



## Item 6 of the Provisional Agenda

### COMMISSION ON PLANT GENETIC RESOURCES

#### Sixth Session

Rome, 19 - 30 June 1995

### REPORTS, PROGRAMMES AND ACTIVITIES ON PLANT GENETIC RESOURCES: 2. REPORTS ON THE ACTIVITIES OF INTER- GOVERNMENTAL AND INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS

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I. INTRODUCTION

1. The Commission on Plant Genetic Resources is the only inter-governmental body where member countries, both donors of funds and technology and users of germplasm, discuss matters specifically related to plant genetic resources for food and agriculture. The Commission, as provided for in its mandate, has regularly received reports on FAO's policies, programmes and activities for the conservation and use of plant genetic resources. Since 1989, the Commission has also received reports from the International Bureau for Plant Genetic Resources (IBPGR, now the International Plant Genetic Resources Institute, IPGRI).
2. At its Fourth Session, the Commission requested the FAO Secretariat to also invite other organizations working in the field of plant genetic resources to report on their programmes and activities on the conservation and use of plant genetic resources. It considered that such reports "would be of value both to the Commission, and to those organizations which would thereby be able to better acquaint countries that are donors of germplasm and funds with their objectives and programmes, and benefit from their comments" (CPGR/91/Rep., para. 111).
3. The Fifth Session of the Commission, in February 1993, received written and verbal reports from a variety of organizations. These included various United Nations and other inter-governmental organizations: the UN Educational, Scientific and Cultural Organization (UNESCO), the UN Environment Programme (UNEP), The UN Industrial Development Organization (UNIDO), and the Commonwealth Secretariat. The International Bureau for Plant Genetic Resources (IBPGR) and ten other International Agricultural Research Organizations of the Consultative Group on International Agricultural Research also reported: the International Centre for Agricultural Research in Dry Areas (ICARDA), the International Centre for Research in Agroforestry (ICRAF), the International Centre for tropical Agriculture (CIAT), the International Centre for Maize and Wheat Improvement (CIMMYT), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Institute for Tropical Agriculture (IITA), the International Livestock Centre for Africa (ILCA), the International Potato Centre (CIP), the International Rice Research Institute (IRRI), and the West Africa Rice Development Association (WARDA). A number of international non-governmental organizations also reported: Genetic Resources International (GRAIN), the World Conservation Union (IUCN), the Rural Advancement Fund International (RAFI), and the World Wide Fund for Nature (WWF)<sup>1</sup>.
4. The Commission welcomed these reports, and requested the Secretariat to invite these and "other governmental and non-governmental international and regional organizations ... (including the World Bank, IFAD and Regional Development Banks), GEF, UNDP and other UN organizations, to submit reports to future sessions". In requesting reports for the Sixth Session, the Director-General accordingly wrote not only to those organizations that had reported to the Fifth Session, but also to the World Bank, the International Fund for Agricultural Development (IFAD), the African Development Bank, the Asian Development Bank, the Global Environmental Facility (GEF), The United Nations Development Programme (UNDP), the United Nations Conference on Trade and Development (UNCTAD), the

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<sup>1</sup> See document CPGR/93/6, "Report on Activities on Plant Genetic Resources by FAO, IBPGR and Other Organizations".

International Union for the Protection of New Varieties of Plants (UPOV), the World Intellectual Property Organization (WIPO), and the World Trade Organization (WTO).

5. The reports received before 13 April 1995 are reproduced in the present document. Each report is fully the responsibility of the organization presenting it; the Secretariat has limited itself to compiling the reports, as submitted.

6. The reports from the CGIAR Centres, though requested individually, were submitted through IPGRI, as the convening Centre of the CGIAR's System-wide Genetic Resources Programme (SGRP), which was established in 1994.

