsibility for long-term conservation**

Crop	Species covered		Scope of collection	Institute
			Global / European / African / Asian / Regional / New World	
Cereals	Barley		●	PGR, Ottawa, Canada
			●	NGB, Lund, Sweden
			●	PGRC/E, Addis Ababa, Ethiopia
			●	NIAR, Tsukuba, Japan
			●	ICARDA
	Maize		●	NPGS, USA
			●	NIAR, Tsukuba, Japan
			●	TISTR, Bangkok, Thailand
			●	VIR, Leningrad, USSR
			● *Mediterranean*	Portuguese Genebank, Braga Portugal
	Millets	*Pennisetum*	●	NPGS, USA
			●	PGR, Ottawa, Canada
			●	ICRISAT
		Eleusine	●	PGRC/E, Addis Ababa, Ethiopia
			●	ICRISAT
		Minor Indian millets	●	NBPGR, New Delhi, India
		Eragrostis	●	PGRC/E, Addis Ababa, Ethiopia
		Panicum miliaceum	●	ICRISAT
		Setaria italica	●	ICRISAT
	Oats		●	PGR, Ottawa, Canada
			●	NGB, Lund, Sweden
	Rice	*Oryza sativa* -		
		indica	●	IRRI
		javanica	●	IRRI
		japonica	●	NIAR, Tsukuba, Japan
			●	IITA, Ibadan, Nigeria
			●	NPGS, USA
		Wild species	●	IRRI
	Rye		●	Polish Genebank, Radzikow
			●	NGB, Lund, Sweden
	Sorghum		●	NPGS, USA
			●	ICRISAT
	Wheat	Cultivated species	●	VIR, Leningrad, USSR
			●	CNR, Bari, Italy
			●	NPGS, USA
			●	CAAS, Beijing
			●	ICARDA
		Wild species (*Triticum* and *Aegilops*)	●	Plant Germplasm Institute, University of Kyoto, Japan
			●	ICARDA

Crop	Species covered		Scope of collection					Institute
			Global	European	African	Asian	Regional	
Food Legumes	Chickpea		●					ICRISAT
			●					ICARDA
	Faba bean		●					CNR, Bari, Italy
			●					ICARDA
	Groundnut		●					ICRISAT
						●	*South American*	INTA, Pergamino, Argentina
	Lentil		●					ICARDA
	Lupin		●					ZIGuK, Gatersleben, GDR
				●				INIA, Madrid, Spain
	Pea		●					NGB, Lund, Sweden
						●	*Mediterranean*	CNR, Bari, Italy
						●	*Central and East European*	Polish Genebank, Radzikow Poland
	Phaseolus	Wild species	●					JBNB, Bruxelles Belgium
		Cultivated species	●					CIAT
			●					NPGS, USA
				●				FAL, Braunschweig, FRG
	Pigeonpea		●					ICRISAT
			●					NBPGR, New Delhi, India
	Soyabean		●					NIAR, Tsukuba, Japan
			●					NPGS, USA
		Wild perennial	●					CSIRO Canberra, Australia
	Vigna	Wild species	●					JBNB, Bruxelles, Belgium
		V. mungo	●					NBPGR, New Delhi, India
		V. radiata	●					IPB, Los Baños, Philippines
			●					AVRDC, Taiwan, China
		V. umbellata	●					NBPGR, New Delhi, India
		V. unguiculata	●					IITA
			●					NPGS, USA
	Winged bean		●					IPB, Los Baños, Philippines
			●					TISTR, Bangkok, Thailand
Root Crops	Cassava (seed)		●					CIAT
	Potato (seed)		●					CIP
	Sweet potato (seed)		●					NPGS, USA
					●			AVRDC, Taiwan, China
			●					NIAR, Tsukuba, Japan
Vegetables	*Allium*		●					CGN, Wageningen, Netherlands
			●					NVRS, Wellesbourne, UK
			●					NPGS, USA
						●	*South and East European*	RCA, Tápiószele, Hungary
					●			NIAR, Tsukuba, Japan

Crop	Species covered	Scope of collection					Institute
		Global	European	African	Asian	Regional	
Vegetables	*Amaranthus*	●					NPGS, USA
					●		NBPGR, New Delhi, India
	Capsicum	●					CATIE, Turrialba, Costa Rica
		●					CGN, Wageningen, Netherlands
					●		NBPGR, New Delhi, India
	Cruciferae *Brassica carinata*	●					FAL, Braunschweig, FRG
		●					PGRC/E, Addis Ababa, Ethiopia
	B. oleracae	●					CAAS, Beijing, China
		●					NVRS, Wellesbourne, UK
		●					CGN, Wageningen, Netherlands
	Raphanus	●					CAAS, Beijing, China
		●					NVRS, Wellesbourne, UK
					●		NBPGR, New Delhi, India
	Wild species	●					Universidad Politécnica Madrid, Spain
		●					Tohoku University, Sendai Japan
	Oilseeds and green manures:						
	B. campestris, B. juncea	●					PGR, Ottawa, Canada
					●		NBPGR, New Delhi, India
	B. napus, Sinapis alba	●					FAL, Braunschweig, FRG
	Safflower	●					NBPGR, New Delhi, India
	Vegetables and fodders:						
	B. campestris, B. juncea, B. napus	●					NVRS, Wellesbourne, UK
	B. napus	●					FAL, Braunschweig, FRG
	All Cruciferae crops				●	*East Asian*	NIAR, Tsukuba, Japan
	Okra	●					NPGS, USA
		●					NBPGR, New Delhi, India
	Tomato	●					CATIE, Turrialba, Costa Rica
		●					ZIGuK, Gatersleben, GDR
		●					NPGS, USA
					●		IPB, Los Baños, Philippines
	Southeast Asian vegetables				●		IPB, Los Baños, Philippines
	Cucurbitaceae *Benincasa, Luffa, Momordica, Trichosanthes*	●					IPB, Los Baños, Philippines
	Cucumis, Citrullus, Cucurbita	●					NPGS, USA
	Citrullus, Cucurbita	●					VIR, Leningrad, USSR
	Cucumis, Citrullus	●					INIA, Madrid, Spain
	Eggplant	●					CGN, Wageningen, Netherlands
		●					NPGS, USA
		●					NBPGR, New Delhi, India

Crop	Species covered		Scope of collection					Institute
			Global	European	African	Asian	Regional	
Industrial Crops	Beet		●					FAL, Braunschweig, FRG
			●					NGB, Lund, Sweden
						●	*Mediterranean*	Greek Gene Bank, Thessaloniki
	Cotton					●	*Mediterranean*	Greek Gene Bank, Thessaloniki
	Sugarcane (seed)		●					NIAR, Tsukuba, Japan
			●					NPGS, USA
	Tobacco					●	*Mediterranean*	Greek Gene Bank, Thessaloniki
	Jute and Kenaf		●					BJRI, Dhaka, Bangladesh
Forages	Legumes	*Centrosema*	●					CIAT
			●					CENARGEN, Brazil
			●					CSIRO, Brisbane, Australia
		Desmodium	●					CIAT
			●					CSIRO, Brisbane, Australia
		Desmanthus	●					CSIRO, Brisbane, Australia
		Stylosanthes	●					CIAT
			●					CSIRO, Brisbane, Australia
		Leucaena	●					NPGS, USA
		Lotononis	●					ILCA
			●					Seed Bank, RBG, Kew, UK
		Macroptilium	●					CENARGEN, Brazil
			●					CSIRO, Brisbane, Australia
		Neonotonia			●			ILCA
			●					Seed Bank, RBG, Kew, UK
		Zornia	●					NPGS, USA
			●					CIAT, Colombia
		Trifolium			●			ILCA
			●					Seed Bank, RBG, Kew, UK
	Grasses	*Cynodon*	●					NPGS, USA
		Cenchrus	●					Seed Bank, RBG, Kew, UK
			●					ILCA
			●					CSIRO, Brisbane, Australia
		Digitaria	●					ILCA
			●					CSIRO, Brisbane, Australia
			●					Seed Bank, RBG, Kew, UK
		Pennisetum	●					NPGS, USA
		Paspalum	●					NPGS, USA
		Urochloa	●					CSIRO, Brisbane, Australia
Others	Tree species		●				(*Fuel and environmental stabilization in arid areas*)	Seed Bank, RBG, Kew, UK

Table 2 Field genebanks (active collections for vegetative material) which have accepted responsibility for conservation

Crop	Species covered	Geographical representation				Institute
		Global	African	Asian	Regional	
Roots and Tubers	Cassava	●				CIAT
				●	*Central American*	INIA, Mexico
			●			IITA
	Sweet potato			●	*Asian and Pacific*	AVRDC, Taiwan, China
		●				IITA
Fruits	Banana	●				Banana Board, Jamaica
				●	*Southeast Asian*	PCARRD, Philippines
			●			DGRST, Cameroon
	Citrus			●	*East Asian*	Fruit Tree Research Station, Tsukuba, Japan
				●	*Mediterranean*	INIA, Valencia, Spain
				●	*Mediterranean and African*	IRFA, Corsica, France
				●	*North American*	USDA
				●	*Latin American*	CENARGEN, Brazil
				●	*South Asian*	IIHR, India*
		●			*Subfamily Aurantioideae*	University of Malaya, Kuala Lumpur, Malaysia
Industrial Crops	Cocoa	●				University of the West Indies, Trinidad and Tobago
		●				CATIE, Costa Rica
	Sugarcane	●				Sugarcane Breeding Institute, Coimbatore, India
		●				USDA, Florida, USA
Perennial Species	*Allium*	●			*Short-day species*	Hebrew University of Jerusalem, Israel*
		●			*Long-day species*	Research Institute for Vegetable Growing and Breeding, Olomouc, Czechoslovakia
	Arachis (wild)			●	*Latin American*	CENARGEN, Brazil
	Glycine (wild)	●			*Latin American*	CSIRO, Australia

*Under discussion or awaiting formal agreement.

Data management and related support to National Programmes

Data management and documentation are important in all aspects of IBPGR's work. Various sections of this Report describe the establishment and expansion of IBPGR's numerous databases. Computer equipment is continually being upgraded to improve IBPGR's information processing ability. At Headquarters, two new microcomputers were installed and orders were placed for two more, together with a replacement of the main office information system by a newer generation computer capable of handling both wordprocessing and data management.

The IBPGR Offices outside Rome all need to be equipped with microcomputers because the Offices are actively involved in developing and updating databases. A start was made in 1987, and in 1988 microcomputers were installed in the Offices in Mexico and India. The work will be completed in 1989 with updated equipment for the Office in Kenya and with new installations in the Offices in China and Colombia. Also in 1988, microcomputers were installed in the Offices of IBPGR's Collectors in Cyprus and in the IBPGR Seed Handling Units in Kew and Singapore.

IBPGR continued in 1988 to advise national genetic resources centres on selecting and operating computer systems, and provided direct hardware and software assistance to Iran, Mexico and Pakistan.

Germplasm acquisition

IBPGR continues to play an important role in germplasm acquisition in part by its support of the collecting of germplasm in partnership with National Programmes.

When there is a high priority in a particular area or for a particular crop genepool, IBPGR appoints Collectors to carry out specialized field work. In 1988, IBPGR had four full-time Collectors on staff, one based in Zimbabwe (University of Zimbabwe, wild *Vigna* species), two in Cyprus (ARI, Mediterranean crops and forages), and a fourth in Niger (ICRISAT, Sahelian material).

Collecting landraces and primitive cultivars

In 1988 IBPGR organized, or assisted in organizing ten projects to collect landraces (Fig. 1). These are summarized below:

Algeria

The IBPGR Collector based in Cyprus, in conjunction with staff from INRAA, collected a wide range of crops in the Hoggar Mountains and a series of oases in the south of the country. At each of the six oases visited, the local civic authorities provided a guide, usually an elderly man of high standing and extensive local knowledge. It was then possible to sample all the local wheat cultivars growing at each oasis, and to limit sampling of crops, such as alfalfa, to local forms rather than varieties that had been brought in from other areas.

Republic of Korea

Through a contract with AVRDC, *Brassica* germplasm was collected in the Republic of Korea. 72 accessions of mustard and Chinese cabbage were gathered from 31 sites.

Mexico and Central America

A joint programme with CATIE to collect traditional cultivars throughout the southeastern part of Mexico, and Costa Rica, El Salvador, Guatemala, Honduras and Panama, finished in 1988. Material included samples from the Annonaceae, Cucurbitaceae and Sapotaceae, species of *Persea*, *Phaseolus* and *Gossypium*, and *Zea mays*. A total of 664 accessions was obtained, nearly all as seed.

Papua New Guinea

A project - supported through special project funds from the Government of Japan - to collect indigenous plant genetic resources in root crops and

traditional vegetables, concluded in 1988. 729 samples were collected, of *Colocasia esculenta, Ipomoea batatas, Dioscorea* species, *Musa* species, *Manihot esculenta* and *Abelmoschus* species.

Also in Papua New Guinea, an IBPGR Intern, accompanied by a plant pathologist from QDPI and an expert from INIBAP, collected 70 edible diploid and wild banana accessions in a number of provinces. Many of these appeared to have field resistance to black Sigatoka disease, and pollen from some of these lines may be useful in conventional breeding programmes.

Peru

The last of a series of missions to collect landraces of indigenous crops in the Andes Mountains gathered 23 samples of Tarwi, Quinoa, Oca, Ulluco, Arracacha, Llacon and Haba.

IBPGR also supported a mission that collected curcurbit germplasm, *Capsicum, Gossypium* and *Lycopersicon* species, in the northern tropical valleys of Peru. Previous missions had reported rapid genetic erosion in the area. This, in conjunction with recent abnormal rainfall, had led to a need to collect local landraces, and some extremely interesting germplasm was obtained.

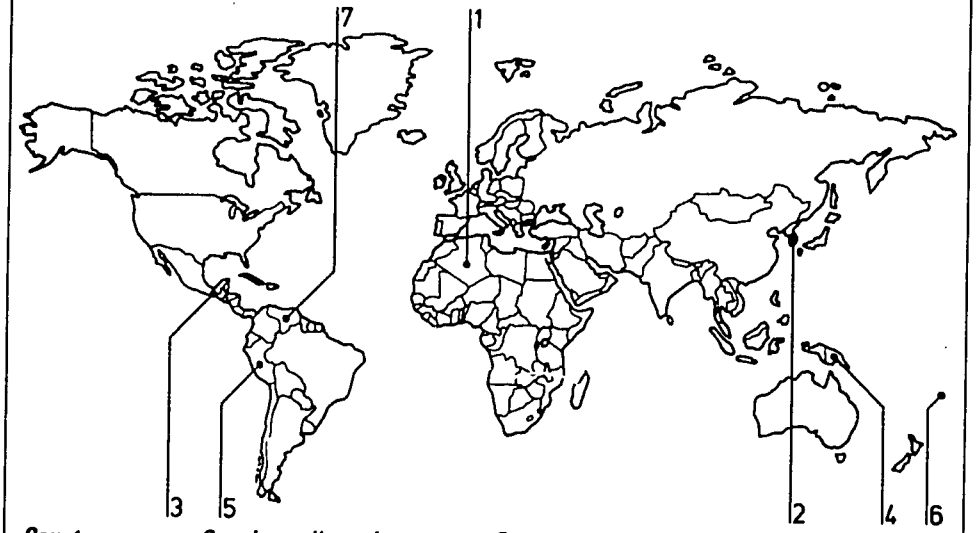
Western Samoa

Samoan cultivars of breadfruit were gathered on the island of Upolu. The 38 accessions are currently being grown out under one-year post-entry quarantine at the Magoon Horticultural Facility of the University of Hawaii on the island of Oahu.

Venezuela

The project to collect wild and cultivated *Theobroma* in the Amazon region

Figure 1 **Collecting landraces and primitive cultivars in 1988**



Country	*Species collected*
1 Algeria	Corn and local crops
2 Korea (Republic of)*	*Brassica*, Chinese cabbage and mustard
3 Mexico and Central America	Annonaceae, Cucurbitaceae, Sapotaceae, species of *Persea, Phaseolus, Gossypium* and *Zea mays*
4 Papua New Guinea*	Indigenous root crops and traditional vegetables, also edible diploid and wild banana

Country	*Species collected*
5 Peru	Indigenous crops, and *Capsicum, Gossypium* and *Lycopersicon*
6 Western Samoa	Breadfruit
7 Venezuela	Wild and cultivated *Theobroma*, and beans, cassava, maize, peppers and pineapple

* (executed in 1987)

continued in 1988. A number of missions took place during the year, principally to the Alto Orinoco and San Carlos de Rio regions. 50 samples were obtained as fruit and vegetative material, from *T. cacao*, *T. grandiflora*, *T. nemorale* and *T. subincanum*.

Another project to collect landraces of indigenous crops in the Orinoco region is also continuing. Four missions have already been undertaken and 339 samples obtained. Major crops sampled include beans, cassava, maize, peppers and pineapple.

Collecting wild species

IBPGR organized 22 projects in 1988 that dealt primarily with wild species (Fig. 2).

Southern Africa

A mission was mounted in Botswana during March-April 1988 in collaboration with the National Herbarium and Department of Agricultural Research, Botswana and the National Herbarium of Zimbabwe. The Department of Biological Science of the University of Botswana provided useful assistance. Two botanists from RBG, Kew also accompanied the mission. Seeds and herbarium specimens of many taxa of potential economic importance were collected.

Of particular interest was the collection of seed from many populations of wild cowpea, *Vigna unguiculata* var. *dekindtiana*, from arid areas of southwest Botswana.

Collectors revisited southern Mozambique and obtained good samples of *V. marina* and *V. unguiculata* var. *stenophylla*. A short trip to the Eastern Highlands of Zimbabwe was made to resample populations of *V. gazensis*. Other populations of various species have also been revisited to collect seeds and herbarium specimens.

Algeria

A mission sampled 21 populations of perennial *Avena macrostachya* in the Aures and Djurdjuira mountains in the northeast of the country in July 1988. The ECP/GR Oat Working Group had recommended this as gene transfer to cultivated oat may be possible. Desirable traits of this species include extreme winter hardiness and resistance to some pathotypes of barley yellow dwarf mosaic disease.

Chad

As a continuation of the Sahel Survey, a joint mission collected forages and crop resources in the Sahelian zone of Chad, October–December 1987. The IBPGR Office for West Africa and the Laboratoire de Recherches Veterinaires et Zootechniques of the Chadian Ministry of Livestock organized the trip. Prior to starting, a list of target species was drawn up from information on species occurrence and distribution, forage value, importance to crop breeding, risk of genetic erosion, etc. Priority was given to collecting wild species of crop genepools. A total of 178 samples was obtained, principally from the genera *Pennisetum*, *Sorghum*, *Echinochloa* and *Oryza*.

Chile

Taking advantage of unusually heavy rains in the country's normally arid north, a team from the Universities of Chile, Austral and Tarapaca collected wild relatives of tomato, including *Lycopersicon chilense*, *L. peruvianum*, *Solanum lycopersicoides* and *S. rickii*.

China

A project initiated in 1986, under the auspices of the Institute of Crop Germplasm Resources, CAAS and the Triticeae Research Institute, Sichuan Agricultural University, to collect Triticeae, continued in the north and west of the country.

The first team collected in the Nibashan and Dashinglin mountain ranges in

the southern part of Sichuan Province, various mountain ranges in the northern part of the province (up to 4000 m) and in Tibet within the general area of Lhasa. Almost 400 seed samples both of landraces and of wild Triticeae species were collected, together with around 110 herbarium specimens.

The second team collected in both Jilin and Heilongjiang provinces in northeast China. The team explored the mountains of Changbai and Lesser Xing'an and the Songnen plain. 97 seed samples and 107 herbarium specimens were collected, representing 18 species and varieties of seven genera.

The CIAT Forage Collector, with partial support from IBPGR, gathered forage legumes in the tropical region of southern China (Guandong and Hainan provinces). 131 samples of high-priority species and 41 samples of low-priority species were obtained. Most came from Hainan Island, where priority forage legumes can still be found in protected niches, e.g. *Desmodium, Dendrolobium, Tadehagi, Pueraria* and *Flemingia.*

Colombia

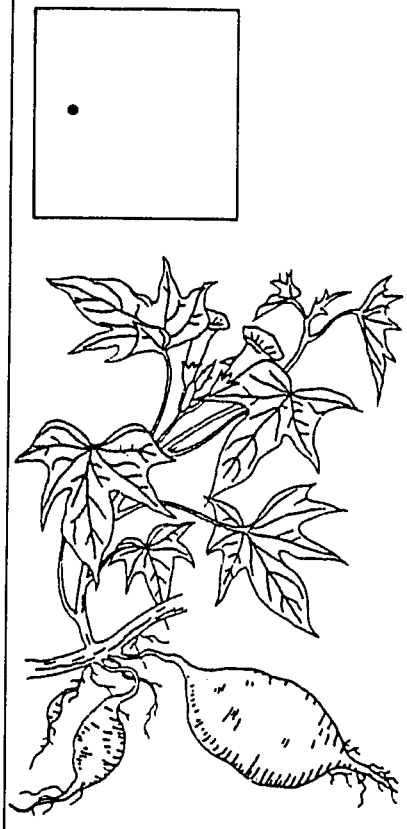
IBPGR partially supported a mission in the subtropical zones to gather the wild species of *Cyphomandra*, which are grossly undercollected.

Ethiopia

During a mission only one population was found of the rare *Lens ervoides*, thought to be native to southwest Asia. It is of particular interest to lentil breeders.

Western Europe

As part of a continuing programme to collect wild populations of *Brassica oleracea* throughout its distribution range, collecting took place on the northern coast of Spain, the Atlantic coast of France and the coasts of England and Wales.



Sweet potato

IBPGR – CIP develop Latin American and Caribbean sweet potato genebank

IBPGR and CIP have worked together to develop a sweet potato genebank, in part by IBPGR funding a full-time Collector in 1985-1987. Although this direct support has ceased and collecting has been taken over by CIP, IBPGR continues to strengthen this effort through its support to National Programmes.

The sweet potato genebank at CIP was significantly expanded in 1988; 2914 accessions of cultivated and wild species were added to the collection.

Cultivated germplasm has been obtained from a wide geographic and ecological range, and therefore could be an important source of genes for a wider adaptation of this important crop.

Nine out of the 11 wild species of the section *Batatas* described from Latin America and the Caribbean have already been collected.

54 other wild species not included in section *Batatas* are also available. Undoubtedly these could be valuable sources for research to identify new virus indicators, root stocks for flower induction, pharmacology, etc.

Within the primary centre of genetic diversity for sweet potato, its progenitors and its wild relatives, many sites have been located where large populations of wild *Ipomoea* species are still found, or where numerous cultivars are grown under traditional practices.

An effective collaboration for sweet potato genetic resources conservation has been established. A number of national and international organizations are now involved and the level of cooperation amongst scientists of each country has also increased.

The conservation and utilization of the genetic resources by National Programmes has been promoted. Several national sweet potato genebanks are being established as a result of the joint collecting work.

A computerized database organized at CIP contains all the passport data from the material collected as well as all the information on evaluation for desirable traits made by CIP scientists. Passport data in machine-readable form was provided to IBPGR for its use in plotting maps of sweet potato genetic resources in Latin America.

A total of 44 populations was sampled. The risk of genetic erosion is greatest in the UK, where several populations are situated close to gardens and farms where cultivated forms are being grown. Introgression is difficult to prove, but indications are strong in a few English populations.

Indonesia

Wild species of citrus were collected on the islands of Java, Kalimantan, Sulawesi, Irian Jaya, Sumbawa, Lombok and Bali. Participants in the mission came from the Faculty of Agriculture, Meiji University and Department of Horticultural Science, Saga University, Japan; Department of Botany, University of Malaya; and Balai Penelitian Hortikultura, Solok, Indonesia. 91 samples from 11 genera were collected, among them species that are new to horticulture from the genera *Glycosmis, Monathocitrus, Severinia* and *Swinglea.*

Kenya

IBPGR assisted IJO in missions to collect *Corchorus* and *Hibiscus* spp. The teams collected 104 seed samples (*Corchorus* spp., *Hibiscus* spp., *Abutilon* spp.) from central – north Kenya, and 151 samples from the Rift Valley, Western and Nyanza provinces.

Mali

An IBPGR collecting mission was undertaken to the Sahelian zone of Mali in late 1988 in collaboration with the Malian Institut National de la Recherche Zootechnique, Forestière et Hydrobiologique. Seeds and herbarium specimens of many taxa of potentially economic importance were collected. Some of the taxa collected are new records to Mali, and some of the areas collected had never before received attention from systematic botanists. Priority was given to wild species of *Cenchrus, Panicum, Rottboellia* and *Sorghum.*

Collecting perennial *Avena* with INRAA

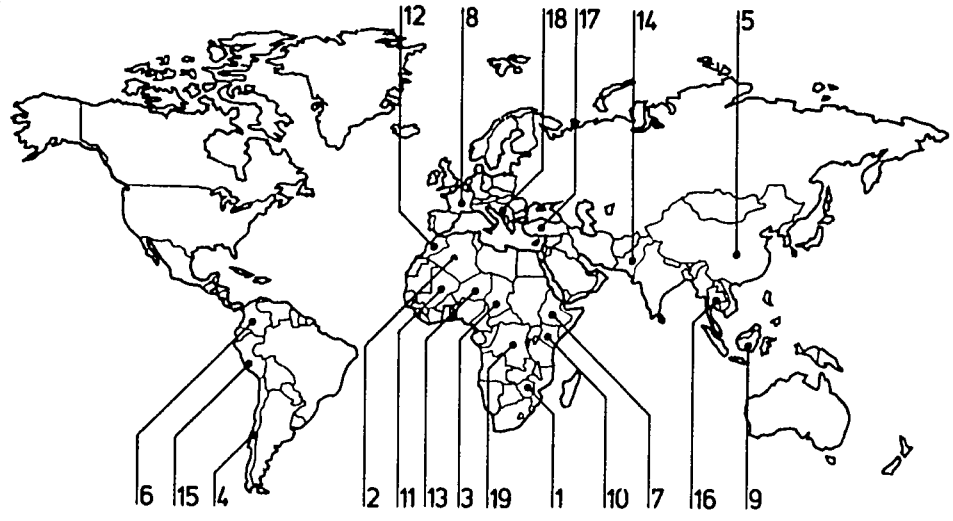
The IBPGR *Avena* Working Group has repeatedly recommended the collection of the only perennial species in the genus, *Avena macrostachya.* This cut-crossing species has been recorded from several high-altitude localities in some limestone mountains of northeastern Algeria, the Bellezima, Aúres and Djurdjura, since Benjamin Balansa first collected herbarium specimens in 1853 in the Aúres. There has, however, apparently only been one previous germplasm collecting mission, for the Djurdjura. Gene transfer to cultivated oats may be possible. Desirable traits include winter hardiness and resistance to some pathotypes of the barley yellow dwarf mosaic virus.

In July 1988 INRAA and IBPGR collaborated on a collecting mission for the species which surveyed a number of sites within and around its known geographical range. Collections of both seeds and vegetative material were made between 1300 m and 1800 m of altitude, in clearings in cedar and oak forests, rocky pastures and rocky crevasses. Large populations were found in the Djurdjura National Park and in the Beliezma mountains, but the species was more rare in the drier Aúres range. It was found in heavily grazed situations. Often, the only flowering shoots were seen emerging from within spring shrubs or clumps of unpalatable species. There is clearly a danger of *Avena macrostachya* disappearing from some areas.

The vegetative material collected will be tended at the Centre National Phytotechnique near Algiers and seed samples produced by the National Programme. Seed samples will be stored at Algeria and several other locations. Evaluation of the species as a forage is envisaged.