7. The report on FAO's activities is contained in the companion document, CPGR-6/95/5.1.

## II. UNITED NATIONS AND OTHER INTER-GOVERNMENTAL ORGANIZATIONS

### THE ASIAN DEVELOPMENT BANK (ASDB)

1. The Bank has been involved from the 1970s in activities and programmes aimed to promote the conservation and use of plant genetic resources. The Bank has collaborated with a number of CGIAR and other international agriculture research centres (IARCs) in sponsoring research studies and financing other programmes and activities for genetic resources. Selected international agricultural research systems have also been assisted either under Bank-financed loan projects or through technical or through technical assistance (TA) grants. A list of regional TA grants approved by the Bank to support CGIAR centres and IARCs' activities in genetic resources follows:

#### *AsDB Support for IARCs for Activities Related to Plant Genetic Resources*

TA No.	Project Title	Date Approved	Total AsDB Financing (in US \$'000)
<b>A. International Rice Research Institute (IRRI)</b>			
1.	5039 Establishment of a Rice Genetic Resources Laboratory	29 Mar. 1977	500.0
2.	5059 Intensification of Rice Research for Disadvantaged Areas	26 July 1979	700.0
3.	5261 Development of Rice Varieties Tolerant to Problem Soil Conditions	20 Aug. 1987	500.0
4.	5414 Decentralized Participatory research for Less favourable Rice Ecosystems and Rice Wheat Systems of Asia	13 Nov. 1990	3,000.0
5.	5510 Establishment of the Asian Rice Biotechnology Network	24 Nov. 1992	900.0
<b>B. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)</b>			
6.	5087 Establishment of a Genetic Resources Laboratory at ICRISAT	22 Sept. 1981	450.0
7.	5118 Strengthening Chick-Pea Research in Pakistan	15 Feb. 1983	300.0
8.	5268 Strengthening Grain Legume Research in South Asia	04 Dec. 1987	350.0
9.	1139 Pigeonpea Varietal Adaptation and SRI Production Studies in Sri Lanka	16 Mar. 1989	230.0
10.	5331 Establishment of Plant Biotechnology Research and Training Unit	25 Apr. 1989	1,250.0

TA No.	Project Title	Date Approved	Total AsDB Financing (in US \$'000)
11.	5405 Strengthening the Genetic Resources Unit	07 Sept. 1990	600.0
<b>C. International Potato Centre (CIP)</b>			
12.	5533 Field Testing of True Potato Seed in Lowland Tropics	24 May 1993	433.0
<b>D. Asian Vegetable Research and Development Centre (AVRDC)</b>			
13.	5027 Outreach Programs in Vegetable Research in Korea, Philippines and Thailand	15 Apr. 1975	390.0
14.	5119 Strengthening Vegetable Research in Indonesia and Malaysia	15 Feb. 1983	475.0
15.	5461 South Asia Vegetable Research Network	25 Sept. 1991	600.0
<b>E. International Plant Genetic Resources Institute (IPGRI)</b>			
16.	5590 Coconut Genetic Resources Network in Asia and the Pacific Region	29 July 1994	800.0
<b>F. International Jute Organization (IJO)</b>			
17.	5235 Collection, Conservation, Characterization and Exchange of Germplasm of Jute, Kenaf and Mesta	05 Jan. 1987	350.0
18.	5375 Development of Improved Varieties of Jute and Allied Fiber Crops (Ph.II)	28 Mar. 1990	600.0

## THE COMMONWEALTH SECRETARIAT

### The Commonwealth Science Council

1. The Biological Diversity and Genetic Resources Programme of the CSC was established in 1986 with the mandate of assisting member countries in conservation and sustainable utilization of biological resources. Under this programme CSC conducts and supports conservation and use of plant genetic resources through training and capacity - building in areas including:

- genebanks, botanical gardens and herbariums
- propagation and distribution of superior plant material of key species and economic plants
- ethnobotany and conservation biology
- databases
- networking and information dissemination

### Iwokrama International Rainforest Programme

2. The Iwokrama programme is the Commonwealth/Government of Guyana project for sustainable use of tropical forest in Guyana, the only Commonwealth country in South America. It comprises 360,000 hectares of Amazonian tropical rainforest donated by the Government of Guyana to the Commonwealth for an exemplary international project. The project which has attracted support from the GEF, UNDP and from Britain's ODA, includes setting up an International Centre for Research and Training as well as a Communications Centre, and conducting a series of innovative research experiments for sustainable forest management.

3. CSC has a special link with the Iwokrama International Rainforest Programme and provides advice and assistance to their Research and Development activities for conservation and sustainable use of forest resources. Protecting the indigenous Amerindian community's traditional practices for management of biodiversity and their ecological prudence in utilization of biological resources is an important aspect of the programme. An ethnobiology project has been initiated to document Amerindians' use of biodiversity, including genetic diversity of their cultivated plants.