Avena macrostachya

***Figure 2* Collecting wild species in 1988**



Country	Species collected
1 Southern Africa	*Vigna*, etc.
2 Algeria	*Avena*
3 Chad*	*Pennisetum, Sorghum, Echinochla, Oryza*
4 Chile	*Lycopersicon, Solanum*
5 China	Triticeae, forage legumes
6 Colombia	*Cyphomandra*
7 Ethiopia	*Lens*
8 Western Europe	*Brassica*
9 Indonesia	Citrus
10 Kenya	*Corchorus, Hibiscus, Abutilon*
11 Mali	*Cendurus, Panicum, Rottboellia, Sorghum*

Country	Species collected
12 Morocco	*Avena*
13 Niger	*Andropogon, Cenchrus, Lasiurus, Panicum, Vigna*
14 Pakistan	Temperate fruit and nuts
15 Peru	*Amaranthus, Chenopodium, Lupinus, Oxalis, Ullucus, Tropaeolum, Arracacia, Polymnia, Vicia, Mirabilis, Solanum*
16 Thailand	Forage legumes, *Vigna*
17 Turkey	*Lens, Pisum, Vicia*
18 Yugoslavia	*Trifolium, Vicia*
19 Zaire	*Cajanus, Oryza, Vigna*

* (executed in 1987)

Morocco

During 1988 IBPGR familiarized Moroccan researchers with the wild species of *Avena*, and demonstrated collecting strategies and methodologies. This was done while actively collecting wild *Avena* in primary and secondary habitats in the different environments from 0 to 1900 m and from a range of agricultural systems. 64 fully documented collections were made at 45 sites, and small reference collections were also made between sites for comparison between populations. The collections contain ten of the possible 12 biological species and at least 13 of the 27 recognized taxonomic species.

Niger

A joint mission to collect wild species in the Sahelian zone of Niger was conducted by IBPGR and INRAN during 1988. The work, in two parts, explored the west and northwest, and the centre and east of the country. 63 sites were examined in detail and 83 samples collected, mainly *Andropogon gayanus, Cenchrus ciliaris, Lasiurus hirsutus, Panicum turgidum* and *Vigna unguiculata*.

Pakistan

During the year a joint Pakistan/US team made a biogeographical survey and conducted a collecting mission to sample temperate fruit and nut species from North West Frontier Province.

Peru

A mission by INIAA, Peru collected indigenous crops in the northern Andes. A total of 247 samples was obtained, comprising *Amaranthus caudatus, Chenopodium quinoa, Lupinus mutabilis, Oxalis tuberosa, Ullucus tuberosus, Tropaeolum tuberosum, Arracacia xanthorriza, Polymnia sonchifolia, Vicia faba, Mirabilis expansa* and *Solanum tuberosum.*

Thailand

A herbarium survey of Asiatic *Vigna* carried out by IBPGR showed that the mountainous northern region of Indo-China has considerable phenotypic diversity of several putative progenitor species of Asiatic *Vigna*. These are *V. aconitifolia, V. angularis, V. umbellata* and perhaps *V. mungo*. An IBPGR Collector, and staff from Chiangmai University, Thailand collected 38 samples of *V. umbellata* var. *gracilis, V. umbellata* var. *umbellata, V. mungo* var. *sylvestris, V. minima* and other *Vigna* spp.

The CIAT Forage Collector continued on from China (p. 29) to collect in Thailand, gathering 369 samples from a similar range of genera. Of particular interest was the discovery of *Desmodium ovalifolium* beyond 20°N and at an altitude of 900 m. Also, *Codariocalyx gyroides* was collected for the first time in Thailand.

Turkey

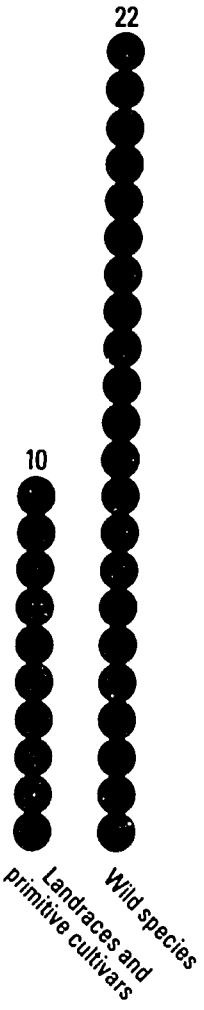
A second collecting mission took place in the area about to be flooded by dams on the Tigris/Euphrates river system of southeast Turkey. The team consisted of staff from PGRRI, Menemen, Turkey; the University of Southampton, UK; the Department of Agriculture, South Australia and an IBPGR Collector. The mission collected 1 450 samples of the wild relatives of *Lens culinaris, Pisum sativum, Vicia faba* and *V. sativa*, and the many forage species represented in the area, notably those of the genera *Lathyrus, Medicago, Trifolium* and *Vicia*.

Yugoslavia

IBPGR organized field work to collect forage legume germplasm during the year. The two collaborating groups involved were USDA and IBPFC. The mission concentrated on perennial *Trifolium* species 130 *Trifolium* and 21 *Vicia* samples were gathered, together with specimens of *Anthyllis, Astragalus, Lathyrus, Melilotus* and *Onobrychis.*

Zaire

A project to collect traditional crops and cereals in Bas-Zaire and Bandudu Provinces was completed in 1988. 203 specimens were gathered of *Cajanus cajan, Oryza sativa* and *Vigna subterranea*, as well as samples of cultivars of pearl millet, sorghum and maize.



IBPGR collecting projects in 1988.

Germplasm distribution

IBPGR's distribution centres facilitate the rapid processing of collected material and satisfy the need to maintain good scientific standards. Two IBPGR Seed Handling Units with newly appointed local staff are now operational: at RBG, Kew, UK and within the Department of Botany, University of Singapore. The latter is in the process of constructing new laboratory and office facilities which are expected to be completed in 1989. The Unit at Kew has continued to operate most successfully while acting as an independent intermediary for IBPGR in the exchange of valuable germplasm between countries. During 1988, 5680 samples were handled by the Unit; many of these were distributed to more than one genebank. Seed samples (3650) received in the previous year from 13 countries were duly processed and dispatched to their respective destinations during 1988. A further 760 samples from eight countries arrived during the year, and 1270 samples from two countries are in the process of being cleaned.

Germplasm characterization and documentation

Characterization and evaluation of germplasm collections are prerequisites for the effective use of material from genebanks. The data obtained during field and laboratory observations should be logged into germplasm documentation-systems as a complement to passport information (i.e. accession identifiers and information taken by plant collectors) on accessions held in collections. Passport and characterization/evaluation data can then be analyzed to select the samples required by breeders for crop improvement. The major components of IBPGR's germplasm documentation and characterization programme are discussed below.

Development and promotion of standards

Working in close collaboration with other IARCs, genebank curators and crop experts, IBPGR publishes crop descriptor lists that provide standards for compatible description of accessions in different collections.

In 1988, descriptor lists for *Citrus*, eggplant and papaya were published. Lists for *Brassica* and *Raphanus*, maize, mango, oil palm, potato, sweet potato and *Xanthosoma* were at different stages of preparation and will be published in 1989. In addition, in response to demand for descriptors in languages other than English, preparation of French versions of descriptors for pearl millet, sorghum and pigeonpea was initiated in 1988.

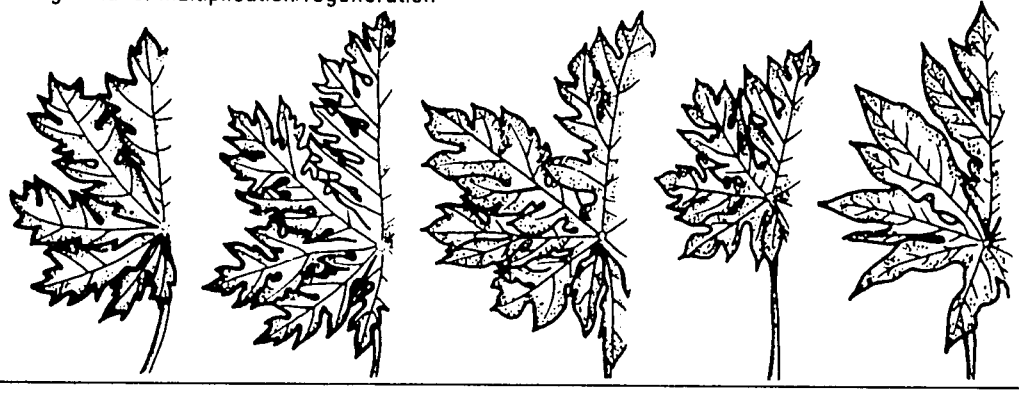
Support for characterization of collections of priority crops

Characterization data, together with passport data, provide a means for classifying germplasm and for studying patterns of variability, and hence are essential in managing collections to reduce redundancy, check the correctness of the regeneration process, etc. These data are, in general, of little direct use to plant breeders. However, during grow-out of materials for characterization, the opportunity is frequently taken to evaluate a limited number of traits.

In the past, characterization and preliminary evaluation have generally lagged behind collecting and conservation activities. IBPGR has in recent years placed greater emphasis on acquiring reliable characterization data for priority germplasm collections and especially for germplasm collected with IBPGR support. Table 3 summarizes IBPGR projects in 1988.

Descriptor categories

- passport data refer to the origin of the sample or its known history, plus any information recorded by collectors
- characterization data concern characters that are highly heritable and expressed in all environments
- preliminary evaluation, covers a limited number of traits that are relatively easy to score and considered to be most useful by plant breeders, since a list of possible evaluation descriptors is potentially unlimited
- evaluation data refer to environmentally influenced characters
- management descriptors are indispensable for managing accessions in medium- and long-term storage and for multiplication/regeneration



Since the early 1980s IBPGR has been encouraging and actively supporting the establishment of international databases on individual crops which compile passport data and to some extent characterization data of major collections. Such systems can assess the current status of genetic resources conservation so that the genetic variability present in collections can be evaluated, gaps and duplication within and between collections can be identified and material matching specific requirements can be selected. A summary of selected projects in 1988 is given below.

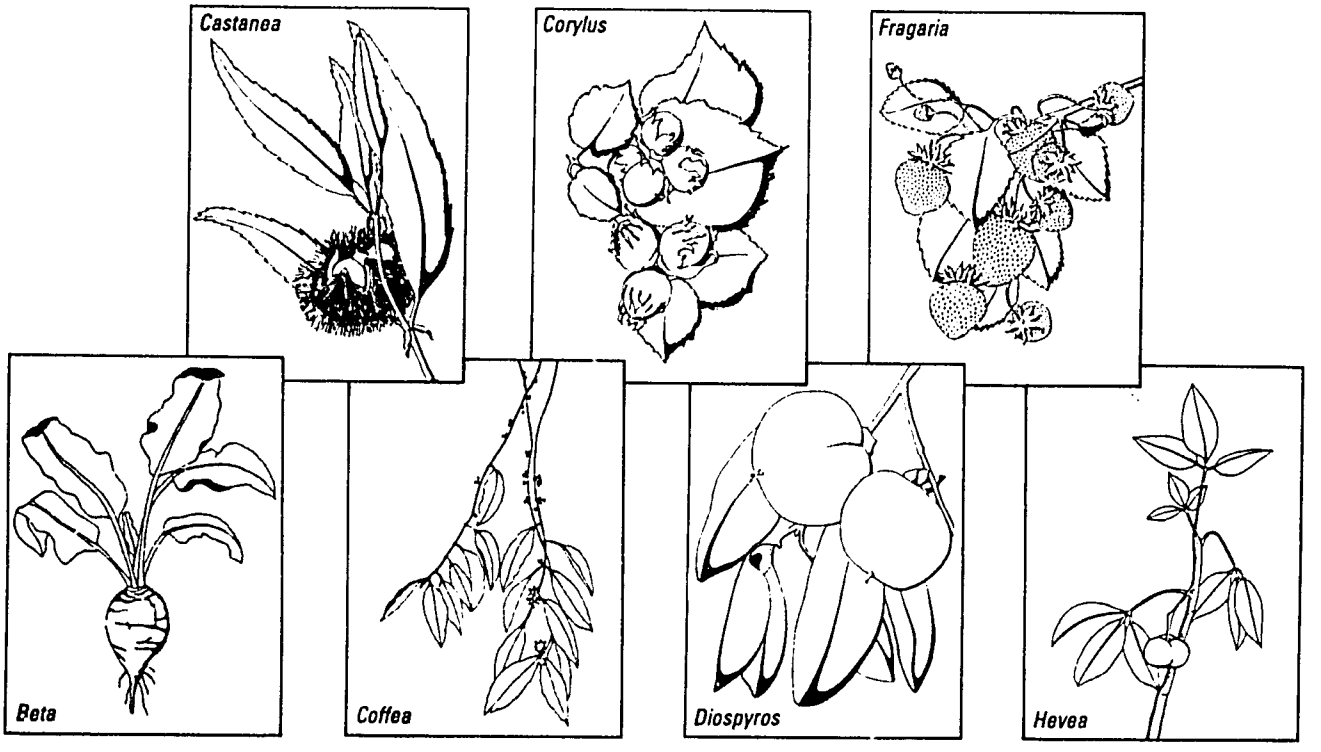
Mediterranean forage species

A database on Mediterranean forage species conserved in genebanks, initiated at Headquarters in 1987, curently holds passport information on over 21 000 accessions maintained in genebanks of 15 countries. In 1988, the system was complemented by a herbarium-based ecogeographic survey of forage *Medicago* species. This cooperative IBPGR/ILDIS project resulted in the establishment of a database with approximately 3400 records on specimens from 26 countries and data from 37 taxa in 20 species. The oldest record in the database is dated 1790 and the most recent is from 1987; of the total, about three-quarters of the records date from after 1900 and nearly half concern specimens collected since 1939. Preliminarily, species distribution maps were produced and these are to be analyzed against the representation of species and accesssions in genebanks. In addition to *Medicago*, arrangements were made with the Viceae Database Project, University of Southampton, UK, to compile an ecogeographical database for *Vicia faba* L., *V. sativa* and their relatives in *Vicia* subgenus *Vicia*. From 1989, the entire Mediterranean forages database project will be operated from ICARDA, Aleppo, Syria.

Wild wheat survey

In 1988 IBPGR started a survey of the wild species closely related to wheat conserved in genebanks. All genebanks known to hold accessions were contacted and requested for up-to-date accession lists and relevant passport data. The project involved preparing a survey of relevant literature, mission

Illustrations from the Directory of Germplasm Collections: Industrial Crops, which was published in 1988; and Temperate Fruits and Tree Nuts, the text of which was finalized in 1988.



Wild wheat; *T. boeoticum*

reports, field books as well as visiting selected genebanks and herbaria. The data obtained were successively entered into the database and at the end of 1988 the system contained over 13 000 records from accessions of many *Aegilops* spp., as well as *Triticum araraticum*, *T. boeoticum*, *T. dicoccoides* and *T. uratu*, in addition to 2770 records for herbarium samples from four international herbarium collections. The project will be continued in 1989 from ICARDA and linked to a special project there on collection and characterization of the wild relatives of wheat.

Citrus database

Progress was made in improving the database on the distribution of *Citrus* and its wild relatives in southeast Asia. The database includes data on herbaria specimens and is being implemented at the University of Malaya in Malaysia.

Wild _Brassica_ species database

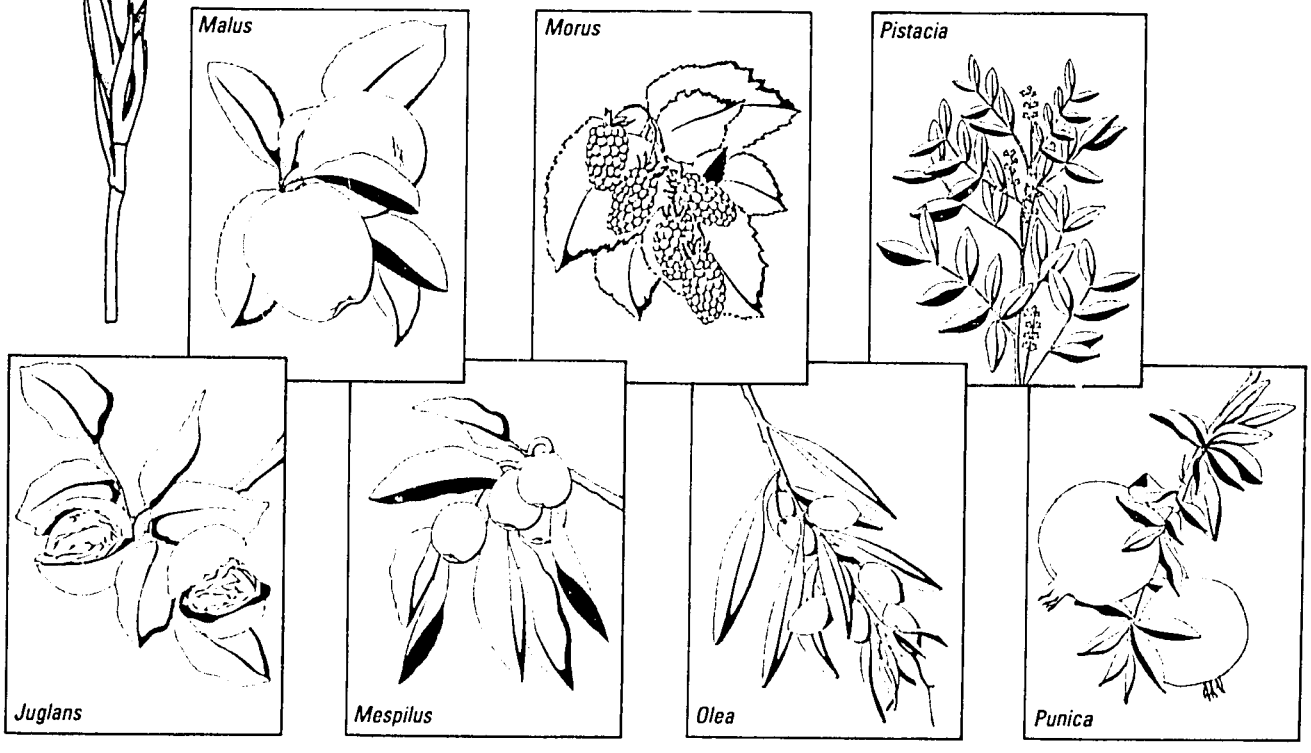
Missions to collect wild *Brassica* species have been sponsored by IBPGR since 1982. The information recorded by collectors as well as data obtained from multiplication and characterization of samples carried out by the Universidad Politechnica, Madrid, Spain and the Swedish University of Agricultural Sciences, Svalöv, Sweden are now being recorded in a computerized database. This is a joint project between IBPGR and the Universidad Politechnica.

Cucumis database

In recent years ETSIA, Valencia, Spain has been developing, with IBPGR support, a comprehensive database for *Cucumis* germplasm held in a base collection at INIA, Spain. In 1988, an extension of this project was approved to include passport information from other major *Cucumis* collections. Once developed, the system will be transferred to INIA, which will assume the long-term maintenance of the database.

Cocoa collections

A database project for primitive cocoa collections was initiated in 1988, with IBPGR support, by the Biscuit, Cake, Chocolate and Confectionary Alliance, UK.



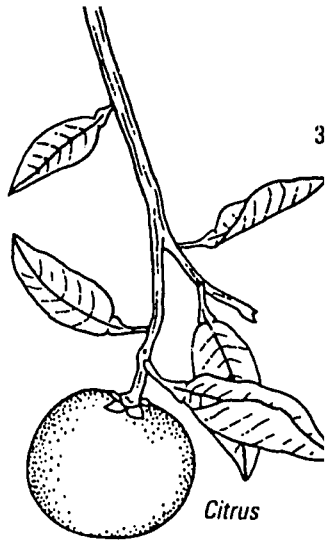
The project aims at collating in a standard format all the information presently available on wild cocoa collected since 1938. The publication of a catalogue is foreseen.

European Apple Inventory

A joint IBPGR/EUCARPIA Fruit Section project on the European Apple Inventory was completed in 1988. The eleventh part of the inventory, which lists material in the GDR, was distributed to cooperators. The inventory is computerized and contains 17 345 records of accessions maintained in 19 countries. The data file in dBaseIII format is available from IBPGR Headquarters on request.

Global maize database

Towards the end of 1988 IBPGR and CIMMYT agreed on the development of a global database for maize. The project will initially collate passport information of the maize collections held by the major Latin American genebanks. At a later stage, other parts of the world will be covered as well. The projected time for completion of the Latin American system is three years.



Directories of germplasm collections

Although centralized crop databases offer the most detailed insight into the structure of collections, their establishment takes considerable time and effort. To keep the scientific community informed of existing collections, IBPGR also compiles and publishes directories of germplasm collections. In 1988, work concentrated on revising directories for cereals and vegetables. The former will replace the directories of wheat, barley, sorghum and millet, maize and rice, all published in separate volumes between 1980 and 1982. The latter is a revision of a 1982 publication. Both documents will be finalized and published in 1989.

In parallel to the directories of germplasm collections IBPGR is developing a database that holds essentially the same data but allows selective retrieval of information. This database is integrated with other IBPGR systems, i.e. country profiles, ex-trainees, germplasm collected through IBPGR-supported missions, etc.

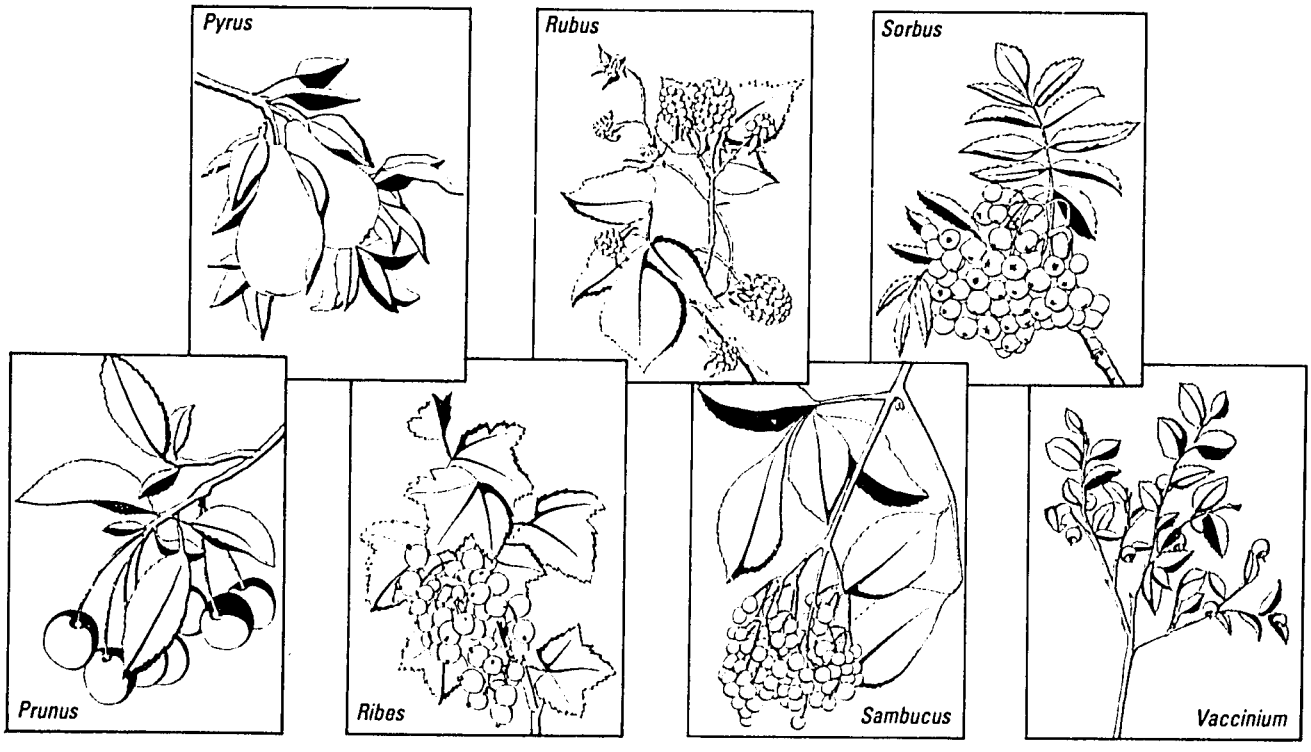


Table 3 1988 IBPGR characterization projects

Crop/Species		Centre	Remarks
Cereals	Barley	ICGR, CAAS, China	2000 accessions of Chinese origin
		Bureau des Ressources Génétiques, France	French landraces
		Yarmouk University,Jordan	Wild species collected in Jordan
		INIAER, Portugal	Portuguese landraces
		Swedish University of Agricultural Sciences, Sweden	Wild species collected in China
	Maize	ICA, Colombia	Work under ICA/NCARS agreement
		Programa Cooperative de Investigaciones en Maiz, UNA, Peru	Regeneration of Latin American maize. Collections in Argentina, Bolivia, Brazil, Chile, Guatemala, Paraguay, Uruguay and Venezuela are involved
		Núcleo de Melhoramento de Milho, Portugal	Mediterranean maize
	Millets	University of Ouagadougou, Burkina Faso	Pearl millet collected in Burkina Faso
		Virginia Polytechnic Institute and State University, USA	*Eleusine* germplasm collected in Kenya
	Oat	Estacao Nacional de Melhoramento de Plantas, Portugal	Portuguese landraces
		IAVH, Morocco	Wild species collected in Morocco
	Quinoa	INIAP, Ecuador	Samples collected in Ecuador 1982–84
	Rice	FOFIFA, Madagascar	Landraces collected in Madagascar 1985–86
	Wheat	ICGR, CAAS, China	2000 accessions of Chinese origin
		Yarmouk University, Jordan	*Triticum dicoccoides* and *Aegilops* collected in Jordan
		Swedish University of Agricultural Sciences, Sweden	Triticeae germplasm collected in China
		University of California (Davis), USA	Durum wheat
Food Legumes	*Phaseolus vulgaris*	Estación Experimental Cajomovca, Peru	Germplasm (1200) collected in Peru 1982–83
		Universidad Nacional de Huanuco, Peru	Landraces (600) from northern Peru
	Phaseolus coccineus	INIAP, Mexico	Project includes a research component on methodology of regeneration
	Lupinus mutabilis	CICA, Peru	1300 accessions
	Arachis	Texas A&M University, USA	Germplasm collected in South America 1983–86
	Soyabean	JAAS, China	Germplasm from northern China
	Others	FOFIFA, Madagascar	*Phaseolus* and *Vigna* collected in Madagascar 1985–86
Root and Tuber Crops	Cassava	Universidad de San Carlos and ICTA, Guatemala	Material collected in Guatemala 1982–85. Project also involves sweet potato, taro and *Xanthosoma* germplasm
	Andean roots and tubers	INIAP, Ecuador	Material collected in different regions of Ecuador
	Yam	Université d'Abidjan, Côte d'Ivoire	Material collected in Côte d'Ivoire 1983–84

Crop/Species		Centre	Remarks
Vegetables	*Allium*	IFVC, Yugoslavia	Germplasm collected in Yugoslavia
		University of Kashmir, India	Wild and cultivated from Himalayan region
	Amaranthus	INIAP, Ecuador	Material collected in Ecuador 1982 - 84
	Capsicum	CATIE, Costa Rica	Central American germplasm
	Brassica	Universidad Politechnica Spain and Swedish University of Agricultural Sciences, Svalov, Sweden	Wild *Brassica* collected in the Mediterranean
		IFVC, Yugoslavia	*Brassica* ecotypes collected in Yugoslavia
	Okra	ORSTOM, Côte d'Ivoire	Includes cultivated and wild species
	Cucurbits	IBTA, Bolivia	Germplasm collected 1972 - 84
		CATIE, Costa Rica	
		Universidad de San Carlos, Guatemala	*Cucurbita* spp. from Guatemala
	Eggplant	IDR, Burkina Faso University of Abidjan, Côte d'Ivoire University of Birmingham, UK	Characterization of African eggplant collected 1980 - 83
	Others	Field Crop Research Institute and Horticultural Research Institute of ARC, Egypt	Vegetable germplasm collected in Egypt 1985 - 86
Industrial Crops	Cotton	CIPI, Greece	Greek landraces
		Proyecto Algodon Nativo, INIAP, Peru	Cotton landraces collected in Peru 1985 - 86
	Sugarcane	WICSBS, Barbados	Caribbean collection
		FSL, USA	Classification of sugarcane clones
Forages	Forages	Belize Forage Legume and Pasture Research Programme, Belize	Legumes and browse species from Belize
		FCPI, Greece	*Dactylis, Festuca, Lolium, Medicago, Trifolium* germplasm collected in Greece
		ENMP, Portugal	Numerous species are included
		INIA, Spain	Over 1600 accessions, mainly legumes
		University of Hawaii, USA	*Leucaena* species collected in Mexico 1985
Fruits	*Citrus*	FTRS, Tsukuba, Japan	Germplasm collected in east Asia
	Cocoa	University of West Indies, Trinidad	Study on environmental stability of descriptors for cocoa
Multicrop Projects		ICA, Colombia	Germplasm collected in Colombia 1983 87 Project covers cotton, cocoa, cassava, *Solanum*, etc.
		ARC, Sudan	Numerous species of horticultural crops are involved
		Agricultural Services, Ministry of Agriculture, Maldives	Genetic resources collected in Maldives in 1986

Training

IBPGR continues to operate its Training Programme by offering group training and short, specialized technical courses, and by supporting the training activities of other institutions. Significant progress was made during 1988 towards developing a survey and database of past trainees. This should be finalized in 1989. It is expected that the results from the survey will enable IBPGR to plan its training operations more effectively and improve the selection process, of both trainees and topics for training.