### Projects

4. Projects relating to plant genetic resources during 1994 include:

#### *Under-utilized Tropical Fruit Trees in Asia Network*

5. The Commonwealth Science Council (CSC) was one of the founder members of the Under-utilized Tropical Fruit Trees in Asia Network (UTFANET), which has been established to improve the economic and social development and nutrition of people in the Asia region, through the increased production of tropical fruit species. Other members include FAO (Food and Agriculture Organization), ICUC (International Centre for Under-utilized Crops), CIRAD Centre de Co-operation internationale en Recherche agronomique pour le Développement) and IPGRI (International Plant Genetic Resources Institute).

6. UTFANET's objectives include the assembly and distribution of relevant information, improvement of propagation and management practices of tropical fruits, and facilitation of rural development through efficient farming system research and extension services, leading to more efficient use of the genetic resources of tropical fruit species. A major activity of UTFANET will be

exploration, collection, conservation, characterization and documentation of genetic resources. Following the successful establishment of UTFANET, CSC is seeking to develop similar networks elsewhere for sustainable use of under-utilized tropical fruits.

*International Course of Under-utilized Tropical Plant Genetic Resources  
and their conservation and utilization*

7. This three week course, held in Malaysia in November 1994, was sponsored by CSC, the UN Food and Agriculture Organization and the International Centre for Under-utilized Crops. Lectures and practical work covered a total of 22 modules in the areas of biodiversity, genetic resource exploration and evaluation, conservation and utilization of plant genetic resources, and procedures for plant introduction and testing.

*International ILDIS Workshop*

8. The workshop held at the National Botanical Research Institute, Lucknow, India, was a joint CSC-CSIR (Council of Scientific & Industrial Research) project for "Design and Establishment of a Computerized Database of Legumes of South Asia", and was intended to make a factual database of plant diversity information for legumes.

*Regional Herbarium and Curation Techniques Training Course*

9. Participants from Commonwealth countries in the South Asian region were supported by CSC to attend this UNESCO course conducted under their Botany 2000 Asia Programme at NBRI, Lucknow, India.

*Regional Training Course on Tissue Culture and Micropropagation of Plants of  
Economic Importance*

10. The course sponsored by CSC was held in the Biotechnology Centre of the University of West Indies, Kingston, Jamaica. Participants from Caribbean Commonwealth countries were trained in methods for tissue culture of superior varieties of economically valuable agricultural and ornamental plants.



## THE UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD)

### Work on Environment and Commodities

1. Since UNCTAD VIII the Commodities Division has carried out a work programme which centres on three issues:
  - a) improved natural resources management and environmental protection in the commodities sector;
  - b) expanding the utilization, production and trade of environmentally friendly products; and
  - c) internalization of environmental costs and resource values.
2. This programme is based on the Rio Declaration and Agenda 21 and various decisions of the Trade and Development Board and the Standing Commodities. It has benefitted from extra-budgetary support of the Governments of the Netherlands and Norway as well as of UNDP.
3. In the context of *improved natural resources management and environmental protection in the commodities sector* the objective has been to assist in the design and implementation of national and international policies which would ensure that the development of the commodity sector and commodity trade are consistent and mutually supportive with a better management of natural resources and protection of the environment.
4. In 1992, with the support of the Government of the Netherlands, a round table meeting was held on the links between market conditions and the intensity of resource use, in particular environmental effects. Reports on agriculture, forestry, fisheries and mining were discussed by 16 experts. The meeting concluded that there was a need to review in greater detail the environmental externalities associated with the production, consumption and trade of different commodities; the differences among countries regarding environmental consequences of commodity production; the instruments which can be applied to internalize environmental externalities in each particular case; and the need for concerted international action.
5. In 1993 and 1994, further work on environmental effects of commodity production focused on the agricultural and mineral sector. Several case studies were undertaken so as to establish a solid factual basis aimed at:
  - i) assisting developing countries in designing and implementing policies which promote environmentally desirable production and processing of commodities; and
  - ii) increasing the awareness in developed importing countries of the difficulties faced by governments and producers in developing countries in terms of environmental protection in the commodities sector.
6. The findings of the studies on the agricultural sector covering coffee, cocoa and rice production have been synthesized in document TD/B/CN.1/15, prepared for the second session of the Standing Committee on Commodities. The document concludes that the case studies show that cocoa, coffee and rice are either produced or could be produced in such a way that the environment, particularly the natural resource base, is not harmed but even improved. Whether production is, in practice, so organized is determined by a set of economic, technical, social and legal factors, some of which are inherent in the production process (endogenous) and some external (exogenous) to it. Policies and measures promoting sustainable development in the commodity field therefore need to address both types of determinants. The document further highlights that specific environmental effects of commodity production and processing differ from commodity to commodity and from country to country.

Systematic information and analysis on the linkages between the determinants and the environmental effects are at best sketchy; hence information must be sought, analyzed and disseminated. The effectiveness of policies and measures at both the national and international levels, aimed at improving natural-resource management and environmental protection, can be considerably increased as this knowledge expands. It is planned to compile the country case studies on cocoa, coffee and rice in a volume and, subject to the availability of extra-budgetary resources, to hold regional and inter-regional seminars where the findings could be discussed by experts from interested countries.

7. As a supplement to the case studies on the minerals sector, an inventory of environmental legislation and practices in the mining and metals industries in selected countries in Asia and the Pacific region has been compiled. This document formed the basis for a regional seminar, held in Indonesia in September 1994. The analysis of environmental legislation and practice highlights that the existence of elaborate environmental protection laws does not suffice if they are not effectively implemented or applied. In fact, inadequate implementation and enforcement appear to be the critical shortcoming in most of the countries studies. If monitoring, implementation and enforcement are to improve, environmental authorities need to delegate or coordinate surveillance and enforcement functions with sectoral agencies. There is also a general tendency to copy Western process standards which are more often than not inappropriate. This results in an inadequate response to environmental challenges and may produce an expensive environmental burden later on. There is thus a need for criteria and standards that are better suited to the cultural setting of the countries.

8. A conference on Development, Environment and Mining was held in Washington D.C. in June 1994. The conference was organized in cooperation with UNEP, the World Bank and the International Council on Metals and the Environment. The conference examined eight subjects which are especially important for the sustainable development of mineral economies. These were: macro-economic policy, including the management of the exchange rate and of mineral revenue; the role of public and private enterprise in the exploitation of mineral resources; the role of government in environmental protection; the impact of mining activities on local communities; investment and taxation policy for the mineral industry; information needs for the management of natural resources; environmental liability and the rehabilitation of mining sites; and the practice of environmental management in the mineral industry. As follow-up to the conference, the UNCTAD secretariat is examining various options for increasing technical assistance to developing mineral economies.

9. The second programme element on *expanding the utilization, production and trade of environmentally friendly products* aims to assist developing countries in (i) increasing export earnings through expanding sustainable production and exports of products which are environmentally preferable from the point of view of producing and consuming countries, and (ii) benefitting from enhanced recycling programmes. In this context, a compendium of such products is being prepared to increase public awareness of the availability of substitution possibilities. Case studies are being undertaken in several developing countries to identify the supply potential. On the basis of these studies, workshops will be organized on specific environmentally friendly products. Concerning recycled and re-usable materials, the aim is to assist developing countries in their assessment of national recycling programmes and evaluation of the likely impact of enhanced global recycling and re-use on the environment, natural resources management, the demand for virgin material and world commodity trade.

10. Document TD/B.CN.1/25, prepared for the third session of the Permanent Committee on Commodities, represents a first attempt in categorizing environmentally preferable products and identifying bottlenecks for their increased consumption and production. According to their market potential, the document identified products with relatively large and established markets (which include re-usable and recycled materials/products, biomass fuels and organically grown products), products with considerable potential but rudimentary markets (which encompass agricultural fibres and alternative wood sources/substitutes), and niche products (that embrace non-wood forest products, natural inputs for agriculture and recycling of agricultural waste). The document classifies the problems that need to

be resolved for encouraging the consumption, production and trade of products which cause less environmental stress into five groups:

- a) the uncompetitiveness of prices of most of these products in the light of the absence of internalization of environmental costs for competing products;
- b) information constraints regarding the quality, properties and environmental advantages of environmentally friendly products, on the one hand, and commercially relevant variables (such as production volume, production location, transport facilities, prices etc.) on the other;
- c) the creation of markets;
- d) the supportive role of government policies, in particular in the areas of public procurement and standardization; and
- e) the provision of international financial assistance for encouraging and supporting the production of environmentally friendly products.