Review

The MSc course and other short courses at the University of Birmingham, UK and the Training Programme as a whole were separately reviewed in 1988.

A new framework for training on core and extracore budgetary sources has been adopted, as follows:

Group training
- first degree; MSc or equivalent; graduate diploma, etc.
- non-degree; specialized short courses.

Individual training
- practical training;
- doctoral programmes;
- predoctoral studies;
- Frankel/Vavilov Fellowships;
- internships.

A Memorandum of Understanding is to be made with the University of Birmingham, UK, to clarify IBPGR's future involvement in the degree programmes. Support for short course training in Birmingham will be discontinued as of academic season 1989–90 in view of the need to increase individual practical training to meet the changing needs of National Programmes. MSc and equivalent programmes in languages other than English will be encouraged, and all specialized courses will have a strong practical orientation and be held in more diverse geographic locations, with an emphasis on developing countries. Taxonomy and biosystematics, seed multiplication, and characterization and documentation will be emphasized in group training. Quarantine aspects will be dealt with in all courses, with special consideration being given to the handling of tropical and subtropical species.

Group training

MSc degree course

In collaboration with the University of Birmingham, UK, IBPGR continues to offer postgraduate training to young researchers of National Programmes in developing countries. Seven of the 13 trainees who successfully completed the 1987–88 course, and thereby received their MSc in conservation and utilization of plant genetic resources, were directly funded by IBPGR (Fig. 3); three were jointly funded by UNEP. IBPGR is also providing fellowships to seven of the ten trainees for the 1938–89 course (Fig. 3).

Short, specialized technical courses

Eight of these short courses were organized during 1988 (Fig. 4). The topics of the courses are developed in close collaboration with other institutions to address perceived needs in the field of genetic resources education. Often the courses are in one of the major international languages for maximum impact and utility.

IBPGR supported researchers from the National Programmes in Cuba, Equatorial Guinea and Guatemala to attend a five month course given in Spanish at ETSIA, Madrid on plant genetic resources.

In collaboration with IBPGR, IITA organized a training course on genebank

Figure 3 **Country of origin of IBPGR-supported trainees attending the University of Birmingham MSc course**

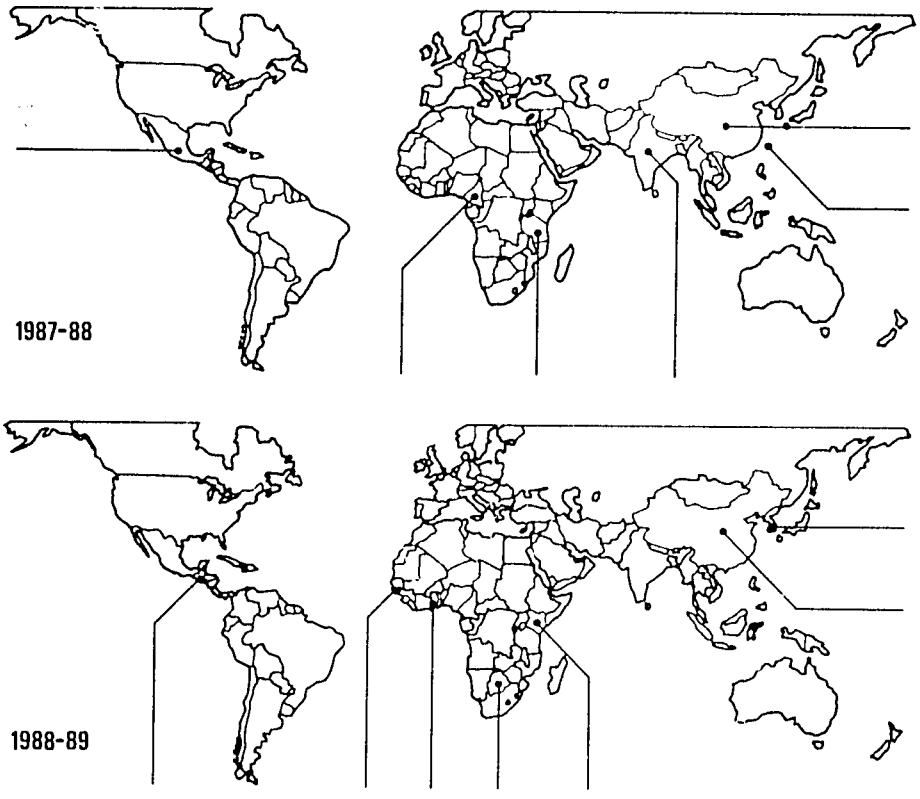
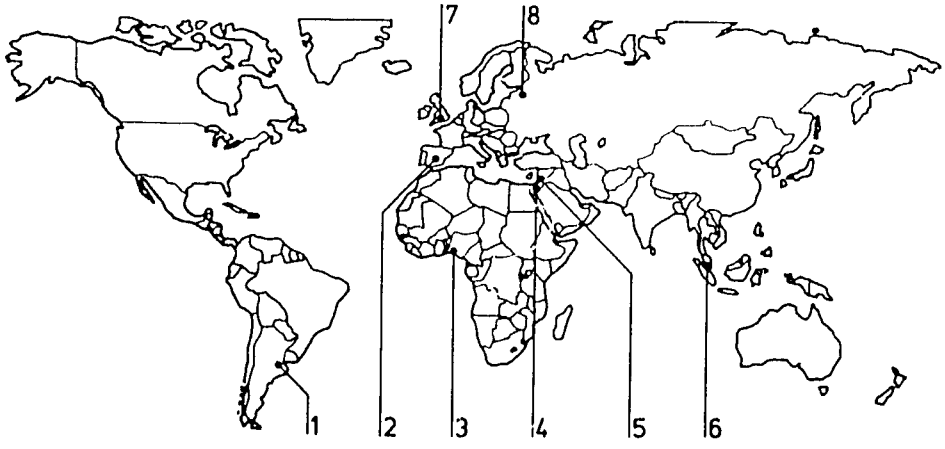


Figure 4 **Location of short, specialized technical courses and number of IBPGR-supported trainees attending**



Location	*Trainees*	*Location*	*Trainees*
1 Buenos Aires, Argentina	17	**5** Aleppo, Syria	8
2 Madrid, Spain	3	**6** Kuala Lumpur, Malaysia	5
3 Ibadan, Nigeria	3	**7** Birmingham, UK	8
4 Jerusalem, Israel	11	**8** Leningrad, USSR	10

management and seed conservation at IITA, Ibadan, Nigeria. IBPGR supported trainees on this course from the Sudan, Mauritania and Cameroon.

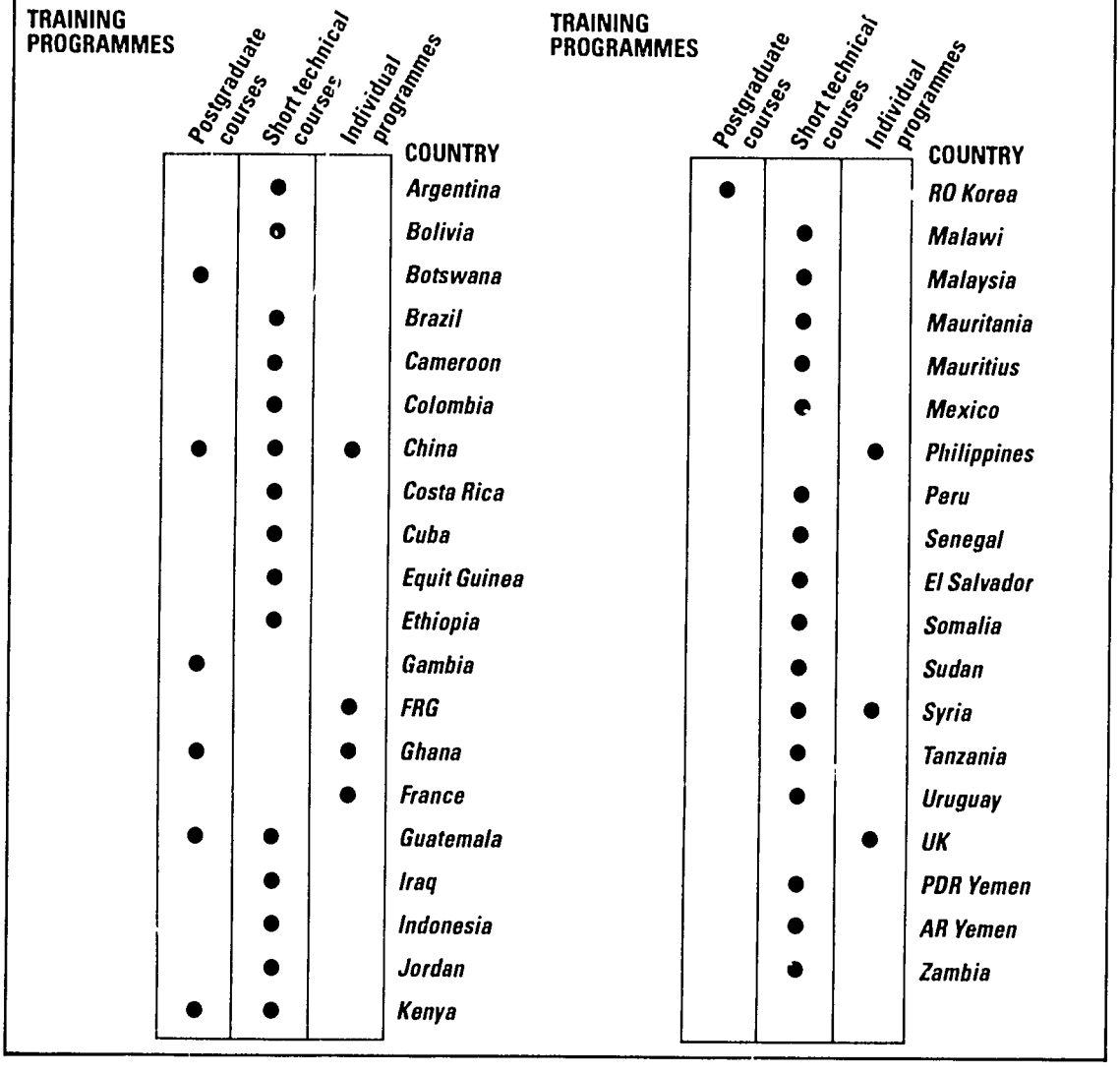
The Hebrew University of Jerusalem, Israel collaborated with IBPGR on a short course on exploring, describing and using wild plant genetic resources. Fellows from the MSc course and short course III at the University of Birmingham attended the course. Participants came from Cameroon, China, Ethiopia, India, Malawi, Mexico and Tanzania.

ACSAD, ICARDA and IBPGR organized a short course in Arabic on forage germplasm collection, conservation and evaluation. The course was held at ACSAD and ICARDA in Syria and IBPGR supported trainees from the National Programmes of Somalia, PDR Yemen, Yemen Arab Republic, the Sudan, Jordan and Syria.

The University of Malaya, with IBPGR, held a short course on the taxonomy, identification, biosystematics and collection of *Citrus* species germplasm in Kuala Lumpur, Malaysia. This course was targeted at technicians of National Programmes in southeast Asia who collect *Citrus* germplasm. IBPGR supported trainees from Indonesia and Malaysia.

In collaboration with the Faculty of Agronomy, University of Buenos Aires,

Countries supported through the IBPGR training programme in 1988



Argentina, IBPGR held a short course in Spanish on collecting, characterizing and evaluating plant genetic resources of Latin America with emphasis on wild species closely related to crops. Researchers from National Programmes in Bolivia, Brazil, Guatemala, Peru, Uruguay, Cuba, El Salvador and Argentina were funded by IBPGR.

With UNEP funding, IBPGR cooperated with VIR, USSR, to conduct a training course in Leningrad on conserving and evaluating cereal crop germplasm. Researchers from the National Programmes of Brazil, Costa Rica, Syria, Argentina, Uruguay, Colombia, Mauritius, Senegal, Kenya and the Sudan attended.

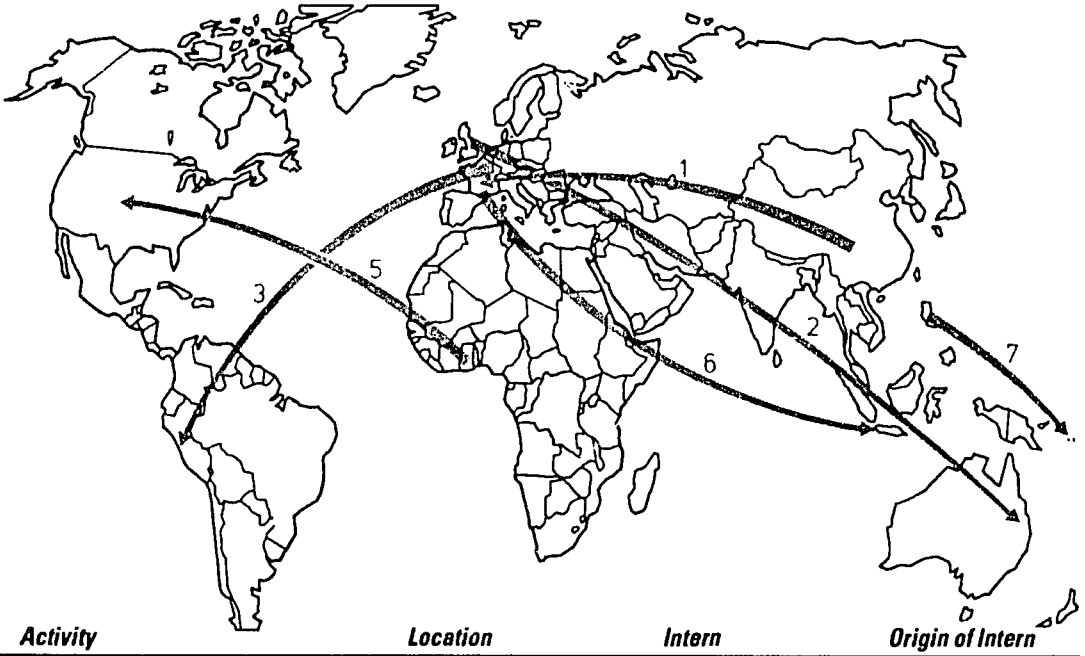
Researchers and technicians from Ethiopia, the Sudan, Malawi, Iraq, Tanzania, Zambia and China received IBPGR fellowships to participate in the University of Birmingham's short courses III and I on evaluation and documentation, and on conservation, respectively.

Individual training

Practical training and study tours

IBPGR collaborates with international and national institutions to arrange individual hands-on training programmes designed to meet needs for specific

Figure 5 **Activity, location and origin of interns in 1988**



	Activity	*Location*	*Intern*	*Origin of Intern*
1	Evaluation and use of wild cereal germplasm	INRA, France	Chen Qin	China
2	Collection and disease-indexing of *Musa* germplasm	QDPI, Australia	Suzanne Sharrock	UK
3	Biosystematics and documentation of minor Andean Tuber germplasm collections	UNA, La Molina, Peru	Michael Hermann	FRG
4	*In vitro* collecting of *Prunus* and *Vitis* species	IMA, Velenzano, Italy	Elias Kamel	Syria
5	Biosystematics of *Pennisetum*	USDA, ARS, USA	Evans Lagudah	Ghana
6	Ecogeographic survey of *Mangifera* spp.	IUCN, Indonesia	Jean-Marie Bompard	France
7	Collection and evaluation of root-crops germplasm	Solomon Islands	Diliberto Ferraren	Philippines

technical skills. During 1988, a technician from Malawi and another from Kenya were trained at ILCA, Ethiopia in appropriate seed technology for African genebanks. A scientist from CATIE in Costa Rica made a study tour of *in vitro* cryopreservation laboratories in France.

Internships

During 1988, IBPGR sponsored seven internship projects that are illustrated in Fig. 5.

Training by other institutions

During 1988, IBPGR provided scientific support, including documents and lectures by IBPGR staff, to international crop genetic resources courses held by other institutions. These were:

- 7th international course on plant genetic resources held by JICA, Japan (11 April–25 June 1988). This was attended by 12 researchers from universities and research institutions of developing countries from Latin America, southwest Asia, southeast Asia and south Asia;
- CIHEAM course on plant breeding and seed production – which includes a section on plant genetic resources, held in Zaragoza, Spain (October 1988–June 1989). This was attended by 30 researchers, mostly representing countries of the Mediterranean basin.

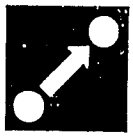
Provision of literature

In 1988, with a view to strengthening research capabilities of national genetic resources programmes in developing countries, the Training Programme of IBPGR provided assistance in the way of bibliographic material, journals and books to 40 libraries of genebanks, research institutes and universities in developing countries to encourage further study of crop germplasm activities.

RESEARCH PROGRAMME

1988 was a significant year in the development of an integrated Research Programme to complement the already established Field Programme. Staff responsible for seed conservation, evaluation and regeneration, and pathology and quarantine were already in post and with the addition of a scientist dealing with *in vitro* conservation it became possible to introduce a team approach to identifying research priorities and selecting institutions from which to commission clearly defined studies.
The longest-serving member of the Research staff, Dr Chris Chapman, who had worked at the IBPGR Washington Office, resigned during the year. The post was transferred to Rome to enable Dr Chapman's successor to function more effectively as a member of the research team. Two new staff were selected in November. It is anticipated that one further appointment will be made early in 1989.

Objectives



The overall objective of the Research Programme is to provide information to bolster the scientific and technological bases of collecting, genetic conservation and description. The Programme continues to pursue the main areas of research approved by the Trustees in 1986, namely: seed conservation; *in vitro* conservation; genetic diversity; and regeneration and evaluation strategies, including aspects of pathology and germplasm movement. Within each major area the barriers to effective and safe germplasm conservation are being identified and will be tackled in order of priority.

The aim is to make a concerted effort to address effectively the most urgent problems rather than to spread resources too thinly. Over the past 14 years, IBPGR has made a large investment in collecting and storage of germplasm and many national and international programmes have contributed very substantially to the growth and maintenance of the collections. Many areas of research need to be explored to ensure the long-term protection of this investment, to improve the efficiency and reduce the cost of seed conservation, and to develop methods for conserving germplasm of species that cannot yet be conserved indefinitely, such as those that are vegetatively propagated or have recalcitrant seeds.

By the beginning of 1988, almost two-thirds of the funds earmarked for research that year had already been committed to continuing projects. In general, these projects were allowed to run to completion and where appropriate incorporated into the restructured programme.

Research networks

IBPGR has decided to foster the development of research networks that will address priority problems through an interdisciplinary approach. Where possible these networks will enable scientists and institutions in developed and developing countries to work together to solve problems and implement solutions. To this end, the IBPGR Visiting Scientist Scheme was announced at International Centers Week in Washington in November. This scheme, to commence in 1989, will support inter institutional visits by selected scientists to collaborate in projects of the IBPGR Research Programme. Awards will be

available for periods of study ranging from two to 12 months.

The technique of bringing together groups of specialists to identify research priorities in particular fields, which IBPGR has used successfully in the past, has been extended to include the planning of complementary and/or collaborative research projects. Two such group activities, concerned with embryo conservation and taxonomic research in the genus *Allium*, are described below in greater detail.

Genetic diversity

To plan and carry out a worldwide programme of germplasm conservation, it is important to know the species relationships and patterns of variation within crop genepools. IBPGR is employing a variety of techniques, some simple and unsophisticated and others at the forefront of research in biotechnology, to investigate this area. IBPGR's work includes identifying the wild relatives of crop species, mapping the known distributions of crop genepools and recording ecogeographic variation in them, investigating genetic systems (including breeding systems) of crop relatives and, at the molecular level, developing and applying various marker techniques to assess patterns of genetic variability in plant populations and in genebank accessions.

Consolidation of past work

Over the past few years IBPGR has carried out a number of projects in the area of genetic diversity either to understand species relationships in order to target collecting or to assess variability in collections. In relation to the latter it has accepted the concept of core collections, which will provide a ready point of access to collections for users. Other research, not funded directly by IBPGR, represented a follow-up to IBPGR work, e.g. research on the wild genepool of *Hordeum sensu lato* at Swedish Agricultural University, Svalöv, Sweden, on the wild *Brassica* genepool also at Svalöv, and on the wild *Avena* genepool at WPBS, UK, Radzikow, Poland and Svalöv (this work related to ECP/GR).

In 1988 the opportunity was taken to consolidate past efforts and to prepare several survey reports for publication. A consultant was engaged to work on manuscripts for publication in the IBPGR series 'Systematic and Ecogeographic Studies on Crop Genepools'. A second consultant assembled and assessed all work on genetic diversity supported by IBPGR since its foundation in 1974, in preparation for a review of the genetic diversity programme in 1989.

The latter consultant found that after significant support for collecting missions in the 1970s, IBPGR slowly shifted its emphasis towards agromorphological characterization of existing crop collections, especially in developing countries. IBPGR has funded pioneering work using multivariate statistical methods to reveal information about genetic diversity. By contrast, only limited use has been made of biochemical and molecular methods, which are helpful for characterizing germplasm collections and which are emerging from the experimental phase and becoming available for routine analysis of genetic variation.

In addition to preparing a report on these findings, the consultant set up a database to facilitate information exchange and coordination of future research activities in the field of genetic diversity.

Studies on the patterns of diversity in the genus *Musa* using isozymes and organelle DNA markers were initiated at Florida International University/ USDA, Griffin, Georgia; additionally, variation related to cyanide content in *Phaseolus lunatus* was investigated in Gembloux, Belgium and a study on the *Digitaria* genepool commissioned from the Centre for Underutilized Crops, Southampton, UK.

Some important ecogeographic surveys of germplasm acquisition were continued in 1988.

Dr Richard Mithen, an IBPGR Collector based in Harare, Zimbabwe, continued his research on the systematics of *Vigna*, with emphasis on the *Vigna unguiculata* complex. He completed a revision of the intraspecific taxonomy of this species in south–central Africa and this was accepted for publication. Dr Mithen visited several herbaria in southern Africa and Europe to study and identify *Vigna* material and he attended a congress on African taxonomy in Hamburg, FRG. In parallel to this work a report was finalized on data from herbaria for all African and Asian *Vigna* species.

Illustration; *Vigna unguiculata*; the infraspecific taxonomy of this species in south-central Africa and Europe was revised by an IBPGR Collector in 1988.

In a joint project between the University of Zimbabwe and the Jodrell Laboratory, Kew, UK, accessions of wild *Vigna unguiculata* from IBPGR's collecting in southern Africa have been screened for bruchid resistance and encouragingly high levels of resistance have been found.

A five-year project, based on the collection of Triticeae in China of wild grasses related to wheat (Triticeae), included collecting missions in 1988 to the north China plain, northern Sichuan Province and Tibet. Two teams, led by scientists from Sichuan Agricultural University and the Institute of Crop Germplasm Resources (CAAS), worked independently. There was extensive overseas collaboration in the survey missions involving scientists from Sweden, Denmark, France, Japan, the USA and Australia. Seed accessions are described in the section on Germplasm acquisition (p.29). Chromosome counts were reported for 38 taxa of the tertiary genepool of wheat/barley/rye, and many with forage potential, encompassing diploids, tetrapoids and hexaploids.

Also in the Triticeae, a biosystematic study of the genus *Thinopyrum* is being carried out at Utah State University, Utah, USA, with field studies in the Mediterranean region.

Ecogeographic work on *Citrus* in southeast Asia continued, and an agreement was reached to extend this work to Sumatra in 1989 with special project funding from US–AID, and to include wild mango species in the survey.

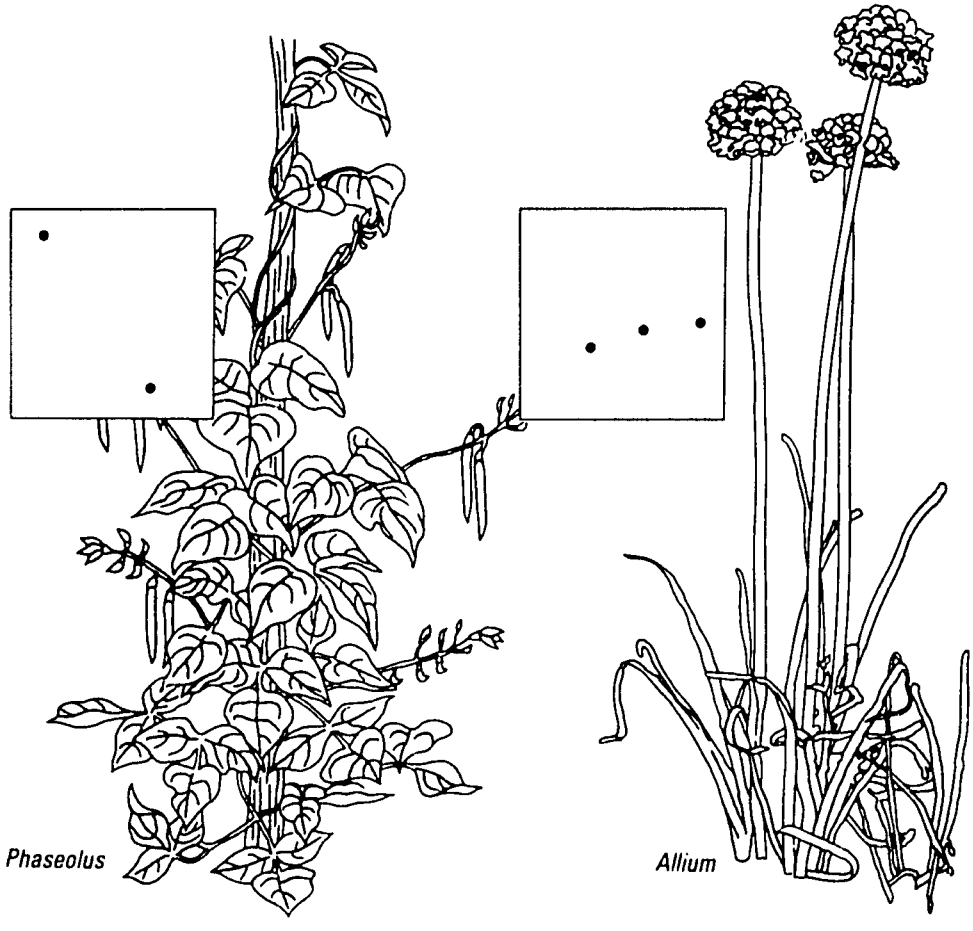
In addition, during 1987 and 1988, genetic diversity in pea accessions collected near the centre of origin of domesticated pea was measured in IBPGR research at Cornell University. 237 accessions from at least 17 countries were characterized for genotype using 59 isozyme loci and for genes controlling morphological characters. The results indicated that accessions with coloured flowers contain most of the isozyme diversity; most accessions from Europe and USA have white flowers and contain relatively limited allozyme diversity. Four of seven alleles that were indentified only once among the 237 samples were from accessions collected in Asia. Apparently there is considerable diversity in this area, which has not been adequately collected. By contrast, all rare alleles identified in material from Afghanistan were found in two or more accessions. These results clearly indicate the need for further collecting in southwest Asia.

New initiatives

Two further lines of research in genetic diversity were initiated by IBPGR in 1988, involving collaboration between workers in different institutions and resulting in what IBPGR has chosen to call 'aggregate projects'.

The first of these projects aims to develop practical strategies for maintaining genetic variability in seed collections during the regeneration process. Wild species of *Phaseolus* have been chosen for a case study to be undertaken at CIAT, Colombia to test the maintenance of variability over four or five seed regenerations. The interpretation of the results of this work will be assisted by collaborators at the University of California, Davis, California, USA, who will seek to identify highly polymorphic DNA markers. IBPGR is contributing financially to both parts of the study. The regeneration plots established at CIAT for this project will be used by staff there to evaluate the wild species for useful traits. The cost of the field work will be shared between CIAT and IBPGR.

Another aggregate project has been developed that involves the collaboration of ZIGuK, GDR, RBG, Kew, UK and the Rijksherbarium, Leiden, in the Netherlands. Lack of taxonomic knowledge has been a major stumbling block to germplasm conservation in *Allium*. This project seeks to clarify taxonomic relationships in the sections of the genus that contain edible species and their wild relatives. ZIGuK will study the infrastructure of the genus at Gatersleben, using its own resources. IBPGR, in addition to its coordinating role, has funded a revision of the section *Allium* (comprising approximately 100 species) at RBG, Kew, as well as a survey, to be undertaken from Leiden, of the species cultivated in southeast Asia and their relationships to the wild and cultivated species of southern China.



New initiatives in genetic diversity; aggregate projects. CIAT, IBPGR and the University of Davis will seek to identify highly polymorphic DNA markers in wild *Phaseolus*. IBPGR, RBG, Rijksherbarium, Leiden and ZIGuK are cooperating to clarify taxonomic relationships in *Allium* species and their wild relatives.

Seed conservation research

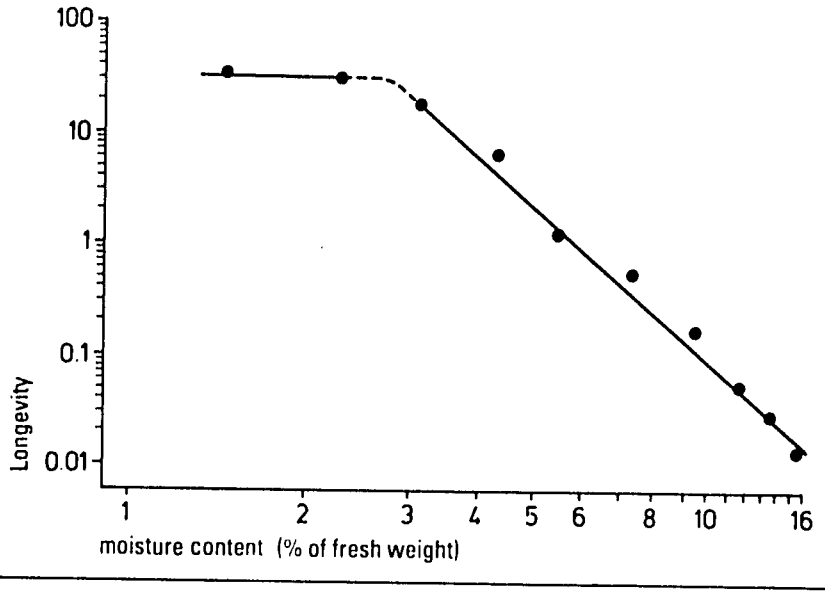
In the early years, IBPGR's main objective in the area of seed conservation was to assist developed and developing countries to establish facilities to store seed. However, the long-term management of these collections requires a better understanding of the responses of the seed to storage conditions. Since 1987, the budget for research on seed conservation has increased significantly in line with IBPGR's revised priorities. Research funded by IBPGR in 1988 produced excellent results which could have a great impact on the conservation of plant genetic resources.

Ultra-low seed moisture content

According to well-established research, every 1% reduction in seed moisture approximately doubles the life of the seed, as does each 5°C reduction in seed storage temperature. It is advisable, therefore, to keep seeds at a low moisture content for long-term storage. One critical question is how low seed moisture content can drop without producing adverse effects. In 1973, Harrington reported that seeds dried below 4–5% moisture deteriorated faster than seeds with 5–6% moisture levels. This is probably due to damage from lipid autooxidation. However, an IBPGR research project at the University of Reading found that for certain crops, seed storage longevity may be increased dramatically by storing seeds at a moisture content of 2–3%. As shown in Fig. 6, when seeds of *Brassica napus* were stored at 3% instead of 5%, the half-viability period increased about 12 times.

This research demonstrated that a wide range of species have a lower limit of percentage seed moisture content. Below this, further desiccation is generally of no additional benefit. This critical moisture content varies substantially amongst species; of the 15 species on which studies have been concluded to date, the values range from 2 to 6%. Lower values can be achieved for oily seeds rather than for starchy seeds: oily seeds show much poorer longevity than starchy seeds at the same storage temperature and moisture content. It was also found that a reduction in seed storage moisture content from 5 to 2% in rape seeds provided approximately the same increase in longevity as a reduction in seed storage temperature from +20 to −10°C (Fig. 7). Ultra dry storage is potentially very cost effective, particularly in the tropics, but experiments to investigate the physiology and genetic stability in seeds stored at these

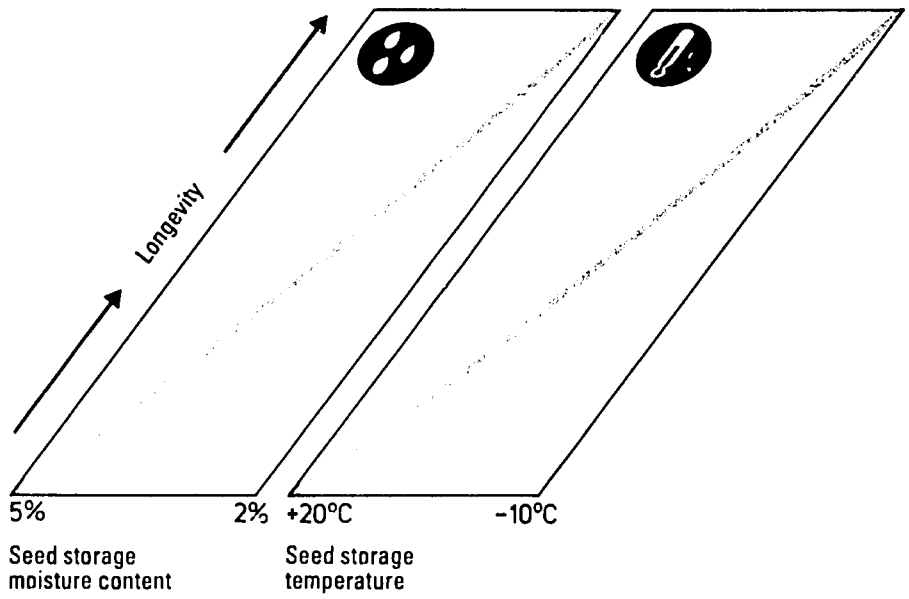
Figure 6 **Effect of ultra-low seed moisture content on seed longevity**



Left *Brassica napus* seeds were dried to different seed moisture contents and hermetically stored for various time periods. (Adapted from R.H. Ellis, T.D. Hong and E.H. Roberts (1989) Annals of Botany, UK.)

50 *Right* A reduction in seed storage moisture content from 5 to 2% in rape seeds provided approximately the same increase in longevity as a reduction in seed storage temperature from +20 to −10°C.

Figure 7 **Increasing seed life by decreasing moisture and temperature**



moisture content levels have to be carried out before this procedure can be recommended for use in genebanks.

Preservation of recalcitrant seeds

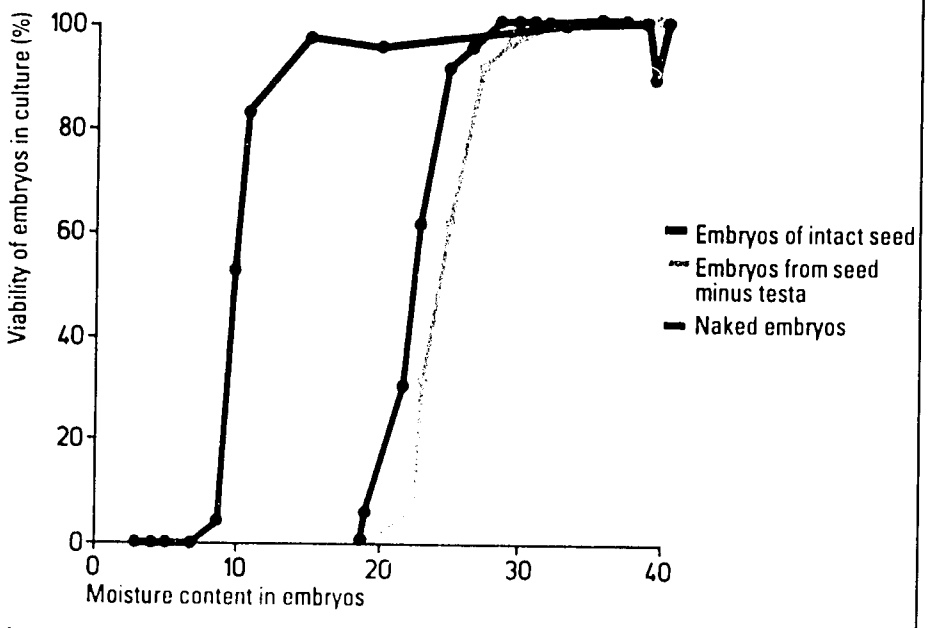
The major characteristic distinguishing orthodox and recalcitrant seeds is their sensitivity to desiccation and low temperature. Appropriate technology for long-term storage of recalcitrant seeds has not yet been developed, even though many of the major plantation crops, fruit trees and timber species produce recalcitrant seeds. IBPGR support continued in 1988 for a project at the University of Agriculture, Selangor, Malaysia, that is studying moisture variation and desiccation sensitivity in seeds and excised embryos of jackfruit. Although the jackfruit seed could not be dried below 22% moisture content without significant loss of viability, the naked embryo dried to 10% moisture content retained a viability higher than 80% (Fig. 8). After treatment with a protectant such as proline, the naked embryos could be dried to 8% moisture content without great loss of viability. Thus, desiccation injury that affects whole seeds can be avoided by drying excised embryos. The next stage of this investigation will focus on overcoming low-temperature damage. A report entitled 'Recalcitrant Seeds – A Status Report' by H.F. Chin and including a bibliography covering 1979–87 by H.W. Pritchard was published by IBPGR.

IBPGR also initiated a research project at Zhongshan University, Guangzhou, China, to investigate conservation techniques for longan, lychee and mango seeds and their excised embryos.

Genetic stability in seeds during storage and regeneration

A project carried out cooperatively by the Boyce Thompson Institute, Cornell University, USA, the National University of Mexico and CIMMYT, Mexico, generated fruitful results in 1988. The objectives were to improve understanding of genetic control of storage characteristics in maize, the biochemical basis of good and poor storage, and genetic stability during seed storage and regeneration. Experimental data indicated that the content of

Figure 8 **The effect of desiccation on excised embryos of jackfruit and percentage viability in *in vitro* culture**

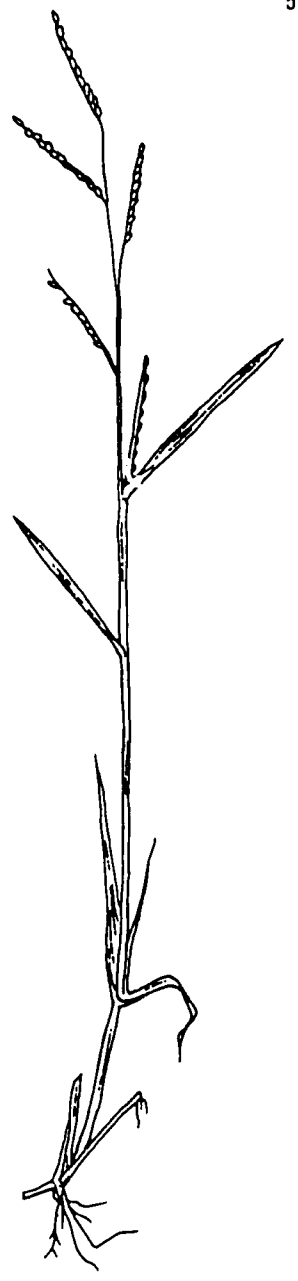


Data from H.F. Chin, P.C. Stanwood and B. Krishnapillay (1988), University of Agriculture, Malaysia and NSSL, USA.

polyamine in maize embryos was correlated with seed longevity. Embryos of the C2 line of maize, which has a long storage life, have a significantly higher polyamine content than those of the C6 line which has a very short storage life. Both polyamine content and good storage characteristics appear to be controlled by nuclear factors. In addition, DNA breakage occurred prior to viability decrease in seeds of the C2 line.

A project at Cornell University, USA examined successive seed increases in each of two onion accessions, using the isozyme technique for 11 enzymes, to determine whether loss of genetic diversity was occurring as a result of small sample size or inbreeding effects. Despite the small size of the reproducing population, genetic diversity appeared to be maintained in the two accessions tested.

Genomic alteration after long-term storage of seeds was studied at Ohio State University, USA. This project applied molecular probes and other techniques to dry soyabean seeds following long-term storage. Approximately 30% of the DNA sequences from one cultivar showed some variation in structure, but 30-year-old seed of another cultivar showed no such variation with any of the probes used. Another project at Ohio State University used techniques of electrophoresis and restriction fragment enzyme digestion of DNA to investigate the change in genetic integrity in seeds following storage and regeneration.



Brachiaria brizantha

Seed dormancy

Tropical forage species often have dormant seeds that fail to germinate during viability tests. A research project at CENARGEN, Brasilia, Brazil has developed germination methods to improve the monitoring of seed viability for such species. For instance, freshly harvested seed of the grass *Brachiaria brizantha* has strong dormancy. Preliminary results indicate that removing the seed coat could break this.

JAAS in Nanjing, China developed methods to induce seed dormancy for

long–term storage and to break seed dormancy for viability monitoring for *Brassica*. Experimental results revealed that seed dormancy was affected by the circumstances in which the seed was harvested. For example, dormancy was highest when seeds were harvested 41 days after flowering. Dormancy was increased when seeds were dried within the seed pods. Furthermore, dormancy can be partially broken by after-ripening and by germination at alternating temperatures (2 and 27°C).

Embryo conservation workshop

A workshop on embryo conservation with emphasis on recalcitrant seeds was held in the Wood Museum, RBG, Kew, UK, on 27–28 June 1988. Nineteen scientists from ten countries attended. This was the first time that experts on recalcitrant seed storage, artificial seeds, tissue culture and cryopreservation had met together to develop proposals for the storage of germplasm of recalcitrant seed-producing crops. A strategy linking seed, embryo and *in vitro* research, including various techniques, was devised. The participants outlined their potential contributions to 'aggregate' research addressing different aspects of the problem. IBPGR is now considering proposals involving collaboration between different laboratories.

In vitro research

The *in vitro* conservation research programme focuses on target crops that have conservation problems either because they have recalcitrant seeds or because they are vegetatively propagated. Where beneficial, crop model systems are also used to develop technologies relating to collecting and storage. IBPGR has maintained as a central objective in project planning and assessment the development and promotion of comprehensive *in vitro* conservation schemes for a limited number of crops. Cassava, coconut and *Musa* are appropriate models and a number of research projects, as described below, are designed to contribute to reaching that objective.

In vitro collecting

The development of *in vitro*-based collecting methods is prompted by collecting difficulties relating to poor seed availability or deterioration in collected material before it can be placed in a genebank. Research in this area moved in 1988 from exploratory studies on a few species to a wider range of crops and use of *in vitro* collecting techniques in the field.

A collaborative IBPGR – IRHO project in Côte d'Ivoire refined methods for collecting coconut embryos. Endosperm plugs or embryos can be explanted in the field.

Contamination rates are low (5 – 11%). Between 50 and 90% of the embryos germinate and develop during the first six months in culture. Removal of the haustorium from the embryo promotes strong plantlet development and reduces culture costs. 80% of the plantlets survive transplanting to *in vivo* growth. This research was presented as a poster exhibit at the International Congress of Genetics in Toronto, Canada.

The Research Institute for Estate Crops in Bogor, Indonesia has confirmed the feasibility of *in vitro*-based collecting methods for coconut.

An IBPGR-funded field project in west Java, carried out by the Research Institute for Estate Crops, Bogor, Indonesia, has successfully applied this technique, confirming its feasibility. The technique is easy to use and significantly reduces manpower requirements and costs. Efforts are now concentrated on improving laboratory methods to culture germinated embryos and successfully establish them in field genebanks.

Two projects are refining and testing *in vitro* collecting methods for woody species. In one project, an IBPGR Intern located at the Istituto Agronomico Mediterraneo, Valenzano, Italy, is examining methods for collecting germplasm of *Prunus* and *Vitis* spp. to facilitate acquisition and movement of germplasm of these crops in the Mediterranean and other regions. Initial findings suggest that low levels of contamination with consequent high survival levels of the cultures

can generally be achieved. Field testing and wider application of the method will be attempted during 1989. Another project, in collaboration with CATIE, Costa Rica, is aimed at improving *in vitro* collecting methods for avocado and cocoa.

Research initiated in 1987 at ILCA, Ethiopia, has continued to develop slow-growth techniques for the forage grasses *Cynodon, Digitaria* and *Brachiaria*. Storage of cultures at 15°C appears to be successful. During 1988, the work has been extended to include the development of *in vitro* collecting methods for these grasses and to transfer germplasm *in vitro* from Ethiopia and Zimbabwe to CIAT, Colombia.

Storage of *in vitro* cultures

Two approaches are taken to *in vitro* storage of germplasm: slow growth for short- to medium-term conservation and cryopreservation for long-term conservation. IBPGR continued to support both approaches in 1988. In addition to slow-growth research on forage grasses, projects have continued on *Allium* spp. at the Hebrew University, Rehovot, Israel; on sweet potato at Clemson University, South Carolina, USA; and on the aroids *Colocasia esculenta*, *Xanthosoma* spp. and *Cryptocoryne* spp. at the Agricultural University, Wageningen, the Netherlands.

Sweet potato presents no serious difficulties in storage when growth is retarded by adding manitol at 30–40 g l^{-1} to the medium. However, the aroids show intergenotypic differences in their response to storage temperature and

Shoot cultures of *Xanthosoma* sp. stored without (*left*) and with (*right*) 3% mannitol. Exposure to mannitol slows down growth. (M.M. van der Werff. G. Stavitsky, Agricultural University, Wageningen, the Netherlands.)

composition of the culture medium. Slow-growth storage for extended periods appears to be most feasible for *Colocasia esculenta*.

The development of culture systems is an important aspect of all *in vitro* conservation work. Most slow-growth studies to date have involved shoot cultures, but IBPGR is supporting a project at the University of Florida Tropical Research and Education Center, Homestead, Florida, USA, to explore the use of zygotic embryos and somatic embryogenic cultures for *in vitro* conservation. Research will include assessing the effect of introducing an adventitious proliferation stage on the phenotypic and genotypic stability of the material.

Cryopreservation

Cryopreservation is a valuable means of tissue conservation since the method provides physical stability and requires little management and low input of consumable material. IBPGR's work on cryopreservation of plant germplasm represents a major part of the research that is being done around the world. Three continuing projects and three projects that began in 1988 are exploring cryopreservation methodology for a range of crops.

Shoot-tips of sweet potato and somatic embryos of aroids have continued to prove difficult to cryopreserve, showing little or no viability below −15 to −30°C. In sweet potato, however, some regeneration of callus has been achieved at Clemson University, South Carolina, USA, from material frozen in liquid nitrogen. At the University of Saskatchewan, Canada, further progress has been made in developing methods to cryopreserve dormant buds of *Prunus* spp. Genotype and season affect survival. Controlled dehydration enhances survival. Shoot culture systems are being developed and subjected to *in vitro* acclimatization and cryopreservation to, in effect, integrate propagation and conservation methodologies.

New projects on cryopreservation involve three crops targeted by IBPGR for systematic attention, namely cassava, coconut and *Musa*. All three have specific long-term conservation needs that can best be met by cryopreservation under different systems of experimental culture.

Cassava

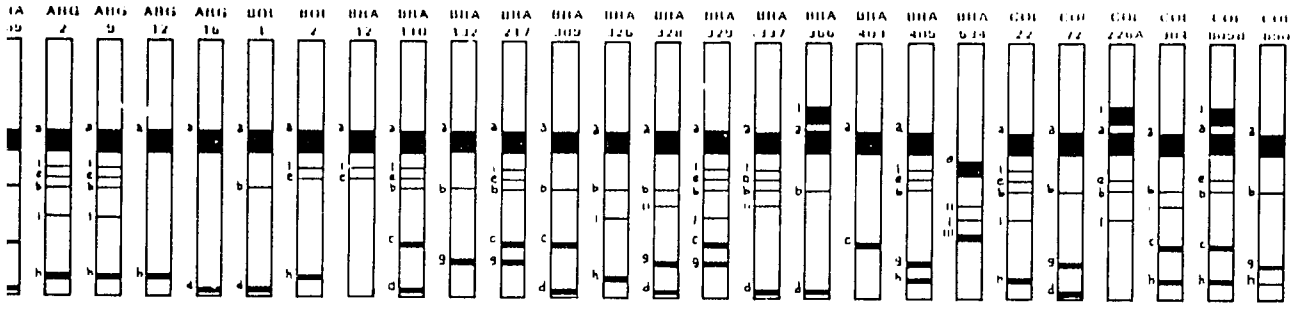
CIAT is carrying out a project to refine cryopreservation methods for cassava that were developed in an earlier IBPGR-sponsored project at the University of Saskatchewan, Canada.

Coconut

ORSTOM and IRHO-CIRAD are collaborating with IBPGR to develop methods to culture and cryopreserve immature coconut embryos, partly in Côte d'Ivoire and partly in France. The work capitalizes on technical expertise gained in the coconut *in vitro* collecting project described earlier.

Musa

A collaborative project with CATIE, Costa Rica also began in 1988. Methods will be developed to cryopreserve *Musa* germplasm. The CATIE project leader received specialist training by cryopreservation experts at IRHO, Paris, France, supported by IBPGR, to prepare for this project.



In vitro culture itself is believed to lead to genetic instability, or somaclonal variation, but little is known of the effect that storage by slow growth or cryopreservation might have on the stability of the genome. IBPGR is currently funding two projects that specifically address the question of stability. One, based at the University of Western Ontario, Canada, involves maize model systems; the other, at the University of Nottingham, UK, is examining potato, *Allium* and rice cultures. Both teams have developed analytical (including RFLP), culture and storage methods. Cultures that will be examined during 1989 have been established in storage.

IBPGR also commissioned a report to survey the literature on biochemical damage in stored germplasm, especially damage caused by free radicals. This should enhance the understanding of potential fundamental causes of damage in stored *in vitro* cultures and point to methods of control.

Pilot *in vitro* active genebank

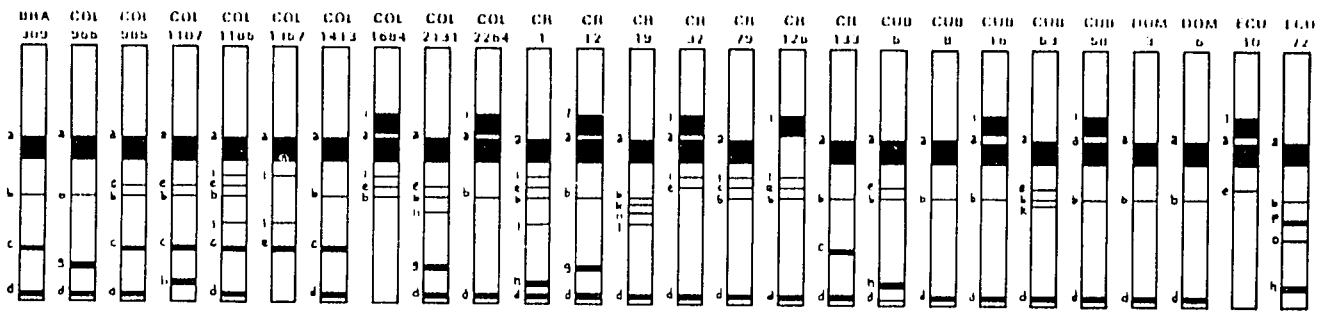
The IBPGR-CIAT collaborative project to develop a pilot *in vitro* active genebank began in 1987. It is testing model standards of operation for an *in vitro* genebank of cassava in which germplasm is maintained as shoot cultures in slow growth. 100 samples selected from the CIAT collection of about 5000 accessions have been introduced into *in vitro* storage after disease indexing and therapy. Shoot nodal cuttings have been multiplied to provide replicates for storage and to monitor stability by morphological and isozyme analyses after being re-established in a field genebank. The 100 accessions have been characterized by esterase isozyme content, through cluster analysis on the basis of visual scoring and computer scanning of gels. Acid phosphatase and diaphorase isozymes are also being analyzed.

IBPGR has developed a database management system to assist in carrying out operations in the pilot genebank such as assembling of passport data on accessions, timing subculturing operations, recording viability observations and registering inputs required to maintain the genebank. This system will provide a model that will make an important contribution to the efficient management of *in vitro* collections of other crops.

In vitro databases

IBPGR has been collecting and analyzing data on *in vitro* conservation research for eight years through a project based at the University of Nottingham. Questionnaires are used to gather data and scientists worldwide contribute to this comprehensive information resource. The most recent survey yielded over 1100 entries, including much unpublished information. A free searching service is offered. Feedback from users indicates a high degree of relevance and a high proportion of new information in the output provided.

Both the database and the pilot *in vitro* active genebank were presented as poster exhibits at the International Congress of Genetics in Toronto, Canada.



100 cassava accessions from the CIAT collection are being stored in a pilot *in vitro* genebank and their stability is being monitored by, among other methods, isozyme analysis (50 accessions shown). (CIAT Biotechnology Research Unit: W. M. Roca and R. Chávez.)

Plant pathology and quarantine

The efficient and safe movement of germplasm is an essential aspect of activities in plant genetic resources. Factors limiting movement can have wide-ranging effects on everything from collecting to the use of the germplasm. Plant pathology and quarantine, an important area within IBPGR's Research Programme, focuses on two major activities:

- Developing and distributing internationally accepted technical guidelines for the safe movement of germplasm.
- Developing improved methodologies to expedite the safe movement of germplasm. These include applying the most advanced biotechnology methods for detection and elimination of disease.

Safe movement of germplasm

The rapid increase in the volume of germplasm exchanged internationally and the recent advances in biotechnology have prompted IBPGR, in collaboration with the Plant Protection Service of FAO, to launch a programme for the safe and expeditious international exchange of germplasm.

Crop-specific technical guidelines are to be the product of meetings bringing together eminent crop specialists. For their respective mandate crops, IARCs will play an important role in developing these guidelines. FAO and IBPGR have opted for a policy of identifying a collaborating institution that will carry out the practical arrangements for a particular meeting and contribute financially to the programme.

In 1988, three such meetings were held. The first was on *Musa* (bananas and plantain) with INIBAP as the collaborating institution. The second meeting was in collaboration with ACRI and dealt with cocoa. The third meeting, held in collaboration with IPO, covered sweet potato, yams and edible aroids. The guidelines for these first three meetings will be published with FAO in 1989.