11. The *internalization of environmental costs and resource values* has been regarded as an issue which is of overriding importance in changing consumption, production and trade patterns. The programme activities aim at developing the conceptual, institutional and practical aspects of internalization; so far, the focus has been on the conceptual aspects, in particular valuation methods, institutional, policy and market failures as well as the pros and cons of certain internalization instruments. Document TD/B/40(2)/6, submitted to the 40th session of the Trade and Development Board, reviews the main economic instruments for full cost pricing. It argues that in choosing the right policy mix of internalization instruments account should be taken of their environmental effectiveness, efficiency in achieving objectives, their impact on equity, political acceptability and their flexibility in adapting to changes. The document opts for a pragmatic and flexible approach. Countries should start off by attenuating or eliminating policies distorting resource allocation and then implement revenue-generating internalization mechanisms for increasing knowledge and reinforcing institutional capacity.

12. A separate review of policy, institutional and market failures, the nature of externalities and various internalization instruments in the commodity sector highlights that any attempt to internalize externalities should be directed at the externalities themselves, and the techniques that cause them, rather than at the commodities *per se*.

13. At the practical level, a study is underway which undertakes a preliminary assessment of the impact of internalization policies in the agricultural sector. Using a static and a dynamic model, initial evaluation is made of the impact on various environmental and economic variables, including the competitiveness of different country groups.

14. At its third session which took place from 31 October to 4 November 1994 the Standing Committee on Commodities recommended that UNCTAD secretariat work should henceforth place emphasis on:

- a) theoretical and practical work regarding the internalization of environmental externalities, with particular focus on the impact on the environment of main distortions in price formation mechanisms, in particular the impact of subsidies and on experimental studies for some specific products where internalization would appear to be most readily addressed;

- b) improved information about the environmental implications of production, transportation, consumption and disposal of products as well as the links between economic policies and the environment; and
- c) improving the applicability of life cycle analysis to commodity issues.

## THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

1. Conservation and sustainable use of genetic resources is essential for environmentally sound and sustainable development. UNEP works both to protect and sustainably use individual species and their genetic resources and to conserve the habitats where they can continue to evolve and respond to a changing environment and to develop appropriate ways of maintaining maximum genetic diversity for improving agriculture, forestry, health, industry and environment with special emphasis on species with established socio-economic value. UNEP addresses biodiversity conservation and sustainable use at various levels: ecosystems/biogeographic realms level (forests, arid zones, oceans, freshwater, etc), species level (wildlife), genetic resources level (plant, animal and microbial resources, natural resources economics), processes level (biotechnology), monitoring and assessment level and legal aspects.
2. In collaboration with sister UN agencies, GOs and NGOs, UNEP's activities in this area focus on promotion of effective implementation of relevant Chapters of Agenda 21, the Convention on Biological Diversity and other relevant international conventions, strategies and action plans. Through its various programmes, UNEP supports a wide range of activities aiming at: promoting *in situ* and *ex situ* conservation of plant, animal, and microbial genetic resources and their sustainable use, and, development of related global and regional gene banks and information systems; conserving and managing habitats, ecosystems and wildlife in selected representative areas of the world's biogeographic provinces; strengthening and expanding the global network of genebanks housing the world base collections of crop genetic resources (coordinated by IPGRI), the global programme on livestock genetic resources (co-ordinated by FAO), the Latin America and Caribbean and the African biodiversity networks, the Biodiversity Information Network (BIN21) the Microbiological Resources Centres (MIRCENS), the international Microbial Strain Data Network (MSDN), the World Data Centre on Micro-organisms (WDC) and the global Information Resources on the Release of Organisms into the Environment (IRRO); expanding and improving related professional and institutional capability for assessment and sustainable management of biodiversity through pilot projects and appropriate training programmes in the conservation of biological diversity and sustainable use of biological resources and the application of relevant technologies; and training in the economics of biological resources and in environmental law and policy.
3. The United Nations Environment Programme is providing funds to the International Centres of Consultative Group on International Agricultural Research in 1994-1995 through joint projects. It includes projects and activities on environmental assessment, information, agroforestry research priorities, sustainable management and conservation of forests, sustainable integrated ecosystem management, biodiversity and genetic resources management totalling approximately 1 million US dollars, a triple of what was our contribution in the past years.
4. At the Ministerial-Level Meeting of the CGIAR held in Lucerne, Switzerland on 9-10 February 1995 it was decided to invite UNEP, which has been a member of the CGIAR since 1974, to join the co-sponsors Group (which currently consists of the World Bank, FAO and UNDP). By including UNEP among its co-sponsors, the system is stressing the importance that it attaches to sustainable natural resources use and environmental issues. The Executive Director of UNEP has decided to accept this invitation and become full co-sponsor as of 1st January 1996, with a view to enlarge UNEP influence in the CGIAR decision-making structure.
5. UNEP continues its support to the international programme for conservation of crop and tree genetic resources, coordinated by the International Plant Genetic Resources Institute (IPGRI). Currently UNEP is collaborating with IPGRI on a new initiative entitled "Capacity Building for Effective Plant Genetic Resources Conservation in Developing Countries". The project looks into the need to overcome erosion of plant genetic diversity and to offer training in plant genetic resources conservation and use to meet national and regional needs. As it is not possible economically or technically, to overcome erosion of plant genetic diversity through blanket conservation of all plant genetic diversity there is a need to know the extent to which the diversity of crop and agro-forestry target species is endangered