Disease indexing

The lack of rapid indexing methods to detect disease often proves a bottleneck in the efficient movement of germplasm. The most advanced techniques in disease indexing currently available were reviewed in 1988 to facilitate the prompt integration of these techniques into the IBPGR Research Programme on disease indexing.

Two new projects were initiated with Agriculture Canada, Vancouver Research Station, BC, Canada. One seeks to develop rapid and sensitive indexing methods for a number of virus and virus-like diseases of vegetatively propagated crops. Monoclonal antibody and/or nucleic acid hybridization tests will be developed. Work has started on a white-fly-transmitted virus-like agent involved in the sweet potato virus disease in Nigeria. The objective of the second project is to develop broad spectrum 'probes' for detecting viruses. These will be most useful for indexing wild relatives of crops since it is generally not known which viruses they harbour. The first phase of the project will study the feasibility of developing monoclonal antibodies that detect all members of a virus group.

Diagnostic probe for banana bunchy top virus

IBPGR supports a project at the Queensland Institute of Technology, Brisbane, Australia, to produce specific DNA probes for the detection of banana bunchy top virus. The initial approach has been to synthesize complementary DNA from double-stranded RNA purified from the virus-infected plants. 550 clones were screened using labelled double-stranded RNA (or synthesized complementary DNA). The results of these analyses were equivocal. It was then established that the cloning vector pUC12, used in all cloning experiments, has sequence homology with banana DNA and RNA. This finding led to another approach, namely to purify bunchy top virus particles and extract genomic single-stranded RNA that will be used for cloning.

Viruses of mangoes

A project was undertaken in 1988 to determine whether double-stranded RNA molecules isolated from mangoes with possible disease symptoms are of viral or viroid origin, and to develop detection methods for these molecules.

During the first year of the project, a limited survey revealed that two major double-stranded RNA species are reasonably common but not present in all samples. Preliminary results indicate that a viroid might be involved.

Detecting and eliminating viruses *in vitro*

Two rosaceous fruit crops were selected as model study systems for detecting and eliminating viruses at the *in vitro* propagation stages: peach infected with *Prunus* necrotic ringspot virus; and strawberry infected with strawberry mild yellow-edge virus. Tobacco infected with tobacco streak virus was selected as a methodological model for preliminary evaluation of the techniques.

With the peach model, a protocol for bud proliferation and elongation was worked out for three cultivars. The first results of serological virus detection tests using ELISA showed that the level of virus in individual plantlets remained fairly constant over six to eight weeks – the period between successive transfers to new media.

With the strawberry model, *in vitro* cultures infected with the virus were prepared from runner tips of known virus-infected strawberry plants. Preliminary experiments to isolate double-stranded RNA from *in vitro*-grown infected plantlets were performed. The reliability of this assay will be tested in the next phase of the project.

Non-destructive seed health testing

Because of the destructive nature of the available methodology, problems occur when testing seed health if accessions have only a small number of seeds. In 1988, a project was initiated at Iowa State University, Ames, Iowa, USA to study the feasibility of non-destructive seed health testing.

In the first stage, three large-seeded crop species (maize, soyabean and common bean) were used as models. Tests were carried out for viral, bacterial and fungal diseases. Because partial hydration is required in many traditional tests, the effect of partial imbibition was investigated, using different methods. All techniques tested so far have proved to decrease the germination rate.

An alternative approach was also investigated. It consists of extracting tissue from dry seeds with a metallic drill and testing extracted tissue for the disease. Preliminary results indicate that this does not decrease germination rate and that the tissue extracted from the seeds allows the detection of diseases with a reliability comparable to, or only marginally lower than, standard tests.

Far left Banana bunchy top virus has a drastic effect on plant growth.

Left Drilling seeds to extract tissue for disease indexing is showing promising results.

ADMINISTRATION

New Trustees appointed from the beginning of the year were Prof. J.A. Spence (Trinidad and Tobago) and Dr M. Touré (Senegal). These were nominated and elected by CGIAR. The Trustees held their annual meeting in Rome 24–26 February 1988 and elected the standing Executive, Programme and Nominations Committees. The Executive Committee met in Rome on 22–23 February and in Washington, DC 9–11 November. It held two extraordinary meetings, one in Rome on 26 February and the other in Singapore 11–12 July. The Programme Committee met in Rome 23–25 May and in Washington, DC 7–8 November. Prof. V.L. Chopra was elected Chairman of the Programme Committee.

The Nominations Committee met on 23 February in Rome and continued its work by correspondence.

In 1988, observers from Canada, India, the Netherlands, Spain and the USA attended meetings. Prof. E.T. York represented TAC at the Trustees' meeting in Rome.

Chairman, Vice Chairman and Director

Dr W.J. Peacock continued to chair the Board of Trustees in 1988. In February, the Trustees elected Dr A. Papasolomontos as Chairman to take up his duties in 1989. He later informed the Executive Committee that he would not be able to assume this task and a new election was required in February 1989.

In July, Dr. A. Papasolomontos resigned as Vice Chairman and subsequently

Representation at international/regional meetings

Apart from IBPGR, TAC and CGIAR meetings, IBPGR staff participated in a number of international or regional meetings in 1988. Selected meetings are listed below:

Presentation of papers/posters
Chairing of session/keynote speech
Press conferences

6–13 March	CIMMYT Global Maize Workshop, Londres, Mexico
20–24 March	IUBS/ISHS Working Group Consultation on Preservation and Exploitation of Medicinal and Aromatic Plants, Paris, France
17–21 April	USAID Symposium on Biotechnology in Agriculture in Relation to the Public and Private Sectors, Arlington, VA, USA
9–11 May	USDA XIII Beltsville Symposium on Biotic Diversity and Germplasm Preservation – Global Imperatives, Beltsville, MD, USA
30 May–3 June	VI Congreso Internacional de Cultivos Andinos, Quito, Ecuador
7–10 June	EC Working Group Meeting on Genetic Resources of Cruciferae Crops, Brussels, Belgium
17–22 June	First Meeting of Public Awareness Association for International Agricultural Research, CIMMYT, Mexico
June	5th International Conference of Scientific Editors, Hamburg, FRG
20–25 June	Seminar in Seed Pathology for ACP countries, CTA/Danish Institute of Seed Pathology, Copenhagen, Denmark

the Trustees elected Dr W.E. Tossell who, in accepting, resigned as Chairman of the Nominations Committee. The Trustees agreed to a proposal from the Executive Committee that Prof. F. Kikuchi take on this task.

Dr Tossell attended the CGIAR Center Board Chairs meeting in Rome 10–11 March and Dr Peacock attended the later meeting in Washington, DC 27–29 October. The Director attended regular meetings of the TAC and the CGIAR Committee of Center Directors in June, in Hyderabad, India and 26–28 October, Washington, DC, USA and extraordinary meetings on 8 January, Maui, USA and 12–14 May, Bad Homburg, FRG. The Director was also elected a member of a joint TAC/Center Directors Committee on Plant Genetic Resources.

Headquarters agreement

The Trustees of IBPGR agreed in 1988 to seek an extension of the existing Headquarters Agreement with FAO at the end of the year. FAO decided however, that this could not be done without payment for rent and overheads and that no further space could be made available in 1989. Accordingly, the Chairman reported to the Mid-term Meeting of CGIAR that short-term agreements were not conducive to carrying out the IBPGR medium-term programme approved until 1993, and that the Executive Committee had constituted itself as a task force to agree on an option for the long-term operational base of IBPGR.

An amended agreement was signed with FAO covering 1989 and 1990 and a supplemental budget request to cover additional costs was accepted by CGIAR in November. The Executive Committee agreed in November that IBPGR should seek new premises outside the FAO complex for occupancy in 1989.

Reviews and committees to advise the Director

The annual In-house Review for 1987 dealt with Public Affairs and was held on 20–22 January 1988 in Headquarters. The results were presented to the Trustees as a draft strategy on public affairs, which was approved in February 1988.

The 1988 In-house Review was held on 29 November–1 December in

2–10 July	V International Lupin Conference, Poznan, Poland
27 July–1 August	FAO Consultation of European Cooperative Network on Sunflower, Szeged, Hungary
26–29 July	XII International Sunflower Conference, Novi Sad, Yugoslavia
11–15 July	Cryo 88, 25th Annual Meeting of the Society for Cryobiology, Aachen, FRG
15–19 August	International Conference on Dryland Farming, Amarillo, TX, USA
14–18 August	Keystone International Dialogue on Plant Genetic Resources, Keystone, CO, USA
20–27 August	V International Plant Pathology Congress, Kyoto, Japan
20–27 August	XVI International Congress of Genetics, Toronto, Canada
September	ILDIS Workshop and Board Meeting, Southampton, UK
5–8 September	IV EUCARPIA Allium Symposium and 3rd Meeting of ECP/GR *Allium* Working Group, University of Warwick, UK
5–9 September	International Symposium on Horticultural Germplasm, Beijing, China
6–9 September	Founding Workshop for the Advanced Cassava Research Network, CIAT, Cali, Colombia
12–16 September	CGIAR Training Officers' Meeting, CIP, Peru
26–30 September	IBPGR/UNEP/IITA/CNR Workshop on Plant Genetic Resources in Africa, Nairobi, Kenya
17–21 October	IBPGR/UNEP/IITA/CNR Workshop on African Plant Genetic Resources, IITA, Ibadan, Nigeria
20–21 October	24th Annual Meeting of Editors of UN Periodicals, Unesco, Paris, France
6–12 November	International Rangelands Congress, New Delhi, India

Headquarters to discuss publications. A draft strategy on publications was tabled at the 16th Annual Meeting of the Trustees in February 1989.

During 1988, two programmes were reviewed by external committees: Training (Prof. Mary Barksworth, University of Utah (Chair); Mr Rashid Anwar PARC, Pakistan, Prof. F. Kikuchi, Trustee); and Seed Conservation Research (Prof. D. Bewley, Guelph, Canada (Chair); Prof. Mohan Ram, Delhi, India, Prof. H.F. Chin, Trustee). The reports were tabled at the Programme Committee meeting and a number of changes in emphasis discussed.

A specialized IBPGR workshop on embryos was held in June 1988 at the RBG, Kew, UK, as described in the Research section above.

The IBPGR Regional Committee for Southeast Asia met in Singapore 14–15 December.

Staffing The Regional Offices for East Asia and for South and Southeast Asia opened in 1988. Coordinators were appointed to both Offices and an Assistant Coordinator was appointed to the East Asia Office. The Regional Office for South America, located in Colombia (for which an Associate Coordinator has been appointed), was strengthened in 1988 by the opening of a second Office in Mexico (for Meso-America and the Caribbean), hosted by CIMMYT, and the appointment of a full-time Coordinator. The position of Coordinator for North Africa, Southwest Asia and Europe, vacant in 1987, was filled during the year. Other Field Programme appointments in 1988 included two Collectors (one based in Cyprus and one in Zimbabwe) and new staff for the Seed Handling Units in Kew and Singapore. In the Research Programme, a post with responsibility for *in vitro* conservation was filled early in 1988. A Publications Officer took up post in June. Dr N.M. Anishetty, who worked for IBPGR for ten years, most recently in the area of active collections, transferred in mid-1988 to the Secretariat of the FAO Commission on Plant Genetic Resources.

Finance The core programme of IBPGR was funded in 1988 by its donors, without recourse to the funds of the World Bank (see Financial Report). In addition, European governments provided special project funding for ECP/GR. The governments of Finland, the Netherlands, Norway and Sweden provided

A selection of the projects completed by Consultants to IBPGR in 1988

Frank Begemann was responsible for assessing all extant IBPGR reports for research on genetic diversity and summarizing all research on genetic diversity carried out by IBPGR and other institutions. He identified further significant gaps in the research in relation to current IBPGR priorities.

Eliseu Bettencourt revised the IBPGR Directories of Germplasm Collections of cereals and vegetables. The work will continue and both directories are scheduled for printing in 1989.

Mike Bolton updated the computerized database on IBPGR-sponsored germplasm collecting projects. He also examined and collated all information available on collections of African rice, *Arachis*, barley, maize and sweet potato, and prepared case studies and maps on the known distribution of the taxa, using passport data on currently held collections and other sources of information.

Ilona de Borhegyi documented IBPGR collecting missions in: Zimbabwe (wild *Vigna*), Mali (forages), Cyprus (fodder crops), Indonesia (wild mango and citrus), Kenya (wild finger millet) and photographed related agricultural activities. She also researched and catalogued the photographs from 15 years of IBPGR missions and related activities, and indexed the collection of 2700 photos into a new IBPGR Photo Library computer database, which will be made accessible to all outposted staff and other CGIAR Centers.

Peter Haase ascertained the major phytogenetic and expected areas of environmental heterogeneity for field-collecting missions

special project funding for the Pan-African Workshop. USAID pledged special project funds for continued research on *Mangifera* and *Citrus* in Sumatra and ACIAR, Australia for research on *Musa*.

Public Affairs

The medium-term strategy of the fledgling Public Affairs office – the first in the CGIAR system – evolved from discussions of the In-house Review on Public Affairs held early in 1988. As well as noting significant areas requiring strategic public affairs emphasis, the Review identified a number of target audiences and recommended the production of a number of potentially useful public information tools.

Based on these recommendations, the Public Affairs office produced several products in 1988: six posters, ranging from a very general description of IBPGR's activities to the specific taxonomy of legumes with high forage potential for Africa, and a brochure – in English and French – concerning IBPGR's activities in Africa for use by the IBPGR Offices in Nairobi and Niamey. In addition, the Public Affairs office mounted information displays of various sizes and degrees of elaboration for exhibition at conferences attended by IBPGR staff: for example, the XVIth International Congress on Genetics (Canada), the International Lupin Conference (Poland), the International Symposium on Horticultural Germplasm, Cultivated and Wild (China), the Workshop on African Plant Genetic Resources (Kenya) and the International Rangelands Congress (India). These exhibitions, which were usually accompanied by press conferences, provided significant opportunities for exposure, particularly the International Congress on Genetics in Canada, which was attended by over 2500 people.

Perhaps the most exciting public affairs event of the year was the initiation of a CGIAR system-wide plant genetic resources public awareness campaign for Latin America. The proposed three-year campaign, which grew out of recommendations put forward at the first meeting of the CGIAR Public Awareness Association in June 1988, will be spearheaded by IBPGR, with the critical involvement of CIAT, CIMMYT and CIP.

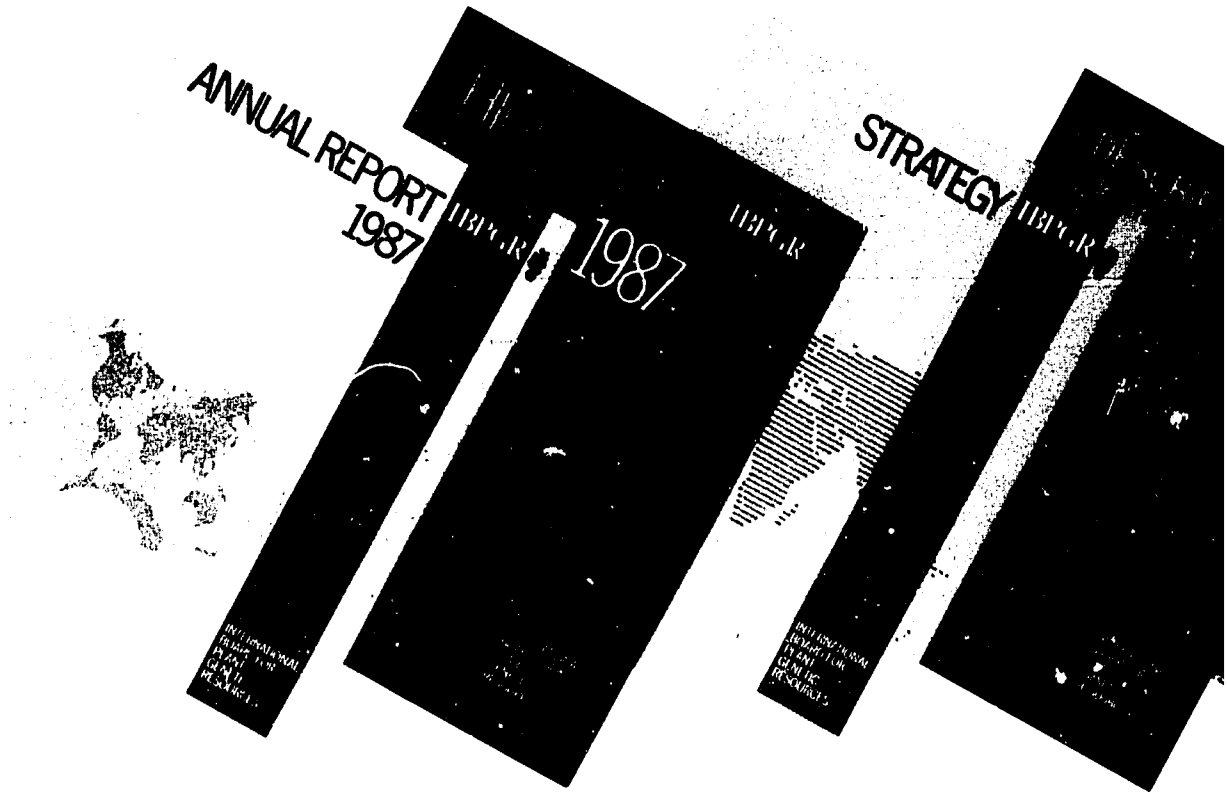
planned by IBPGR and prepared maps and briefing kits for field collecting on selected IBPGR missions.

Stephanie Hardy developed a draft of a revised Glossary of Plant Genetic Resources Terms, based on IBPGR's English-Arabic Glossary. The final version will be published in a number of languages.

K.L. Mehra undertook his first characterization mission to the Maldives in 1988 and assisted the National Programme in sowing/planting 582 accessions in the fields in Feridhoo Island. The local staff were trained to record observation data. Two more missions are planned for 1989: in May/June and in October 1989 for harvesting, and then processing of characterization data.

Piers Pool created a country profiles database, which will be linked into other existing IBPGR databases to form a comprehensive information network. One of the functions of the database is to provide IBPGR staff members undertaking duty travel with as much relevant information as possible about the countries they will be visiting.

J. Serwinski developed a system for linking IBPGR databases on: conservation facilities available in genebanks, and the germplasm conserved there, material collected with IBPGR support, country profiles and IBPGR-sponsored projects. He identified gaps in information and developed menu-driven software for data retrieval and data transfer between IBPGR databases. The systems were distributed to IBPGR Regional Coordinators.



Publications

General

Annual Report 1987
Strategy
Highlights 1987
Programme and Budget 1989–93
Conserving the Wild Relatives of Crops, by Erich Hoyt (IBPGR, IUCN, WWF)
Crop Genetic Resources of East Asia (S. Suzuki, ed.) Proceedings of the International Workshop on Crop Genetic Resources of East Asia 10–13 November 1987, Tsukuba, Japan

Newsletters/Bulletins

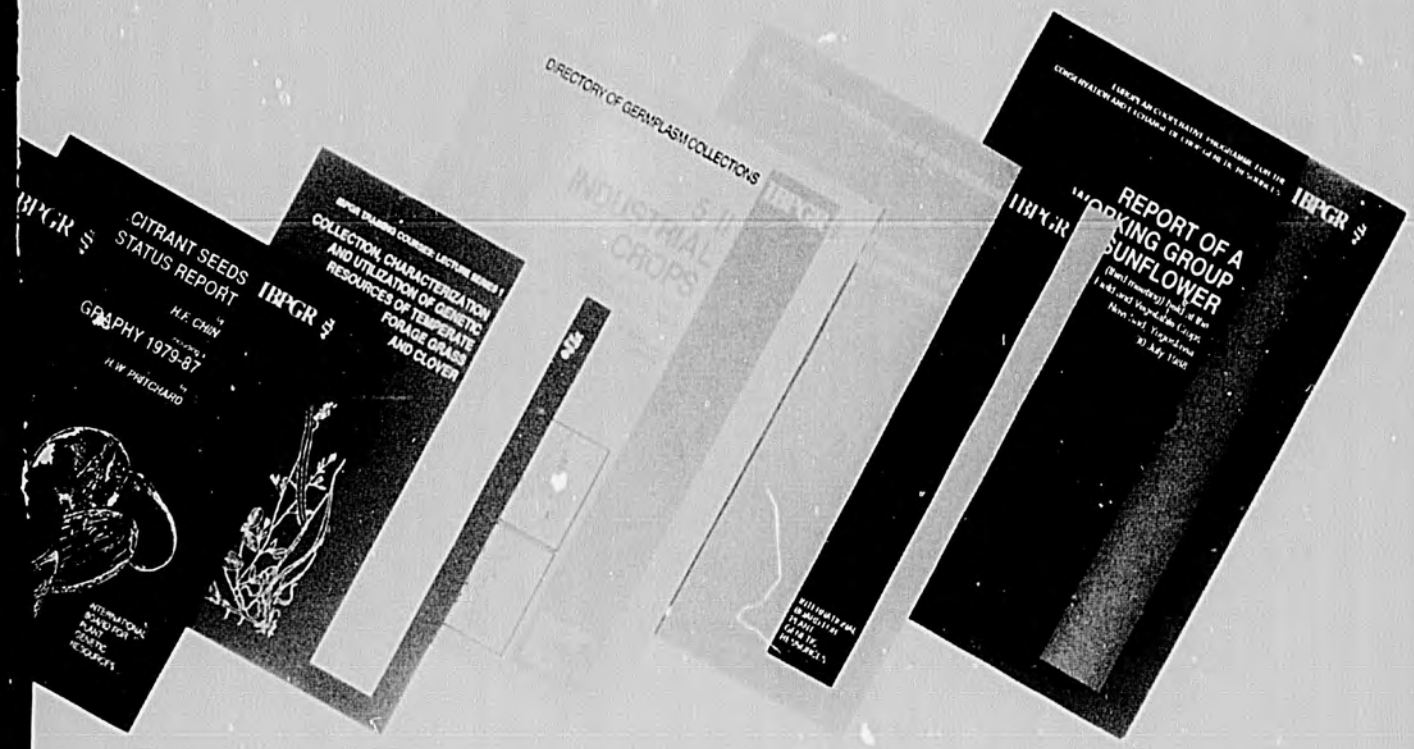
FAO/IBPGR Plant Genetic Resources Newsletters Nos. 71–74
IBPGR Bulletin for SubSaharan Africa, Nos. 2 and 3
IBPGR Bulletin for Europe, North Africa and Southwest Asia, Nos. 2–4

Characterization and Evaluation

Descriptors for *Citrus*
Descriptors for Eggplant
Descriptors for Papaya
Forage Legume Descriptors (reprint)
Strawberry Descriptors (reprint)
Lupin Germplasm Collections – Excerpted from Directory of Germplasm Collections. 1.II. Food Legumes, 1989

Training

IBPGR Training Courses: Lecture Series 1
Collection, Characterization and Utilization of Genetic Resources of Temperate Forage Grass and Clover



Research

Recalcitrant Seeds, A Status Report, by H.F. Chin. Including a Bibliography 1979–87 by H.W. Pritchard

IBPGR Advisory Committee on *In Vitro* Storage. Conservation and Movement of Vegetatively Propagated Germplasm: *In Vitro* Culture and Disease Aspects

Practical Manuals for Genebanks: No. 1. Procedures for Handling Seeds in Genebanks (reprint)

Project Application for Research Support

Visiting Scientist Scheme – announcement and details

ECP/GR

Report of a Working Group on *Allium*

Report of a *Beta* Workshop

European Apple Inventory, Part II: GDR (IBPGR/EUCARPIA)

European Catalogue of *Poa* L. (FAL, FRG – IBPGR)

European Catalogue of *Allium*

European Catalogue of *Medicago* (perennial species) (INRA/GEVES – IBPGR)

Public Affairs

IBPGR – leaflet

IBPGR in Africa – leaflet (English and French)

IBPGR Christmas Card 1988

The Vanishing Rangelands – poster

Legumes and Grasses with High Forage Potential – poster

Genetic Diversity and Erosion – poster

Workshop on Plant Genetic Resources – poster in English and French

IBPGR – general poster

Opening of Regional Office for West Asia – poster

IBPGR Staff in 1988

Office of the Director

Prof. J.T. Williams
Director

Miss D.E. Quaye
Secretary to the Director

Mrs C. Gorelli
Programme Assistant

Ms M.G. De Angelis [2]
Clerk

Mr P. Stapleton [2]
Publications

Ms R. Raymond
Public Affairs

Ms P. Blake [2]
Secretary

Ms M. Fabri
Clerk

Research programme

Dr Alison McCusker
Head

Ms L. Dalton [1]
Secretary

Ms C. Zanettin [2]
Secretary

Ir E. Frison
Plant pathology and quarantine

Dr Kar-Ling Tao
Seed conservation

Ms J. Nunan [2]
Secretary

Mr C.D. Chapman [1]
Evaluation and regeneration

Mrs G. El Belghami Sijelmassi [1]
Secretary

Field programme

Headquarters

Ir D.H. van Sloten
Head

Ms M. McArthur-Giannini
Secretary

Dr W.G. Ayad
Training

Ms S. Angus [1]
Secretary

Regional Offices

East Africa
c/o ILRAD
Nairobi
Kenya

Mr A.F.Y. Attere
Coordinator

Mr H. Kamau
Assistant Coordinator

Mrs. D. Shako
Secretary

Mr J. Goithuma
Driver

West Africa
c/o ICRISAT Sahelian Centre
Niamey, Niger

Ms J.A. Toll
Coordinator

Mme Ayélé N'Diaye
Secretary

Mr Abel Soubeiga
Driver

Latin America
c/o CIMMYT
Mexico

Mr L.G. Gonzalez [2]
Coordinator for Latin America

Mr F. Rincon
Assistant Coordinator

Special Project (Headquarters)

Dipl. Ing. P.M. Perret
ECP/GR

Ms R. Andarias de Prado
Secretary

Seed Handling Units

Ms J. Clark [2]
Royal Botanic Gardens,
Kew, UK

Ms R. Chng [2]
National University of Singapore
Singapore

[1] Left during the year
[2] Joined during the year

Mr D. Witmeyer [2]
Liaison Officer
c/o IFPRI, Washington DC, USA

Librarian
Candidate has been selected

Special programme on active collections:

Dr N. Murthi Anishetty [1]

Dr Lyndsey A. Withers
In vitro conservation

Ms R. Nash [2]
Secretary

Genetic diversity
Position vacant

Molecular biology
Position vacant

Dr R. Mithen
Research Associate
c/o Department of Biological Science,
University of Zimbabwe,
Harare, Zimbabwe

Research associate
(outposted)
Position vacant

Ms S. Ebel [2]
Secretary

Mr J. Konopka
Documentation

Ms M. Bonomi
Computer operations clerk

Mr R. Reid
Germplasm acquisition

Ms A. Taylor-Russo [1]
Secretary

Ms S. Bounford [2]
Secretary

Ms A. Castillio
Secretary

South America
c/o CIAT
Cali, Colombia

Dr L. E. Lopez J. [2]
Associate Coordinator for South America

North Africa, Southwest Asia and Europe
(Based at Headquarters)

Dr Y. Adham [2]
Coordinator

South and Southeast Asia
c/o NBPGR, New Delhi, India

Dr J.M.M. Engels [2]
Coordinator

Mr A. R. Madas [2]
Administrator

Mr B. R. Sharma [2]
Driver

East Asia
c/o CAAS
Beijing, China

Ms Zhou Ming-De [2]
Coordinator

Mr Cui Yun-Xing [2]
Assistant Coordinator

Ms Sun Wei [2]
Secretary

Collectors

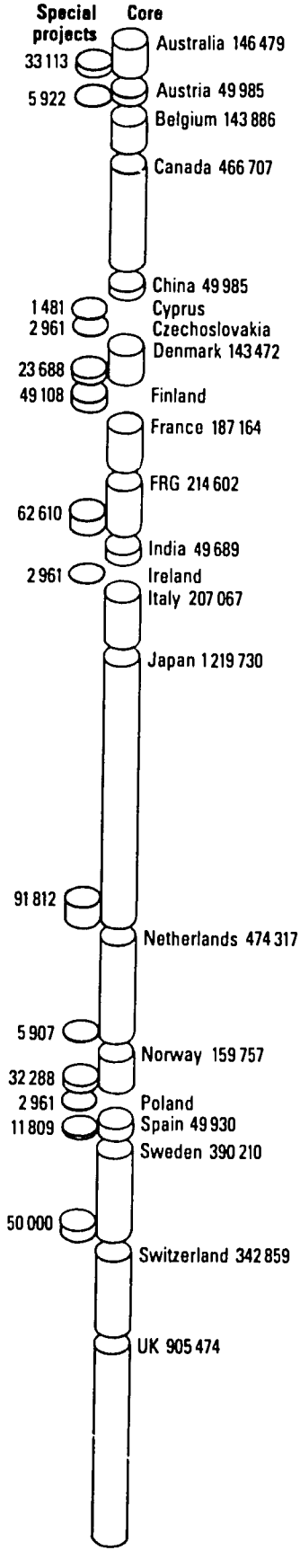
Ms V. Watt [1]
(Niamey, Niger)

Mr L. Guarino
(ARI, Cyprus)

Mr A. Bari [2]
(ARI, Cyprus)

Ms H. Moss [2]
(Harare, Zimbabwe)

Financial report



CONTRIBUTIONS RECEIVED BY IBPGR DURING 1988

US$ equivalents

Donor	Core	Special Projects
Australia	146 479	33 113
Austria	99 970[2]	5 922
Belgium	143 886	
Canada	466 707	
China	[4]	
Cyprus		1 481[1]
Czechoslovakia		2 961[1]
Denmark	143 472	23 688[1]
Finland		2 961[1]
		+46 147[1]
France	[4]	
FRG	[6]	62 610[7]
India	1 287[8,4]	
Ireland		2 961[3]
Italy	207 067[9]	
Japan	1 219 730	91 812[1]
Netherlands	474 317	5 907[3]
Norway	159 757	5 922[3]
		+26 366[5]
Poland		2 961[3]
Spain	49 930	11 809[3]
Sweden	390 210	50 000[5]
Switzerland	342 859	5 922[3]
UK	905 474	
UNEP	50 000	
USA	634 000[11]	
	5 435 145	382 543

[1]Characterization of *Musa* collection in Papua New Guinea

[2]1987 contribution received in 1988, and 1988 contribution

[3]Phase III of ECP/GR

[4]1988 contributions to be received in 1989

[5]Pan-African Workshop on Genetic Resources

[6]1988 contribution was received in 1987

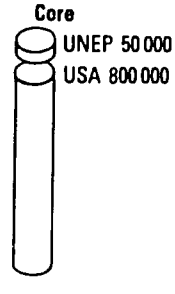
[7]Support to the Genebank in CATIE, Costa Rica

[8]Balance of 1987 contribution

[9]1987 contribution received in 1988

[10]Collecting *Citrus* in southeast Asia

[11]Balance of 1988 contribution to be received in 1989



STATEMENT OF ACCOUNTS FOR 1988

US$ equivalents

RECEIPTS		
Balance at 1 January 1988		2 179 242[1]
Various Governments Contributions		5 385 145
Special projects[2]		382 543
UNEP		50 000
Interest accrued in 1988		128 116
Transfer to Working Capital Fund		(350 000)
		7 775 046
DEDUCT		
Cash expenditure		
Core Programme		
Personnel services	1 807 302	
Duty travel	713 242	
Contractual services	2 293 795	
General operating exp.	207 704	
Supplies and materials	41 880	
Equipment	11 605	
Fellowships	208 180	
	5 283 708	
Special projects	464 149	
Payment of obligations carried forward from previous years	829 416	
	6 577 273	
Commitments		
Incurred in 1988[3]	1 025 332	
Unliquidated obligations from previous years	915 052	
	8 517 657	8 517 657
BALANCE AT 31 DECEMBER 1988		(742 611)[4]

[1]Unobligated cash balance and unliquidated obligations from previous years

[2]European Cooperative Programme/Phase III, Collecting in South East Asia (Japan), support to Genebank in CATIE (Germany), characterization of Musa Collection (Australia) and African Workshop (Finland, Norway, Netherlands, Sweden)

[3]Including commitments for special projects (US$63 675)

[4]To be partially offset by: late 1988 core contributions receivable in 1989 for a total of US$446 630; Special Projects contributions (African Workshop) receivable in 1989 for a total of US$ 110 949

1988 EXPENDITURE BY FUNCTIONS

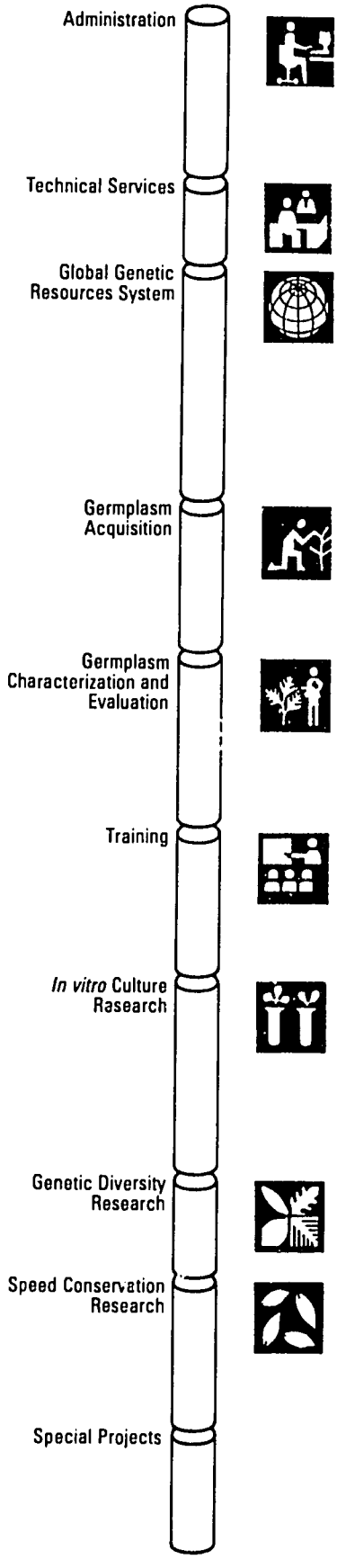
US$ equivalents

Administration[1]	769 172
Technical Services[1]	344 483
Global Genetic Resources System[2]	1 072 974
Germplasm Acquisition	661 103
Germplasm Character Ration and Evaluation	767 762
Training	651 581
In vitro Culture Research	889 942
Genetic Diversity Research	426 710
Seed Conservation Research	661 638
Special Projects	527 824

[1]Includes programme coordination

[2]Includes regional coordination

1988 EXPENDITURE BY FUNCTIONS



Evenements marquants 1988

Introduction

L'année 1988 marque un tournant dans l'existence de l'IBPGR. L'élargissement du mandat du Centre – approuvé par le CGIAR en 1986 – s'est reflété cette année tant sur les activités de terrain que dans les programmes de recherche. Des bureaux ont été ouverts en Chine, en Inde et au Mexique, et un coordonnateur pour l'Europe, l'Afrique du Nord et l'Asie du Sud-Ouest a été nommé à Rome. Cela porte à sept au total le nombre des bureaux régionaux de l'IBPGR (des bureaux existent depuis longtemps en Colombie, au Niger at au Kenya). La décentralisation accrue des activités de l'IBPGR nécessite évidemment une amélioration de la planification et de la coordination. A cet effet, deux réunions ont eu lieu en 1988 – à Nairobi (Kenya) et à Torgiano (Italie) – avec tout le personnel du programme de terrain.

L'élargissement du programme de recherche, avec la nomination d'un directeur de la recherche et de deux chercheurs supplémentaires, à la fin de 1987 et au début de 1988, a permis d'adopter une approche fondée sur le travail d'équipe pour identifier les recherches prioritaires et désigner les instituts chargés d'entreprendre des études pour le compte de l'IBPGR. L'annonce du programme de visites scientifiques de l'IBPGR, en novembre 1988, manque une étape importante dans les efforts du Centre visant à renforcer la collaboration entre les chercheurs du monde entier.

Administration

Deux nouveaux administrateurs – Prof. J. Spence (Trinidad) et Dr M. Touré (Sénégal) – sont devenus membres de l'IBPGR en 1988. Un accord de siège biennal amendé a été signé avec la FAO et une demande de crédits budgétaires supplémentaires a été acceptée par le CGIAR. Ces fonds serviront à couvrir les dépenses supplémentaires de location et les fraix généraux qui seront facturés par la FAO à partir de 1989. Le Comité exécutif a accepté d'examiner les options qui s'offraient pour doter l'IBPGR d'une base opérationnelle à long terme. Fin 1988, le Comité exécutif a demandé au Directeur de chercher des locaux en dehors de la FAO pour y emménager au début de 1989.

Services techniques

La stratégie de l'IBPGR concernant les affaires publiques, mise au point lors d'une réunion interne sur ce thème tenue début 1988, a été approuvée par le Conseil à sa quinzième session en février. Elle a commencé à être appliquée à partir de 1988. A la première réunion de l'Association du CGIAR pour la sensibilisation du public, organisée au CIMMYT en juin, l'IBPGR est convenu de prendre la tête d'une campagne de sensibilisation du public aux activités menées en Amérique latine dans le domaine des ressources génétiques. Tout le personnel de l'IBPGR – au siège et sur le terrain – a participé à une réunion interne sur les publications en décembre 1988. Cette réunion a abouti à un projet de stratégie en matière de publications, qui sera examiné à la session de 1989 du Conseil.

Réseau mondial de ressources génétiques

L'IBPGR s'est efforcé d'emblée d'intégrer divers programmes dans un réseau coopératif efficace de conservation des ressources phytogénétiques. Un projet pilote a été lancé en 1988 pour intégrer les collections de base et les collections actives, les instituts et les chercheurs dans des réseaux s'occupant de cultures spécifiques.

En 1988, les spécialistes de l'IBPGR ont continué à effectuer des visites dans des centres détenant des collections de base pour leur donner des conseils sur la facon de se conformer aux normes scientifiques préférables. En 1988, le conseil a donné des avis techniques aux gouvernements et aux instituts de dix pays en ce qui concerne la construction ou l'amélioration des installations de conservation. De plus, sept pays ont reçu du matériel pour améliorer leurs installations de stockage.

En 1988, deux réunions régionales ont été organisées en Afrique par le CNR, l'IBPGR, l'IITA et l'UNEP pour promouvoir la conservation de la diversité du patrimoine génétique du continent et renforcer la coopération entre les programmes nationaux et régionaux, les instituts privés et les organisations internationales opérant en Afrique.

Le RECSEA, qui représente les programmes nationaux d'Indonésie, de Malaisie, de Papouasie-Nouvelle Guinée, des Philippines et de Thaïlande s'est réuni à Singapour en décembre 1988, avec l'assistance du coordonnateur de l'IBPGR pour l'Asie du Sud et du Sud-Est.

Trois memorandums d'entente ont été signés officiellement en 1988. L'un d'eux, avec le CAAS, ouvre la voie à la création d'un Bureau de l'IBPGR pour l'Asie de l'Est à Beijing. Un autre, avec l'IUCN, servira à renforcer la collaboration entre l'IBPGR et l'organisation de conversation. Enfin, un accord a été également signé avec l'IRRI en vue d'améliorer l'interaction entre les deux centres du CGIAR.

Acquisition de matériel génétique

Les activités de collecte entreprises cette année reflètent des décisions antérieures visant à concentrer l'attention sur les objectifs prioritaires. En 1988, l'IBPGR a organisé ou aidé à organiser 10 missions chargés de collecter des variétés locales et des cultivars primitifs et 22 missions de collecte de plantes sauvages apparentées aux variétés cultivées, dont sept portaient sur les plantes fourragères.

Formation

Le Centre a accordé des bourses à sept stagiaires de pays en développement pour qu'ils puissent suivre un cours de maîtrise en sciences à l'Université de Birmingham pendant l'année universitaire 1987–1988. Sept autres stagiaires ont été aidés financièrement en 1988–89. Cinquante-quatre étudiants, représentant 34 pays, ont reçu une aide pour participer à de brefs stages techniques parrainés par l'IBPGR. En outre, le Centre a parrainé quatre programmes de formation individuelle et sept bourses d'internat pour des spécialistes de niveaux pré- et post-doctorat.

En 1988, le programme de formation de l'IBPGR a été passé en revue. Les recommandations qui s'en sont dégagées ont été approuvées dans le courant de l'année par le Comité du programme de l'IBPGR. L'enquête de l'IBPGR sur les anciens stagiaires était pratiquement achevée en 1988.

Recherche sur la culture *in vitro*

En 1988 l'IBPGR a continué à s'intéresser aux aspects opérationnels de la conservation *in vitro*. Une banque pilote active de gènes *in vitro*, créée l'an dernier en collaboration avec le CIAT, a continué à expérimenter les normes de conservation *in vitro* du manioc, en conservant le matériel génétique sous forme de cultures de pousses, en état de croissance ralentie .

Une partie des recherches *in vitro* effectuées en 1988 était concentrée sur la viabilité des ressources génétiques collectées sous forme *in vitro*. Par exemple, un projet conjoint IBPGR-IRHO en Côte d'Ivoire, comportant des méthodes perfectionées de collecte d'embryons de noix de coco, a été achevé en 1988. La technique *in vitro* mise au point pour la noix de coco en Côte d'Ivoire, a depuis été appliquée avec succès dans un projet IBPGR dans l'ouest de Java, exécuté par l'Institut de recherche de Bogor en Indonésie. Une autre retombée de ce projet est la collaboration de l'ORSTOM et de l'IRHO-CIRAD pour la mise au point de méthodes de culture et de cryopréservation des embryons de noix de coco immatures.

Recherche sur la phytopathologie et le côntrole phytosanitaire

En 1988, l'IBPGR a entrepris plusieurs projets portant sur la phytopathologie et du contrôle phytosanitaire. Le Centre a lance en outre, en collaboration avec le service de la protection des plantes de la FAO, un programme visant à assurer la circulation sans danger et efficace du matériel génétique. Trois réunions connexes parrainées par l'IBPGR et la FAO ont été tenues en 1988: sur *Musa* (en collaboration avec l'INIBAP), sur le cacao (en collaboration avec l'ACRI) et sur les patates douces, l'igname et les aracées comestibles (en collaboration avec l'IPO). Des directives techniques qui se rapportent expressément à certaines cultures et qui ont été mises au point pendant les réunions, seront publiées conjointement avec la FAO début 1989.

Recherche sur la diversité génétique

L'étude des relations entre les espèces et des schémas de variation au sein des "pools" de gènes, qui fait pourtant partie des activités de recherche de l'IBPGR depuis quelques années, n'en est encore qu'à ses débuts comme composante officielle du programme de recherche de l'IBPGR. En 1988, l'évaluation et la consolidation des travaux sur la diversité génétique réalisés avec l'aide de l'IBPGR depuis sa création ont progressé, pour préparer l'étude dont programme sur la diversité génétique fera l'objet en 1989. De plus, deux importantes enquêtes écogéographiques portant sur *Vigna* en Afrique du Centre-Sud et sur les espèces sauvages de Triticeae en Chine, se sont poursuivies en 1988.

Recherche sur la conservation des semences

Une étude des travaux passés et des politiques actuelles dan ce domaine de la recherche a été effectuée en juin 1988. Un atelier sur la conservation des embryons, mettant l'accent sur les semences récalcitrantes, a été organisé immédiatement après cette étude. Il a ouvert de nouvelles perspectives en la matière. Des recherches parrainées par l'IBPGR ont porté sur la teneur ultrafaible en humidité, la préservation des semences récalcitrantes, la stabilité génétique, la dormance des semences, et elles ont permis d'obtenir d'excellents résultats.

Acontecimientos 1988

Introducción

El año 1988 fue fundamental en la existencia del IBPGR. La ampliación del mandato del Centro – aprobada por el CGIAR en 1986 – se reflejó este año en las actividades de los programas de campo y de investigación. Se abrieron oficinas en China, la India y México y se designó en Roma un coordinador para Europa, Africa del Norte y el sudeste de Asia. Con ello existen actualmente siete oficinas regionales del IBPGR (las había ya desde hacía mucho tiempo en Colombia, Níger y Kenya). La mayor descentralización de las actividades del IBPGR pone de manifiesto la clara necesidad de una planificación y coordinación mejoradas. Con este fin se celebraron en 1988 dos reuniones, en Nairobi, Kenya, y en Torgiano, Italia, de todo el personal del Programa de Campo.

La expansión del Programa de Investigación, con el nombramiento de un Director de Investigación y de otros dos oficiales científicos a finales de 1987 y comienzos de 1988, permitió introducir un enfoque de equipo para la identificación de prioridades de investigación y la selección de instituciones para realizar estudios en nombre del IBPGR. Se dio un paso importante en los esfuerzos del Centro para fomentar la colaboración en materia de investigación entre científicos de todo el mundo con el anuncio del programa de científicos visitantes del IBPGR en noviembre de 1988.

Administración

En 1988 se incorporaron a la Junta del IBPGR dos nuevos miembros, el Prof. J. Spence, de Trinidad, y el Dr. M. Touré del Senegal. Se firmó un acuerdo bianual enmendado sobre la Sede con la FAO y el CGIAR aceptó una solicitud de presupuesto suplementario. Este cubrirá los costos adicionales de alquiler y gastos generales que la FAO cargará desde 1989. El Comité Ejecutivo acordó actuar como grupo de trabajo encargado de estudiar las opciones para la base operacional del IBPGR a largo plazo. A finales de 1988, el Comité Ejecutivo pidió al Director que buscase locales fuera del complejo de la FAO para ocuparlos a comienzos de 1989.

Servicios técnicos

La estrategia de asuntos públicos del IBPGR, formulada en el examen interno sobre asuntos públicos realizado a comienzos de 1988, fue aprobada en febrero por la Junta en su 15ª reunión. En 1988 se inició la aplicación de la estrategia. En la primera reunión de la Asociación de Sensibilización del Público del CGIAR, celebrada en el CIMMYT en junio de ese año, el IBPGR acordó asumir el papel dirigente en una campaña de toma de conciencia del público relacionada con las actividades sobre recursos genéticos en América Latina. Todo el personal del IBPGR – tanto de la Sede como de campo – asistió en diciembre al examen interno de publicaciones de 1988. De dicha reunión surgió una estrategia regional para las publicaciones, que se debatirá en la reunión de la Junta de 1989.

Red mundial de recursos genéticos

Desde el comienzo, el IBPGR ha procurado integrar los diferentes programas en una red eficaz y cooperativa para la conservación de los recursos fitogenéticos. En 1988 se inició un proyecto piloto para integrar colecciones de base y activas, instituciones y científicos en redes basadas en cultivos específicos.

Los expertos del IBPGR siguieron visitando en 1988 centros que mantienen colecciones de base para asesorar sobre el cumplimiento de normas científicas aceptables y preferibles. En 1988, el IBPGR facilitó asesoramiento técnico a gobiernos e instituciones de 10 países sobre la construcción o mejora de instalaciones de conservación. Además, se proporcionó equipo a siete países para mejorar las instalaciones de almacenamiento.

Durante 1988 se convocaron en Africa dos reuniones regionales, organizadas por el CNR, el IBPGR, el IITA y el UNEP para promover la conservación de la abundante diversidad genética de dicho continente y lograr una mayor cooperación entre los programas nacionales y regionales, las instituciones privadas y las organizaciones internacionales que actúan en Africa.

En diciembre de 1988 se reunió en Singapur el RECSEA, que representa programas nacionales de Indonesia, Malasia, Papua Nueva Guinea, Filipinas y Tailandia, con la asistencia del Coordinador del IBPGR para el sur y el sudeste de Asia.

Durante 1988 se firmaron tres memorandos de acuerdo. Uno, con el CAAS, preparó el camino para la apertura de la Oficina del IBPGR para el este de Asia en Beijing. Otro, con la IUCN, conducirá a una mayor colaboración entre el IBPGR y la mencionada organización. Por último, un acuerdo firmado por el IRRI y el IBPGR debería permitir mejorar la interacción entre los dos centros del CGIAR.

Adquisición de germoplasma

En las actividades de recolección de este año se reflejaron anteriores decisiones de prestar mayor atención a los objetivos prioritarios. En 1988, el IBPGR organizó, o colaboró en su organización, 10 misiones para recoger variedades locales y cultivares primitivos, y 22 misiones para recoger especies silvestres afines de cultivos, entre ellas siete que se dedicaron a recoger plantas forrajeras.

Capacitación

El Centro concedió becas a siete cursillistas de países en desarrollo para asistir a un curso de licenciatura (MSc) en la Universidad de Birmingham en el año académico 1987–1988. Se ha becado a siete cursillistas más para el año académico 1988–1989. Se prestó asistencia a 54 estudiantes, procedentes de 34 países, para su participación en cursillos técnicos patrocinados por el IBPGR. Además, el Centro patrocinó cuatro programas independientes de capacitación y siete proyectos de internado para científicos licenciados y doctorados.

En 1988 se examinó el programa de capacitación del IBPGR. El Comité del Programa aprobó a finales de dicho año las recomendaciones del examen. En ese mismo año casi quedó terminada la encuesta del IBPGR a excursillistas.

Investigación sobre cultivos *in vitro*

En 1988, el IBPGR siguió prestando atención a los aspectos operacionales de la conservación *in vitro*. Un banco activo de genes *in vitro* de cáracter piloto, creado el pasado año en colaboración con el CIAT, siguió ensayando las normas de funcionamiento para la conservación *in vitro* de yuca, consistente en mantener germoplasma como cultivos de vástagos en condiciones de crecimiento lento.

Parte del esfuerzo investigador *in vitro* de 1988 se concentró en la búsqueda de los medios para hacer viable la recolección *in vitro*, con independencia de los cultivos. Por ejemplo, en 1988 se conluyó un proyecto de colaboración IBPGR–IRHO en Côte d'Ivoire, que permitió perfeccionar los métodos para recolectar embriones de coco. La técnica *in vitro* puesta a punto para el coco en dicho país se ha aplicado desde entonces con éxito a un proyecto del IBPGR en Java Occidental, ejecutado por el Research Institute for Estate Crops, de Bogor, Indonesia. Otro resultado del proyecto relativo a los embriones de coco es la colaboración del ORSTOM y del IRHO-CIRAD en la preparación de métodos de cultivo y crioconservación para embriones inmaduros de coco.

Investigación sobre fitopatología y cuarentena

El IBPGR inició en 1988 varios proyectos relacionados con aspectos de fitopatología y cuarentena. Además, el Centro, en colaboración con el Servicio de Protección Vegetal de la FAO, inició un programa para el transporte eficiente y seguro de germoplasma. En 1988 se celebraron tres reuniones al respecto patrocinadas por el IBPGR y la FAO: sobre *Musa* (en colaboración con el INIBAP), sobre el cacao (en colaboración con el ACRI) y sobre la batata, el ñame y las aroideas comestibles (con el IPO). A comienzos de 1989 se publicarán conjuntamente con la FAO unas directrices técnicas específicas para los distintos cultivos elaboradas durante las reuniones.

Investigación sobre la diversidad genética

Aunque el estudio de las relaciones entre las especies y los modalidades de variación dentro de los acervos de genes de cultivos es un componente de la investigación del IBPGR desde hace algunos años, está aún en sus comienzos como componente estructural e integrado del Programa de Investigación del IBPGR. En 1988 se avanzó en la evaluación y la consolidación del trabajo sobre diversidad genética, apoyado por el IBPGR desde su fundación, como preparación para un examen del programa sobre diversidad genética en 1989. Además, en 1988 se continuó trabajando en dos importantes estudios ecogeográficos, relacionados con el género *Vigna* en el Africa centromeridional y con especies silvestres de triticeas en China.

Investigación sobre conservación de semillas

En junio de 1988 se llevó a cabo un examen del trabajo realizado y de las políticas actuales en este ámbito de investigación. Inmediatamente después de dicho examen se celebró un seminario de iniciación sobre conservación de embriones, prestando especial atención a las semillas recalcitrantes. En la investigación patrocinada por el IBPGR se examinaron asuntos como: contenido ultrabajo de humedad, conservación de semillas recalcitrantes, estabilidad genética y latencia de las semillas, obteniendo excelentes resultados.

Hohepunkte 1988

Einleitung

1988 war ein entscheidendes Jahr in der Geschichte von IBPGR. Der erweiterte Zuständigkeitsbereich des Zentrums – 1986 von CGIAR bewilligt – spiegelte sich in diesem Jahr in den Aktivitäten, sowohl des Entwicklungs- als auch des Forschungsprogramms, wider. Geschäftsstellen wurden in China, Indien und Mexiko eröffnet, ein Koordinationsübro für Europa, Nordafrika und Südwestasien wurde in Rom geschaffen. Damit beläuft sich die Zahl der regionalen IBPGR-Büros auf insgesamt sieben (seit langem sind Stellen in Kolumbien, Niger und Kenia etabliert). Die zunehmende Dezentralisierung der IBPGR-Aktivitäten begründet die dringliche Notwendigkeit verbesserter Planung und Koordination. Zu diesem Zweck führten 1988 zwei Tagungen – abgehalten in Nairobi, Kenia und Torgiano, Italien – den gesamten Mitarbeiterstab des Entwicklungsprogramms zusammen.

Die Erweiterung des Forschungsprogramms durch Ernennung eines Forschungsleiters und zweier weiteren wissenschaftlichen Angestellter Ende 1987 und Anfang 1988 ermöglichte die Einführung gemeinschaftlicher Setzung von Forschungsprioritäten und Auswahl von Institutionen, die Studien für IBPGR durchführen sollen. Ein wichtiger Schritt in den Bemuhüngen des Zentrums, die Zusammenarbeit zwischen Wissenschaftlern aus aller Welt im Bereich der Forschung zu fördern, wurde durch die Bekanntgabe des IBPGR-Programms für Gast-Wissenschaftler im November 1988 eingeläutet.

Verwaltung

Zwei neue Treuhänder – Prof. J. Spence aus Trinidad und Dr M. Touré aus Senegal – schlossen sich 1988 dem IBPGR-Ausschuss an. Ein abgeänderter Zwei-Jahres-Vertrag über die Anwesenheit der Hauptgeschäftsstelle wurde mit der FAO unterzeichnet und eine zusätzliche Budgetforderung wurde von CGIAR bewilligt. Somit können Mehrkosten für Miete und allgemeine Betriebsausgaben gedeckt werden, die die FAO ab 1989 berechnen wird. Der Leitausschuss erklärte sich damit einverstanden, als Arbeitsgruppe zu fungieren, die Möglichkeiten für die langfristige Operationsbasis von IBPGR untersucht. Ende 1988 bat der Leitausschuss den Director, Räumlichkeiten ausserhalb der FAO-Gebäude zu suchen, die Anfang 1989 bezogen werden könnten.

Technischer Dienst

Die Strategie sinnvoller Offentlichkeitsarbeit, die IBPGR bei einem hausinternen Rückblick auf öffentliche Angelegenheiten Anfang 1988 entwickelt hatte, wurde von der Tagung auf ihrer 15. Sitzung im Februar befürwortet. Die Durchführung dieser Strategie begann 1988. Beim ersten Treffen der CGIAR-Vereinigung zur öffentlichen Meinungsbildung bei CIMMYT im Juni, war IBPGR damit einverstanden, eine Kampagne zu leiten, die die Offentlichkeit über Aktivitäten auf dem Feld genetischer Ressourcen in Lateinamerika aufzuklärt. Das gesamte Personal von IBPGR – in der Zentrale und auswärts – nahm am internen Publikationsüberblick für das Jahr 1988 im Dezember teil. Dieser Rückblick erbrachte einen Strategie-Entwurf für Veröffentlichungen, der 1989 bei der Sitzung der Versammlung diskutiert werden wird.