within specific areas or ecosystems and the various factors that are likely to have significant impact on genetic erosion. Socio-economic, physical and biological factors could serve as good indicators of genetic erosion. In view of scarce resources and the need for their proper utilization, such indicators would guide priority setting and more effective targeting of *in situ* and *ex situ* conservation activities and other measures that would reduce or prevent genetic erosion. However, development of such erosion indicators is in its early stage and case studies as envisaged under the project, focus on development of relevant methodologies and their testing.

6. Training opportunities in biodiversity conservation in general and, specifically in the conservation and use of plant genetic resources are not adequate to needs, particularly in developing countries, which are far from self-sufficient in this respect. The joint UNEP/IPGRI project will help build the capacity within developing countries to further training in plant genetic resources conservation and use to meet national and regional needs for trained scientists. Mechanisms for this will include the encouragement of developed/developing trainer links, the initiation of specific training activities in focal institutes in developing countries in order to build research and implementation of expertise in plant genetic resources conservation and use, and the development of training materials.

7. UNEP is also currently collaborating with the Centre for Agricultural Research in Dry Areas (ICARDA) on a project entitled "Promotion of Drylands Biodiversity Conservation Through Integrated Management." The project will initiate activities which enable the dryland plant genetic resources threatened with extinction in priority areas, be surveyed, collected, evaluated and preserved nationally and as well as in the gen banks network housing the world base collection. The project will also undertake training of experts from developing countries in the collection, evaluation, documentation and conservation of dryland plant genetic resources; organize training courses/workshops for candidates from developing countries on drylands biodiversity conservation through integrated management of natural resources. The project will, therefore, complement the need for concerted international action and regional cooperation to protect biological diversity including drylands diversity as recognized by the Convention on Biological Diversity, Desertification Convention and Agenda 21.

8. Bearing in mind the large number of economically important species originating from drylands, UNEP's Desertification Control Programme Activity Centre (DC/PAC) has over the years had keen interest in the conservation of dryland ecosystems and their biodiversity. To this effect, DC/PAC has supported SADC in its *Kalahari-Namib Plan*, one aim of which is to conserve (*in situ*) some economically important species of the dry Kalahari-Namib region, presently under increasing exploitation. DC/PAC has also supported (along with UNESCO, FAO, UNDP, IPGRI and others) the development of *IPALAC (International Programme for Arid Land Crops)*, which is a comprehensive programme designed to contribute to desertification control by maximizing the potential of germplasm that is specifically adapted to arid lands.

9. More recently DC/PAC has jointly with CGIAR Centres (ICRAF, ICRISAT, ILRI, ICARDA) initiated the Dryland Margin Initiative (DMI) which will aim at sustainable use of dryland resources including improved natural resource conservation and domestication of tree species of economic and environmental value. DC/PAC/Soils have also initiated the design of a project on "the below the surface biodiversity of tropical dryland soils"; a workshop was held in India in January 1995 on "*Biodiversity and ecosystems functions in tropical agricultural systems*" which reviewed the current understanding and knowledge on methodologies for determination of soil biodiversity and ecosystem functions.