Globaler Verbund für genetische Ressourcen

Von Anfang an war IBPGR bestrebt, unterschiedliche Programme in einen wirksamen, kooperativen Verbund einzugliedern, der den Schutz pflanzengenetischer Ressourcen zum Ziel hat. 1988 wurde ein Pilotprojekt begonnen, um Basis- und Aktivsammlungen, Institutionen und Wissenschaftler in Verbundnetzen für bestimmte Pflanzenarteu zusammenzufassen.

Experten von IBPGR fuhren 1988 damit fort, Zentren mit Basissammlungen zu besichtigen, um fachlichen Rat zu erteilen, damit akzeptable und bevorzugte wissenschaftliche Standards erreicht werden können. Ferner beriet IBPGR 1988 Regierungen und Institutionen von zwölf Ländern bei der Einführung oder Verbesserung von Konservierungsmöglichkeiten und sieben Länder erhielten Ausrüstungen für die Verbesserung ihrer Lagereinrichtungen.

Im Laufe des Jahres 1988 wurden zwei regionale Treffen von CNR, IBPGR, IITA und UNEP in Afrika organisiert, um die Erhaltung der Vielfalt genetischen Materials auf diesem Kontinent und die engere Zusammenarbeit zwischen nationalen und regionalen Programmen, sowie zwischen privaten Institutionen und internationalen Organisationen, die in Afrika arbeiten, zu fördern.

RECSEA, das nationale Programme in Indonesien, Malaysia, Papua-Neuguinea, den Philippinen und Thailand repräsentiert, tagte im Dezember 1988 in Singapur, unterstützt von der IBPGR-Koordinationsstelle für Süd- und Südost-Asien.

Drei formlose Vereinbarungen wurden 1988 abgeschlossen. Eine davon, mit CAAS, ebnete den Weg für die Eröffnung der IBPGR-Geschäftsstelle für Ost-Asien in Beijing. Eine andere wird zu stärkerer Kollaboration zwischen IBPGR und IUCN führen. Schliesslich soll ein Abkommen, das von IRRI und IBPGR unterzeichnet wurde, verbesserte Beziehungen zwischen den beiden CGIAR-Centern schaffen.

Erwerb von Zellplasma

Die Sammelaktivitäten dieses Jahres spiegeln frühere Beschlüsse wider, vorrangigen Zielen erhöhte Aufmerksamkeit zu widmen. 1988 organisierte oder unterstützte IBPGR 10 Reisen zur Sammlung von Landrassen oder primitiver Sorten sowie 22 Reisen für die Sammlung wilder Verwandten von Nutzplanzen, wobei sich sieben auf Futterpflanzen konzentrierten.

Ausbildung

Das Zentrum vergab Forschungsstipendien für sieben Auszubildende aus Entwicklungsländern, die so an einem Master-of-Science-Kurs der Universität Birmingham im Studienjahr 1987/88 teilnehmen konnten. Sieben weitere Studenten wurden 1988/89 finanziell unterstützt. 54 Studenten aus 34 Ländern erhielten Mittel für ihre Teilnahme an von IBPGR geförderten Technik-Kurzkursen. Zusätzlich finanzierte das Zentrum vier individuelle Fortbildungsprogramme und sieben interne Ausbildungsprojekte für Wissenschaftler vor und nach der Promotion.

Die Ausbildungsprogramme von IBPGR wurden 1988 überprüft. Die sich daraus ergebenden Verbesserungsvorschläge wurden Ende des Jahres vom IBPGR-Programmausschuss angenommen. Die IBPGR-Erhebung über ehemalige Ausbildungsempfänger war 1988 fast abgeschlossen.

In-vitro-Kultur-Forschung

Aspekte der Handhabung von *in-vitro*-Konservierung waren auch 1988 Gengenstand des Interesses von IBPGR. Als Versuchsproject fuhr eine *in-vitro*-Genbank, die letztes Jahr in Zusammenarbeit mit CIAT entwickelt worden war, damit fort, Gebrauchstandards für *in-vitro*-Konservierung von Maniok zu testen, worin bei langsamem Wachstum Zellplasma als Keimkultur erhalten wird.

Ein Teil der *in-vitro*-Forschung von 1988 konzentrierte sich auf die Entwicklung von Möglichkeiten, *in-vitro*-Sammlungen praxistauglich zu machen, unabhängig von den dabei behandelten Pflanzen. So wurde beispielsweise 1988 gemeinsam von IBPGR und IRHO ein Projekt abgeschlossen, das die Sammelmethoden von Kokosnukkeimen verfeinern konnte. Diese in Côte d'Ivoire entwickelte *in-vitro*-Technik für Kokosnüsse wurde seitdem erfolgreich in einem IBPGR-Projekt in West-Java angewandt, unter Leitung des Forschungsinstituts für Plantagenkulturen in Bogor, Indonesien. Ein zusätzliches Ergebnis des Kokosnusskeim-Projekts ist die Zusammenarbeit von ORSTOM und IRHO-CIRAD in der Entwicklung von Zucht- und Gefrierkonservierungsmethoden für unreife Kokosnusskeime.

Pflanzenpathologie und Quarantäne Forschung

IBPGR begann 1988 eine Reihe von Projekten, die sich mit Einzelheiten der Pflanzenpathologie und Quarantäne beschäftigen. Ausserdem rief das Zentrum gemeinsam mit dem Pflanzenschutzdienst der FAO ein Programm ins Leben für den effizienten und sichern Versand von Zellplasma. Drei diesbezügliche Treffen wurden 1988 mit gemeinsamer Unterstützung von IBPGR und FAO abgehalten. Sie befassten sich mit *Musa* (in Zusammenarbeit mit INIBAP), mit Kakao (in Zusammenarbeit mit ACRI) sowie mit Süsskartoffel, Yams und essbarem Aronstab (in Zusammenarbeit mit IPO). Pflanzenspezifische technische Richtlinien, die während der Sitzungen erarbeitet wurden, sollen gemeinsam mit der FAO Anfang 1989 veröffentlicht werden.

Forschung auf dem Feld genetischer Vielfalt

Obgleich einige Jahre lang Bestandteil der IBPGR-Forschung, steckt die Studie über Artenverwandtschaften und Muster von Abweichungen innerhalb pflanzlicher Erbmasse noch in ihren Kinderschuhen – als ein formeller, integrierter Bestandteil des Forschungsprogramms von IBPGR. 1988 wurden Fortschritte erzielt bei der Stärkung und Stabilisierung der Arbeit, die IBPGR seit seiner Gründung zur Erhaltung genetischer Vielfalt geleistet hat – in Vorbereitung einer Uberprüfung des Programms für Genvielfalt im Jahre 1989. Des weiteren wurden 1988 zwei wichtige umweltgeografische Studien fortgeführt, die sich mit *Vigna* im südlichen Zentralafrika und wilden Arten der Triticeae in China befassen.

Forschungsarbeit im Bereich der Saatgutkonservierung

Eine Uberprüfung der vergangenen Arbeit sowie aktueller Praktiken auf diesem Feld der Forschung wurde im June 1988 durchgeführt. Unmittelbar danach tagte eine Arbeitsgruppe, die sich mit bahnbrechenden Neierungen im Bereich der Saatgutkonservierung (vor allem bei schwer züchtbaren Samen) befasste. Von IBPGR finanzierte Forschungprojekte untersuchten mit hervorragenden Ergebnissen Themenwie: extrem niedriger Feuchtigkeitsgehalt, Konservierung schwer züchtbarer Samen, genetische Stabilität und Keimruhe.

1988年ハイライト

序論

IBPGR（国際植物遺伝資源理事会）にとって，1988年は極めて重要な年であった。IBPGRの任務を拡大することは，すでに1986年CGIAR（国際農業研究協議グループ）によって承認されたが，1988年のフィールド部ならびに研究部の活動のなかで具体化された。中国，インドおよびメキシコに地域事務所が新設され，ヨーロッパ，西アフリカおよび西南アジアの地域を担当する調整官がローマのIBPGR本部に配置された。その結果，IBPGRの地域事務所は，既存のコロンビア，ニジェール，ケニアを含めると7つになった。このようにIBPGRの活動を地域へ分散することによって，相互間の活動計画の調整が一層必要になってきた。そのため，1988年に，ケニアのナイロビとイタリアのトルジアノで，二つの会議が開かれ，フィールド部の全職員が招集された。

研究部では，1987年後半に部長が任命され1988年前半2名の科学者が職員として増員されたことにより，研究課題の優占順位の決定やIBPGRの依頼によって研究を行う研究所の選定などを部内で検討する体制ができあがった。1988年11月に発表されたIBPGR客員研究員計画は，世界中の科学者間の研究協力を促進強化しようとするIBPGRの研究活動における重要な一歩となっている。

管理

1988年，トリンダードトバコのスペンス教授とセネガルのトウレ博士が理事になった。FAOと修正2カ年本部協定の調印が行われ，追加予算請求がCGIARによって認められた。これは，1989年以降FAOから要求される家賃や間接費に要する追加費用である。執行委員会は，IBPGRの移転場所を選定する特別部会を務めることになり，1988年末所長に対し1989年の前半までにFAO本部ビルの外に建物を探すことを依頼した。

技術サービス

1988年初めに行われた広報活動に関する内部レビューでまとめられた広報活動方針は，2月の第15回理事会で承認されたが，その方針は1988年に実行に移された。6月CIMMYTにおけるCGIARの公共啓蒙協会の第1回会合で，IBPGRがラテンアメリカの遺伝資源活動に関わる公共啓蒙運動の先導的役割を果たすことに同意した。本部および現地駐在のIBPGRの全職員が12月に行われた出版物に関する1988年の内部レビューに出席した。このレビューで提出された出版物の案が，1989年の理事会で討議されることになった。

遺伝資源に関する世界的ネットワーク

IBPGRは，設立以来いろいろの計画を植物遺伝資源保存を目指した有効で協力的なネットワークにまとめることに努力してきた。1988年，ベースコレクション，アクティブコレクション，研究機関，科学者を特定作物ごとのネットワークに統合させるための計画を発足させた。

IBPGRの保存担当職員は，1988年にも引き続きIBPGRが依頼してあるベースコレクション保存機関を訪問し，種子保存に関する許容し得るあるいは望ましい科学的基準に適合しているかどうかについて助言を行った。1988年，IBPGRは保存施設の建設あるいは改良に関して10カ国の政府や研究所に技術的助言を与え，さらに7カ国に対し保存施設を改良するための備品を提供した。

1988年には，CNR，IBPGR，IITAおよびUNEPによる主催で2つの地域会議がアフリカで開催された。これは，アフリカ大陸の豊富な遺伝的多様性の保存を促進させることと，アフリカで実施している国内および地域計画，私立研究所，国際機関との相互協力関係を作りあげることを目的とするものである。

インドネシア，マレーシア，パプアニューギニア，フィリッピンおよびタイの国内プログラムを代表するRECSEAは，1988年12月にシンガポールで会合を開いたが，IBPGRからは南および東南アジア地域調整官が出席した。

1988年に，3つの覚え書きが正文化された。一つは，中国農学科学院（CAAS）と，北京にIBPGR東アジア地域事務所を開設するためのものである。他の一つは，国際

自然天然資源保全連合（IUCN）とのもので，IBPGRと保全機構と協力関係を一層強化しようとするものである。さらに，IRRIとの協定は，CGIARセンター間の協力関係を向上発展させようとするものである。

遺伝資源の収集

今年の収集活動は，すでに決められた方針に基づいて優先地域や作物に重点をおいて実施された。1988年，IBPGRは在来品種や原始的栽培品種の収集に10チーム，野生種の収集に22チームを派遣した。このうち，7チームは牧草に重点をおいた収集を行った。

トレーニング

IBPGRは，1987～1988年の学年に，バーミンガム大学の植物遺伝資源修士コースに入学する発展途上国の7人の研究者に奨学金を与えた。1988～1989年にも7人に資金を援助した。IBPGRが主催した短期技術コースに，34カ国から54名の研修生を参加させた。さらに，個別研修計画の4名，博士号取得前後のインターンの7名に資金を与えた。

IBPGRのトレーニング計画に関するレビューが1988年に行われ，その勧告が同年IBPGR計画委員会によって承認された。IBPGRの資金によってトレーニングを受けた研究者の追跡調査は1988年までにほとんど終了した。

試験管内保存

IBPGRは，1988年にも試験管内保存の具体的な方法の発展に努力した。昨年CIATと協力して始めた試験管内アクティブ遺伝子銀行の予備実験では，キッサバの試験管内保存方法の基準を作るための検討を行った。この方法では，キッサバの茎頂培養を生長抑制の条件下で行う。

1988年にはまた，試験管内収集を可能とする方法についても重点的に研究した。例えば，ココヤシの胚を収集する方法を改善したオートジボアールにおけるIBPGRとIRHOの協力プロジェクトは1988年に完了した。この方法は，その後インドネシアのボゴールにあるエステート作物研究所で行われた西ジャバのIBPGRプロジェクトでも成功した。さらにこの方法を進めて，未熟のココヤシの胚を培養したり凍結保存する方法の開発がORSTOMとIRHO－CIRADの協力で実施されている。

植物病理と防疫

IBPGRは，1988年に植物病理や防疫に関連した多くのプロジェクトを始めた。さらに，FAOの植物保護部と協力して，遺伝資源の効率的で安全な移動計画を検討した。IBPGRをFAO主催による3つに会議が1988年に開催された。すなわち，INIBAPとの協力によるバナナ，ACRIとの協力によるココア，IPOとの協力によるサツマイモ，ヤマイモ，食用サトイモに関する会議である。これらの会議でまとめられた作物特有の技術的指針が1989年FAOと共同で出版されることになっている。

遺伝的多様性の研究

種間関係や作物における遺伝子プールの遺伝変異パタンに関する研究は，ここ数年IBPGRの研究テーマであったが，まだ十分な成果をあげていない。1989年に行われる遺伝的多様性研究計画に関するレビューに向けて，IBPGRの発足以来継続されてきた遺伝的多様性研究の評価と整理が1988年にかなり進んだ。さらに，南および中央アフリカのササゲ類と中国のコムギ類の野生種に関する2つの重要な生態地理学的研究が1988年にも継続して行われた。

種子保存研究

この分野における過去の研究や最近の保存方法のレビューが1988年に行われた。このレビュー後，短命種子に重点をおいた新しい種保存方法に関する研究集会が開催された。そこでは，IBPGRが支援した研究すなわち超低温水分含量，短命種子の保存，遺伝的安定性，種子の休眠など優れた成果が得られたトピックスを検討した。

1988 要 点

引言

1988年在国际植物遗传资源委员会的历史上是关键性的一年。1986年，国际植物遗传委员会同意将中心的职权扩大，1988年实地计划和研究计划的活动都反映出了这一点。在中国、印度和墨西哥都开设了办事处，在罗马设置了欧洲、北美和西南亚协调员。这样，国际植物遗传资源委员会区域办事处的总数就达到了 7个（在哥伦比亚、尼日尔和肯尼亚早已设置了办事处）。国际植物遗传资源委员会的活动日益分散化，因而明显地需要改进规划和协调工作。为此，1988年在肯尼亚的内罗毕和意大利的托尔詹诺举行了两次会议，使所有的实地计划工作人员聚集到了一起。

通过在1987年晚些时候和1988年早些时候任用一名研究计划负责人和增加了两名负责科研工作的官员，研究计划得到了扩大，从而使之有可能采用协作的方法来确定研究重点和选择科研机构为国际植物遗传资源委员会进行研究。1988年11月，宣布了国际植物遗传资源委员会访问科学家计划，这预示着该中心在致力于促进全世界科学家之间研究合作方面采取的一个重要步骤。

管理

1988年国际植物遗传资源委员会理事会增加了两名新的理事，一名是特立尼达的 J·斯彭斯教授和塞内加尔的 M·杜尔博士。与粮农组织签订了一项经过修改的两年总部协定，国际植物遗传资源委员会接受了追加预算的请求。这项预算将包括新增加的房租和管理费用，粮农组织将从1989年开始收取上述费用。执行委员会同意作为一个工作组来研究国际植物遗传资源委员会的长期业务活动基地的选择问题。1988年晚些时候，执行委员会请主任在粮农组织大楼以外寻找用房以便在1989年早些时候占用。

技术服务

理事会在 2月份举行的第十五届会议上通过了国际植物遗传资源委员会的公共事务战略，这项战略是在1988年早些时候举行的公共事务内部审评会议上制定的。该战略从1988年开始实施。 6月份，在国际玉米、小麦改良中心举行的国际农业研究磋商小组公共宣传协会第一届会议上，国际植物遗传资源委员会同意牵头开展有关拉丁美洲国家遗传资源的公共宣传的运动。国际植物遗传资源委员会的全体工作人员，不论是总部人员还是外派人员都参加了12月举行的1988年出版物内部审评会议。该会议提出了一项出版物战略草案，将在1989年理事会会议上进行讨论。

全球遗传资源网络

国际植物遗传资源委员会从一开始就力图将各种各样的计划合并为一个保护植物遗传资源的有效合作网络。1988年开始实施了一个试点项目以按照具体的作物将基础收集品库、科研机构和科学家组成不同的网络。

国际植物遗传资源委员会的专家，1988年继续到拥有基础收集品库的各中心去访问以便就如何达到可接受的和理想的科学标准提供咨询。1988年国际植物遗传资源委员会在建设和改善保护遗传资源设施方面为10个国家的政府和机构提供了技术咨询。另外，还向 7个国家提供了改善储存设施的设备。

在1988年期间由自然资源委员会、国际植物遗传资源委员会、国际热带农业研究所和联合国环境规划署共同组织在非洲召开了两次区域会议，以促进大陆多种遗传资源的保护并促使国家计划和区域计划之间，在非洲进行活动的私人研究机构和国际组织之间开展更广泛的合作。

在国际植物遗传资源委员会南亚和东南亚协调员的帮助下，东南亚区域委员会于1988年12月在新加坡举行了会议，东南亚区域委员会有印度尼西亚、马来西亚、巴布亚新几内亚、菲律宾和泰国的国家计划的代表参加。

1988年期间，正式签署了三项谅解备忘录。其中，同中国农科院签署的一项谅解备忘录为在北京开设国际植物遗传资源委员会东亚办事处铺平了道路。与国际保护自然及自然资源联盟签署的另一项谅解备忘录，将促使国际植物遗传资源委员会与该自然保护组织之间开展更为广泛的合作。最后，由国际水稻研究所与国际植物遗传资源委员会之间签署的一项备忘录，应能改进这两个国际农业磋商小组中心之间的相互关系。

种质收集

1988年的收集活动反映了早些时候作出关于更加注重优先品种的决定。国际植物遗传资源委员会1988年组织或帮助了10个工作组去收集当地品种和原始栽培品种，并组织了22个工作组收集各种作物的野生亲缘种，其中7个工作组主要收集牧草品种。

培　训

该中心向7个来自发展中国家的受训人员提供了进修金，供其于1987－1988 学年在伯明翰大学学习硕士课程。另有7名受训人员1988－1989年的学习费用已得到资助。34个国家的54名学生得到支持，参加了国际植物遗传资源委员会主办的短期技术培训班。此外，该中心还发起实施了4项单独的培训计划和7个博士前和博士后科学家的实习项目。

1988年对国际植物遗传资源委员会的培训计划进行了评议。国际植物遗传资源委员会 1988 年晚些时候对评议中所提出的建议表示赞同。1988年国际植物遗传资源委员会基本上完成了对以前的受训人员的调查。

试管栽培研究

利用试管进行遗传资源保护的操作方面的活动1988年继续得到了国际植物遗传资源委员会的重视。去年与国际热带农业中心合作建立的试点试管活性基因库继续进行试管保存术等操作标准的检验工作，利用试管保存就是采用芽苗在生长缓慢的条件下将种质保存下来。

1988年试管研究的工作有一部分主要是寻找无论对什么作物，均能以试管进行收集的手段。例如，1988年在科特迪瓦完成了一个国际植物遗传资源委员会与植物油及油籽研究所的合作项目，该项目是要改进椰子胚芽的收集方法。在科特迪瓦创造出来的保存椰子胚芽的技术在西瓜哇国际植物遗传资源委员会的一个项目中成功地得到了运用，这个项目是由印度尼西亚蔬菜的种植园作物研究所进行的。上述椰子胚芽项目的另一个收获是法国发展和合作科技研究所同法国植物油及棕榈研究所一国际农艺发展研究合作中心合作，创造了未成熟椰子胚芽的栽培和低温保存方法。

植物病理和检疫研究

国际植物遗传资源委员会1988年开始实施了一些有关植物病理和检疫方面的项目。另外，该中心还与粮农组织植保处合作，开始实施了一项有关有效、安全地移置种质的计划。1988年国际植物遗传资源委员会与粮农组织共同发起召开了3次有关的会议：一次是关于大蕉的会议（与国际香蕉及大蕉改良网络合作），一次是关于可可的会议（与美洲可可研究所合作），再有一次是关于红薯、山药和食用天南星科植物的会议（与植物保护研究所合作）。1989年早些时候将与粮农组织联合出版这几次会议期间所编写的具体作物技术指南。

遗传多样性研究

虽然国际植物遗传资源委员会对品种之间关系和作物基因库内变异方式的研究已进行了一些年，但这一研究仍处于初级阶段，只是作为国际植物遗传资源委员会研究计划中的一个正式组成部分。1988年，在评估和加强遗传多样性工作方面有了些进展，为1989年审议遗传多样性计划作了准备。自国际植物遗传资源委员会成立以来，遗传多样性的工作便得到了它们的支持。此外，1988年继续进行了两项有关中南非洲豇豆和中国野生小麦科品种的重要生态地理调查。

种子保存研究

1988年 6月对这一研究领域中过去的工作和现行政策进行了回顾。在这之后马上举行了首次胚芽保存研讨会，讨论的重点放在不能长期贮存的种子方面。国际植物遗传资源委员会主持的研究工作包括以下课题：超低含水量，保存不能长期贮存的种子，遗传稳定性，种子休眠等，这些课题的研究均获得了极好的成果。

أهم أحداث ١٩٨٨

المقدمة

كانت سنة ١٩٨٨ سنة بالغة الأهمية فى حياة المجلس الدولى للموارد الوراثية النباتية. فتوسع سلطات المركز الذى أقرته الجماعة الاستشارية للبحوث الزراعية الدولية فى ١٩٨٦ – انعكست آثاره خلال السنة الحالية على أنشطة كل من البرامج الميدانية وبرامج البحوث. ففتحت مكاتب فى الصين والهند والمكسيك، كما عين منسق لأوروبا، وشمال افريقيا، وجنوب غرب آسيا مقره فى روما. وبذلك وصل مجموع عدد المكاتب الاقليمية التابعة للمجلس الدولى للموارد الوراثية النباتية الى سبعة مكاتب (وكانت توجد منذ مدة طويلة مكاتب فى كولومبيا والنيجر وكينيا). ونظرا لزيادة اتجاه أنشطة المجلس نحو اللامركزية، فقد برزت الحاجة الى تحسين عمليتى التخطيط والتنسيق. وتحقيقا لهذا الغرض – عقد اجتماعان فى نيروبى بيكينيا وتورجيانو بايطاليا فى ١٩٨٨ حضرهما جميع العاملين فى البرنامج الميدانى .

وبفضل التوسع فى برنامج البحوث بعد تعيين رئيس لهذا البرنامج وتدعيمه بجهود اثنين من الباحثين فى أواخر ١٩٨٧ وأوائل ١٩٨٨، تسنى انتهاج أسلوب الفريق فى تحديد أولويات البحوث، واختيار المؤسسات التى يسند اليها اجراء البحوث نيابة عن المجلس الدولى للموارد الوراثية النباتية، ومن الخطوات الهامة التى اتخذها المركز فى سياق جهوده لتعزيز تعاون الباحثين فى مجال البحث العلمى اعلان المجلس عن خطة لتبادل الزيارات بين الباحثين فى جميع أرجاء العالم وذلك فى نوفمبر/تشرين الثانى ١٩٨٨ .

الادارة

انضم الى المجلس الدولى للموارد الوراثية النباتية فى ١٩٨٨ عضوان جديدان هما البروفسور ج. سبنس من ترينيداد، والدكتور م. توربه من السنغال. كما وقع المجلس مع منظمة الأغذية والزراعة على اتفاقية المقر المعدلة وأمدها سنتان، كما وافقت الجماعة الاستشارية الزراعية الدولية على طلب بتخصيص اعتمادات تكميلية. وستستخدم هذه الاعتمادات فى مواجهة التكاليف الاضافية مقابل الايجار والمصروفات الادارية المتكررة التى ستستحق للمنظمة ابتداء من عام ١٩٨٩. ووافقت اللجنة التنفيذية على أن تقوم بدور فريق العمل فى دراسة الخيارات المطروحة لقاعدة عمل المجلس فى الأجل الطويل. وكانت اللجنة التنفيذية قد طلبت من المدير أن يسعى لايجاد مبنى خارج مجمع المنظمة ليشغله المجلس فى أوائل ١٩٨٩ .

الخدمات الفنية

وافق المجلس الدولى للموارد الوراثية الزراعية فى اجتماعه الخامس عشر الذى عقد فى شهر فبراير/شباط على استراتيجية العلاقات العامة للمجلس التى تم وضعها أثناء الاستعراض الداخلى للعلاقات العامة الذى أجراه المجلس فى أوائل ١٩٨٨. وقد بدأ بالفعل تنفيذ

الاستراتيجية فى ١٩٨٨. وخلال الاجتماع الأول لرابطة الوعى العام التابعة للجماعة الاستشارية للبحوث الزراعية الدولية الذى عقد فى مقر المركز الدولى لتحسين الذرة والقمح فى يونيو/حزيران، وافق المجلس على أن يتولى الدور القيادى فى حملة التوعية العامة بأنشطة الموارد الوراثية فى أمريكا اللاتينية. وقد حضر جميع موظفى المجلس سواء العاملين فى المقر الرئيسى أو فى الميدان اجتماع ١٩٨٨ المخصص للاستعراض الداخلى للمطبوعات الذى عقد فى ديسمبر/كانون الأول. ووضع الاستعراض مشروع استراتيجية للمطبوعات سيناقشها مجلس الادارة عند اجتماعه فى ١٩٨٩ .

شبكات الموارد الوراثية العالمية

لقد سعى المجلس الدولى للموارد الوراثية النباتية منذ نشأته الى ادماج البرامج المختلفة فى شبكة تعاونية لصيانة الموارد الوراثية تتسم بالفعالية. وفى عام ١٩٨٨، بدأ العمل بتنفيذ مشروع رائد لادماج المجموعات الأساسية والمجموعات العاملة والمؤسسات والباحثين فى عدد من الشبكات حددت على أساس المحاصيل النوعية .

وواصل خبراء المجلس فى ١٩٨٨ زيارة المراكز التى تحتفظ بمجموعات أساسية لتقديم مشورتهم بشأن المعايير العلمية المقبولة والمفضلة فى عمليات الحفظ. كما قدم المجلس فى ١٩٨٨ مشورة فنية الى الحكومات والمؤسسات فى عشرة بلدان فى مجال انشاء أو تحسين مرافق التخزين، وقدم معدات لسبعة بلدان فى مجال تحسين مرافق التخزين.

وفى عام ١٩٨٨ عُقدت لجنة الموارد الطبيعية، والمجلس الدولى للموارد الوراثية النباتية، والمعهد الدولى للزراعة الاستوائية وبرنامج الأمم المتحدة للبيئة اجتماعين اقليميين فى افريقيا بهدف الترويج لصيانة ثروات القارة من التنوع الوراثى، وتوثيق التعاون بين البرامج الاقليمية، والمؤسسات الخاصة، والمنظمات الدولية العاملة فى افريقيا .

وعقدت اللجنة الاقليمية لجنوب شرق آسيا التابعة للمجلس الدولى للموارد الوراثية النباتية التى تمثل البرامج القطرية فى اندونيسيا، وبابوا غينيا الجديدة، وماليزيا والفلبين وتايلند اجتماعا فى سنغافورة فى ديسمبر/كانون الأول ١٩٨٨ بمساعدة منسق المجلس الدولى للموارد الوراثية النباتية فى جنوب وجنوب شرق آسيا.

وتم التوقيع على ثلاث مذكرات تفاهم خلال عام ١٩٨٨، وقد مهدت المذكرة التى وقعت مع الأكاديمية الصينية للعلوم الزراعية الطريق لفتح مكتب المجلس لشرق آسيا فى بيجين، وستفضى المذكرة الموقعة مع

الاتحاد الدولى لصيانة الطبيعة والموارد الطبيعية الى توثيق التعاون بين المجلس والاتحاد المذكور. وأخيرا ستؤدى الاتفاقية المبرمة بين المعهد الدولى لبحوث الأرز والمجلس الى تحسين التفاعل بين المركزين التابعين للجماعة الاستشارية الزراعية الدولية .

الحصول على الاصول الوراثية

عكست عمليات جمع الأصول الوراثية فى السنة الحالية القرارات التى اتخذت من قبل بضرورة ابلاء اهتمام أكبر بالأهداف ذات الأولوية . وفى عام ١٩٨٨، نظم المجلس أو ساعد فى تنظيم ١٢ بعثة لجمع السلالات البدائية والأجناس الأرضة و ٢٢ بعثة لجمع الأقارب البرية للمحاصيل الزراعية ركزت ٧ منها فى الاصول الوراثية للأعلاف .

التدريب

قدم المركز منحا دراسية الى سبعة من المتدربين من البلدان النامية للحصول على درجة الماجستير من جامعة برمنجهام فى السنة الدراسية ١٩٨٧ – ١٩٨٨. كما موّل تدريب سبعة متدربين آخرين فى ١٩٨٨ – ١٩٨٩، كما تلقى ٥٤ طالبا بمثلون ٣٤ بلدا منحا دراسية للاشتراك فى الدورات الفنية القصيرة التى نظمها المجلس الدولى للموارد الوراثية النباتية. وقام المركز بتمويل أربعة برامج تدريب فردية، وسبع منح تفرغ للباحثين فى مراحل ماقبل أو ما بعد الدكتوراه .

وفى عام ١٩٨٨، تم استعراض برنامج التدريب فى المجلس الدولى للموارد الوراثية النباتية، ووافقت لجنة البرنامج فى المجلس على التوصيات التى انتهى اليها الاستعراض فى وقت لاحق من السنة، وقد استكمل المجلس فى عام ١٩٨٨ المسح الذى أجراه لمن حصلوا بالفعل على التدريب سابقا.

بحوث زراعة الانسجة فى أنابيب الاختبار

واستمرت الجوانب العلمية للصيانة فى أنابيب الاختبار تحظى باهتمام المجلس الدولى للموارد الوراثية النباتية فى عام ١٩٨٨. وواصل بنك الجينات العاملة – ويعتبر بنكا رائدا أنشئ فى العام الماضى بالتعاون مع المركز الدولى للزراعة الاستوائية – فى اختبار معايير العمل التى تطبق فى حفظ الكسافا داخل هذه الأنابيب بحفظ الأغصان المستزرعة فى حالة نمو بطئ .

وقد ركز جزء من هذا النوع من البحوث خلال ١٩٨٨ على ايجاد الوسائل التى توفر لعملية الجمع فى أنابيب الاختبار امكانية الاستمرار بغض النظر عن نوع المحصول. فقد استكمل فى عام ١٩٨٨، على سبيل المثال، مشروع مشترك بين المجلس ومعهد بحوث الزيوت والبذور الزيتية فى كوت ديفوار تطوير أساليب جمع أجنة جوز الهند، ومنذ ذلك الحين، وأسلوب استنباط جوز الهند فى الأنابيب الذى طور فى كوت ديفوار يطبق بنجاح فى مشروع تابع للمجلس فى غرب جاوا قام بتنفيذه

معهد بحوث محاصيل المزارع فى بوجور باندونيسيا. وبفضل مشروع أجنة جوز الهند، نشأ تعاون بين مكتب البحوث العلمية والفنية لما وراء البحار ومعهد بحوث الزيوت والبذور الزيتية والمركز التعاونى الدولى للبحوث الاقتصادية والزراعية من أجل التنمية فى مجال تقنيات استزراع أجنة جوز الهند – غير مستكملة النمو – وحفظها بالتجميد .

بأمراض النبات والحجر الزراعى

وبدأ المجلس فى عام ١٩٨٨ فى تنفيذ عدد من المشروعات المتعلقة بأمراض النبات والحجر الزراعى، كما أجرى – بالتعاون مع ادارة وقاية النبات – برنامجا لنقل الأصول الوراثية على نحو يتميز بالفعالية والسلامة. وعقدت فى هذا المجال ثلاثة اجتماعات تحت رعاية المجلس والمنظمة فى عام ١٩٨٨. فعقد اجتماع عن الموز (بالتعاون مع الشبكة الموءسسية المختصة بتحسين زراعات الموز والموز الافريقى، واجتماع عن الكاكاو (بالتعاون مع المعهد الأمريكى لبحوث الكاكاو) واجتماع عن البطاطا واليام وقلقاسيات الطعام (بالتعاون مع معهد بحوث حماية النباتات). وقد وضعت هذه الاجتماعات خطوطا توجيهية تقنية نوعية خاصة بعدد من المحاصيل. وسيجرى نشرها بالاشتراك مع المنظمة فى بداية ١٩٨٩.

بحوث التنوع الوراثى

ولا تزال دراسة أقارب الأنواع وأنماط التباين الوراثى فى مجموعات جينات المحاصيل كعنصر أساسى لا يتجزأ من برنامج بحوث المجلس، فى طور الطفولة رغم أن هذه الدراسة تشكل أحد عناصر البرنامج منذ عدة سنوات . وتوطئة لاستعراض برنامج التباين الوراثى فى ١٩٨٩، أحرز فى عام ١٩٨٨ تقدم ملحوظ فى تقدير وتعزيز الأعمال الجارية فى مجال التباين الوراثى التى حرص المجلس على دعمها منذ نشأته. كذلك استمر فى ١٩٨٨ اجراء مسحين على جانب كبير من الأهمية فى مجال الايكولوجيا الجغرافية عن اللوبيا فى جنوب وسط افريقيا وعن التريتيكى فى الصين .

بحوث حفظ البذور

فى يوشيو/حزيران ١٩٨٨، جرى استعراض شامل الأعمال المنجزة، والسياسات الحالية فى هذا المجال. وأعقب الاستعراض مباشرة عقد حلقة دراسة عملية عن حفظ الأجنة مع تركيز خاص على البذور غير القابلة للتجفيف والحفظ بالتبريد وقام المجلس برعاية بحوث تناولت موضوعات مثل: الانخفاض الشديد فى محتوى الرطوبة، وحفظ البذور غير القابلة للتجفيف بالتبريد، والاستقرار الوراثى، ورقاد البذور، وقد توصلت هذه البحوث الى نتائج باهرة .

The European Cooperative Programme for the Conservation and Exchange of Crop Genetic Resources

By December 1988 23 countries had formally joined Phase III (1987–1989) of ECP/GR, but scientific collaboration extended to 26 European countries, as in Phase II of the Programme (1983–1986). Three of the six Crop Working Groups met during the year.

The Sunflower Working Group met on 30 July 1988 at IFVC, Novi Sad, Yugoslavia, immediately after the XII International Sunflower Conference (25–29 July 1988), which was organized by IFVC. Dr J.F. Fernández Martínez of INIA, Córdoba, Spain, chaired the meeting, which was attended by 11 participants including the Chairman of the USDA Sunflower Committee.

The *Allium* Working Group met at IHR, Wellesbourne, Warwick, UK, on 5 and 8 September 1988. Eleven participants attended and Dr D. Astley, who has responsibility for the European *Allium* Data Base (IHR), was re-elected as Chairman. This Working Group meeting was held in conjunction with the IV EUCARPIA *Allium* Symposium as a means to strengthen collaboration and interaction between the curators of *Allium* collections and the users.

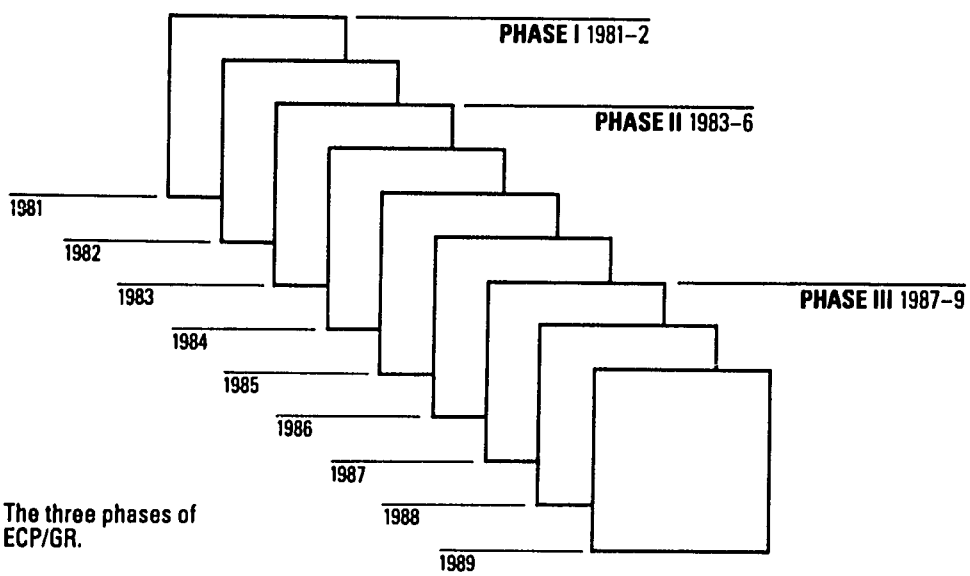
Finally, the *Prunus* Working Group meeting was convened at the Bildungsstäte des deutschen Gartenbaues, Grünberg, FRG, 24–26 November 1988. An unusually high number of members (16 from 13 countries) were invited, as one of the objectives of the meeting was to consider ways of ensuring the long-term maintenance of European *Prunus* collections through a network. Prof. H. Schmidt from the Federal Research Centre for Horticultural Plant Breeding in Ahrensburg, FRG, was the Chairman.

Of particular note in 1988 was progress made on databases and standard varieties.

European Data Bases

- European Catalogue of *Allium* (June 1988)
- European Catalogue of *Medicago* (perennial species) (September 1988, third edition)
- European Catalogue of *Poa* (first edition, October 1988).

The European Catalogue of *Allium*, edited by Dr D. Astley from IHR, includes passport data (17 descriptors) of 3853 accessions held in 23 institutes in 20 countries. The file has been sorted by species, subspecies, botanical



The three phases of ECP/GR.

variety/group and cultivar name. The taxonomic names and cultivar groups have been standardized according to the scheme agreed to by the Group.

The European Catalogue of *Medicago*, edited by INRA-GEVES in La Minière, France, contains passport data (up to 28 descriptors) of 1314 accessions from 16 institutes in 12 countries and is sorted by status of sample (advanced cultivars and breeder's lines, primitive cultivars/landraces, semi-natural and wild, unknown accession status). Advanced cultivars and breeder's lines are listed in alphabetical order; other accessions follow the country of origin.

The European Catalogue of *Poa*, edited by FAL, in Braunschweig, FRG, contains 1 137 accessions from nine institutes. Named accessions are listed in alphabetical order, unnamed accessions by species.

New *Brassica* Data Base

PBAI, Radzikow, Poland, agreed in November 1988 to establish a European database for cultivated *Brassica*, which is one of the four crops (*Beta*, *Vitis* and *Pisum* are the others) dealt with on an *ad hoc* basis by ECP/GR. All *Brassica* curators were immediately contacted by Dr J. Serwinski, the organizer of the database, and the ECP/GR Secretariat. A first list of holdings of cultivated *Brassica* is planned to be distributed in 1989.

Internationalization of databases

In view of its collaboration with USDA, the responsibilities of the CRI, Szeged, Hungary, for the database for cultivated sunflower and of the IFVC, Novi Sad, Yugoslavia, for the Data Base for Wild Sunflower have extended beyond Europe. The Sunflower Working Group agreed in July 1988 that both these databases should become global. CRI and IFVC will therefore distribute in 1989 the full content of their databases to all significant collections all over the world and request these collections to join the network by supplying their data.

The ECP/GR *Beta* Workshop held in November 1987 in Wageningen, the Netherlands also recommended that the *Beta* Data Base (implemented by CGN the Netherlands), assume global responsibilities within the framework of the ECP/GR Programme. The achievements of the international *Beta* Data Base will be presented in February 1989 at an international workshop on *Beta* genetic resources organized by IBPGR and CGN.

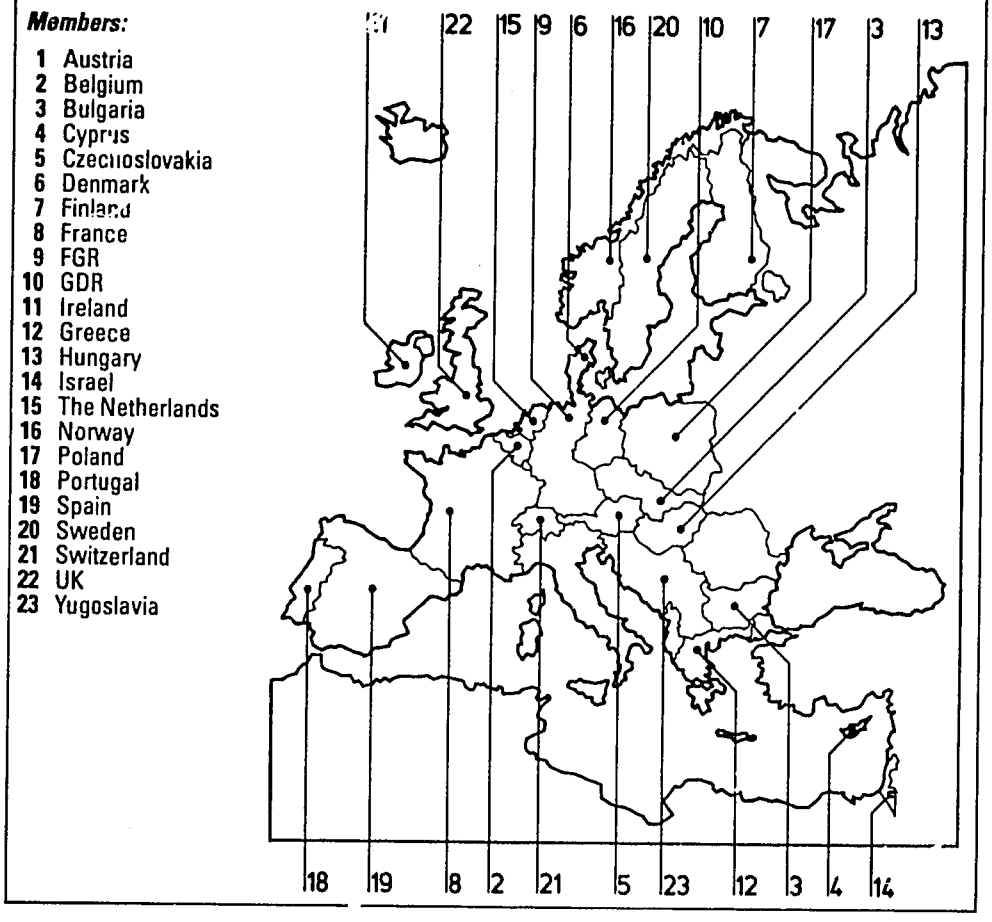
Computerized exchange

In the early years of ECP/GR, data were usually exchanged between curators and databases as printouts or in written form. The dominant trend nowadays is to exchange data directly on floppy disks or magnetic tapes, thanks to increasing computerization within institutes holding collections, the implementation of ECP/GR file transfer centres in 1984 and 1985 and, above all, the accumulation and expertise acquired through the practice of exchange between documentation officers of the various institutions. In 1987, a working session of the Forage Working Group strongly recommended the use of electronic media for exchange of data. In 1988, the Sunflower Working Group established procedures in which data will be exchanged almost exclusively via diskettes. Similarly, IHR will distribute, starting in January 1989, the content of the European *Allium* Data Base in computerized form to all contributors; these will return amended and additional data in the same way. This systematic, computerized exchange within the ECP/GR will accelerate the full process of data registration into central databases. In addition, the availability of these databases in computerized form will enhance sorting and search of information by genebank curators and users.

Further services of databases

During the third meeting of the Sunflower Working Group, IFVC distributed a list of 361 bibliographical references on genetic resources of wild sunflower species. At the same time, IHR, as holder of the *Allium* Data Base, agreed to

Figure X. **Member countries of Phase III of ECP/GR, as at 31 December 1988.**



implement a computerized bibliography of all *Allium* publications relevant to taxonomy and genetic resources.

Use of standard varieties

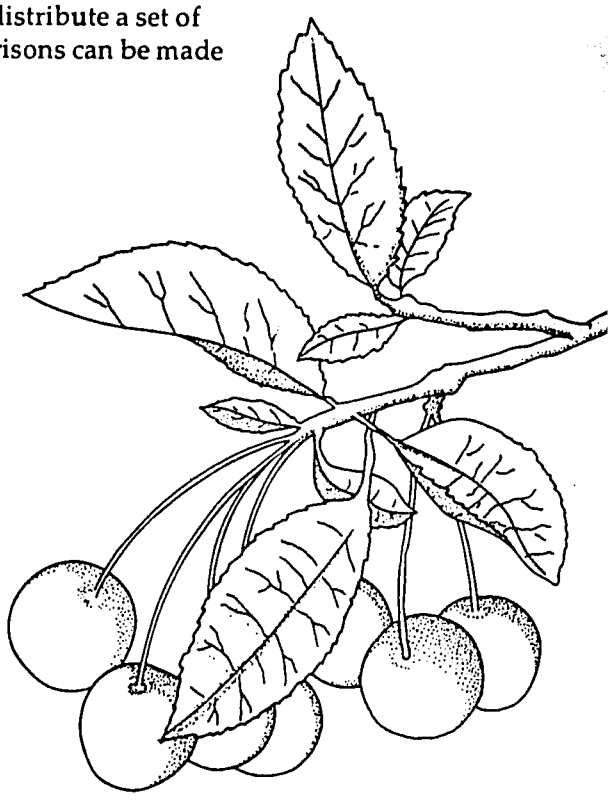
The use of standard varieties is recommended in IBPGR descriptor lists. Indeed, quantitative characters, for which phenotypes show a continuous range of expression (flowering time, plant height, etc.) can only be meaningfully assessed when compared with a standard variety. Without mentioning the need for standard varieties to aid in comparison between locations, the expression of many qualitative characters will be influenced by environment and again, reference to a standard variety will give most useful information to users. Since 1985, most of the ECP/GR Working Groups have worked towards the adoption of common standard varieties for programmes/countries when allowed by ecoclimatic conditions.

The Sunflower Working Group recommended in its second meeting the use of the inbred line HA89 as a reference variety, and by the end of 1986 INRA Clermont–Ferrand had distributed the line. Experience now shows that this line is sensitive to photoperiodism, consequently the Group in its third meeting (July 1988) decided to study photosensitivity of inbred lines that have potential interest as reference varieties. These trials will be conducted under greenhouse conditions by INIA, Spain, as an input-in-kind to ECP/GR.

The Forage Working Group agreed in 1987 on a list of 'Standard Forage Legumes in the Mediterranean Zone' (29 varieties for 17 species) and a list of

'Standard Varieties for Forage Genetic Resources in Northern and Middle Europe' (36 varieties for 14 species, different ploidy levels or earliness and lateness being considered depending on the species). In 1988, originators of the designated standard varieties sent 2–5 kg of seeds of their varieties to the databases having responsibility for the species, so that in 1989 each standard variety will be easily available to all evaluators.

The third meeting of the *Prunus* Working Group established a list of standard varieties for each crop, selected mainly on the basis of their wide adaptability and plasticity. These include 36 clones for 12 categories of crops. Curators of small collections should include at least one of these standard varieties for each crop, whereas curators of larger collections should include the full set of standard varieties. Nine curators from eight countries will distribute a set of virus-free clones of these reference varieties, so that comparisons can be made using the same material all over Europe.



Prunus

Abbreviations used in this report

AAASA	Association for the Advancement of Agricultural Sciences in Africa, Ethiopia
ACIAR	Australian Centre for International Agricultural Research, Australia
ACRI	American Cocoa Research Institute, USA
ACSAD	Arab Centre for the Study of Arid Zones and Dry Lands, Syria
ARC	Agricultural Research Corporation, Egypt and Sudan
ARI	Agricultural Research Institute, Cyprus
ARS	Agriculture Research Service, USDA
AVRDC	Asian Vegetable Research and Development Center, Taiwan, China
BJRI	Bangladesh Jute Research Institute, Bangladesh
CAAS	Chinese Academy of Agricultural Sciences, China
CATIE	Centro Agronomico Tropical de Investigacion y Ensenanza, Costa Rica
CENARGEN	Centro Nacional de Recursos Genéticos, Brazil
CGIAR	Consultative Group on International Agricultural Research
CGN	Centre for Genetic Resources, the Netherlands
CIAT	Centro Internacional de Agricultura Tropical – CGIAR
CICA	Centro de Investigacion en Cultivos Andinos, Peru
CIHEAM	International Centre for Advanced Mediterranean Agronomic Studies
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo – CGIAR
CIP	Centro Internacional de la Papa – CGIAR
CIPI	Cotton and Industrial Plants Institute, Greece
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France
CNR	Consiglio Nazionale delle Ricerche, Italy
CRA	Centre de Recherche Agronomique, France
CRI	Cereal Research Institute, Hungary
CSIRO	Commonwealth Scientific and Industrial Research Organization, Australia
CTA	Technical Centre for Agricultural and Rural Cooperation, the Netherlands
DANIDA	Danish International Development Agency, Denmark
DGIS	Directorate General for International Cooperation, the Netherlands
DGRST	Delegation Generale a La Recherche Scientifique, Dakar, Senegal
ECP/GR	European Cooperative Programme for Conservation and Exchange of Crop Genetic Resources – UNDP/IBPGR
ELISA	Enzyme-linked immunosorbent assay
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria, Brazil
ENMP	Estacao Nacional de Melhoramento de Plantas, Portugal
ETSIA	Escuela Tecnica Superior de Ingenieros Agronomos, Spain
EUCARPIA	European Association for Research on Plant Breeding
FAL	Institut für Pflanzenbau und Pflanzenzhchtung der Bundesforschungsanstalt für Landwirtschaft, FRG
FAO	Food and Agriculture Organization of the United Nations
FCPI	Fodder Crops and Pastures Institute, Greece
FINNIDA	Finnish International Development Agency, Finland
FOFIFA	Centre National de la Recherche Appliquee au Developpement Rurale, Madagascar
FSL	Florida Sugarcane League, USA
FTRS	Fruit Tree Research Station, Japan
GEVES	Groupe d'Etudes des Varietes et des Semences, France
IAM	Istituto Agronomico Mediterraneo, Italy
IARC	International Agricultural Research Center (of CGIAR)
IARI	Indian Agricultural Research Institute, India
IAVH	Institut Agronomique et Veterinaire Hassan II, Morocco
IBPFC	Institute for Breeding and Production of Field Crops, Yugoslavia
IBPGR	International Board for Plant Genetic Resources – CGIAR
IBTA	Instituto Boliviano de Tecnologia Agropecuaria, Bolivia
ICA	Instituto Colombiano Agropecuario, Colombia
ICAR	Indian Council of Agricultural Research, India
ICARDA	International Centre for Agricultural Research in the Dry Areas – CGIAR
ICGR	Institute of Crop Germplasm Resources, CAAS, China
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics – CGIAR
ICTA	Instituto de Ciencia y Tecnologi Agricola, Guatemala
IDR	Institut du Developpement Rural, Burkina Faso
IFPRI	International Food Policy Research Institute – CGIAR
IFVC	Institute for Field and Vegetable Crops, Yugoslavia
IHR	Institute of Horticulture Research, UK
IIHR	Indian Institute of Horticultural Research, India
IITA	International Institute of Tropical Agriculture – CGIAR
IJO	International Jute Organization, Bangladesh

ILCA	International Livestock Centre for Africa – CGIAR
ILDIS	International Legume Database and Information Service, UK
ILRAD	International Laboratory for Research on Animal Diseases – CGIAR
INIA	Instituto Nacional de Investigaciones Agrarias, Spain
INIAA	Institut Nacional de Investigacion Agraria y Agroindustrial, Peru
INIAER	Instituto Nacional de Investigacao Agraria e de Extensao Rural, Portugal
INIAP	Instituto Nacional de Investigaciones Agropecuarias, Ecuador (also INIAP – Mexico and INIAP – Peru)
INIBAP	International Network for the Improvement of Banana and Plantain, Philippines
INRA	Institut National de la Recherche Agronomique, France (also INRA – Morocco)
INRAA	Institut National de la Recherche Agronomique, Algeria
INRAN	Institut National de Recherches Agronomiques du Niger, Niger
INTA	Instituto Nacional de Tecnologia Agropecuaria, Argentina
IPB	Institute of Plant Breeding, Philippines
IPO	Research Institute for Plant Protection, the Netherlands
IRFA	Institut de Recherches sur les Fruits et Agrumes, France
IRHO	Institut de Recherches pour les Huiles et Oléagineux, France
IRRI	International Rice Research Institute – CGIAR
ISNAR	International Service for National Agricultural Research – CGIAR
ISRA	Institut Senegalais de Recherche Agronomique, Senegal
IUCN	World Conservation Union, Switzerland
JAAS	Jilin Academy of Agricultural Sciences, China
JBNB	Jardin Botanique National de Belgique, Belgium
JICA	Japan International Cooperation Agency, Japan
NCARS	National Centre for Genetic Resources and Biotechnology, Nigeria
NGB	Nordic Gene Bank, Sweden
NIAR	National Institute of Agrobiological Research, Japan
NORAD	Norwegian Agency for International Development, Norway
NPGS	National Plant Germplasm System, USA
NSSL	National Seed Storage Laboratory, USA
NVRS	National Vegetable Research Station, UK
OAU	Organization of African Unity
ORSTOM	Institut Francais de Recherche Scientifique pour le Developpement en Cooperation, France
PARC	Pakistan Agricultural Research Council, Pakistan
PBAI	Plant Breeding and Acclimatization Institute, Poland
PCARRD	Philippine Council for Agricultural and Resources Research and Development, Philippines
PGR	Plant Gene Resources of Canada, Canada
PGRRI	Plant Genetic Resources Research Institute, Turkey (previously ARARI)
PGRC/E	Plant Genetic Resources Center, Ethiopia
QDPI	Queensland Department of Primary Industries, Australia
RBG	Royal Botanic Gardens, Kew, UK
RCA	Research Centre for Agrobotany, Institute for Plant Production and Qualification, Hungary
RECSEA	Regional Committee for Southeast Asia – IBPGR
RFLP	Restriction fragment length polymorphism
SBI	Sugarcane Breeding Institute, India
SIDA	Swedish International Development Authority, Sweden
TAC	Technical Advisory Committee – CGIAR
TISTR	Thailand Institute of Scientific and Technological Research, Thailand
UKM	National University of Malaysia, Malaysia
UNA	Universidad Nacional Agraria, Peru
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPM	Universiti Pertanian Malaysia, Malaysia
USAID	United States Agency for International Development, USA
USDA	United States Department of Agriculture, USA
VIR	N.I. Vavilov Institute of Plant Industry, USSR
WARDA	West Africa Rice Development Association – CGIAR
WICSCBS	West Indies Central Sugarcane Breeding Station, Barbados
WPBS	Welsh Plant Breeding Station, UK
WWF	World Wide Fund for Nature, UK
ZIGuK	Zentralinstitut fhr Genetik und Kulturpflanzenforschung, GDR