10. With FAO, UNEP has undertaken from the early 1980s up to 1987 pilot projects for the conservation of forest genetic resources - on site in Cameroon, Malaysia and Peru. It further supported, in collaboration with FAO, the establishment of a number of pilot off-site stands in Africa and Asia in the 1970s. UNEP concentrated particularly on the use of indigenous plant genes in rehabilitating arid and semi-arid lands. FAO and UNEP sponsored pilot projects for the conservation of endangered livestock genetic resources, focusing most of their activities on the needs and opportunities of developing countries. The two organizations have developed animal descriptor surveys, conservation

methodologies and pilot genebanks, worked out training programmes, and set up databanks for genetic resources in Africa, Asia and Latin America. As a follow-up to these activities, a Global Databank was developed, initially in Hanover with the technical University and covering only European countries, then in Rome at FAO Headquarters of the whole world. A Global Breed Survey was implemented, allowing for the collection, validation and input of 2800 entries. Training courses were held on gene banks and databanks of DNA Technologies for the Conservation of Animal Genetic Resources.

11. In the framework of the same project, a more in-depth analysis of the status of a few critical breeds was initiated, in four situations selected for the uniqueness and/or emergency. The dissemination of information was efficiently promoted, with the reappearance after a two year interruption of the Animal Genetic Resources Information Bulletin (AGRI), now published regularly twice a year, and with the publication of a manual on *in situ* preservation of livestock and poultry and of the first edition of the World Watch List for Domestic Animal Diversity. More recently, UNEP has jointly with FAO embarked on upgrading the communication with all experts involved in the domestic animal segment of biodiversity while expanding the Global Databank to new species and completing the range of information collected, and to support the dissemination of information, through publications and training courses.

12. UNEP continued its support to the preparation of national biodiversity country studies. The primary objective of the country studies is to assist national Governments to identify, in the light of social, economic, environmental and other objectives, the basic needs and levels for effective conservation, including rational use of national biological resources and necessary supportive measures and costs to meet those needs, as well as the benefits associated with the implementation of these measures. More than 30 countries are at various stages of preparation of biodiversity studies. The country studies are expected to:

- a) provide an overview of the status of biological diversity, in terms of present knowledge, conservation efforts and future conservation needs and costs;
- b) institutionalize national biodiversity conservation strategies and action plans to be carried out in concert with national, regional and international institutions, and within the framework of the Convention on Biological Diversity;
- c) provide a basis for establishing priority areas of biological diversity conservation, and for national environmental planning and resource use;
- d) identify or develop techniques and methodologies for estimating costs and benefits of biological diversity conservation;
- e) enhance the national capacity to assess the direct and indirect benefits, investment costs and basic funding needs of biodiversity conservation and its rational use;
- g) develop understanding among decision makers, educators, economists, social scientists and the general public of importance of safeguarding biological diversity and to engage their support in this area; and
- h) secure additional parties and funds to the Convention on Biological Diversity and promote the effective implementation of other biodiversity-related international and regional agreements and action plans.

13. Drawing from the results of the biodiversity country studies and similar exercises, Guidelines for national biodiversity planning have been prepared in collaboration with the World Resources Institute (WRI) and the World Conservation Union (IUCN). The national biodiversity strategies and action plans called for in Article 6 of the Convention on Biological Diversity and Chapter 15 of Agenda

21 are key vehicles for implementing the Convention and relevant Chapters of Agenda 21. The guide is intended to help national agency officials, NGOs, communities, indigenous people and business leaders orient their initial efforts in biodiversity planning. It should also help in capacity-building workshops and team planning and is expected to be supplemented by national-level guides as soon as countries develop their own methods for dealing with their special issues and opportunities. To date more than 110 countries had ratified the Convention (for which UNEP provides the Secretariat) and are in the process of adopting or developing measures, strategies, programmes or plans to implement its provisions.

14. To improve the availability of reliable up-to-date information to support biodiversity planning and management in developing countries, UNEP with support from the GEF launched a project to assist developing countries and countries with economies in transition in building their information capabilities and to transfer appropriate technologies and skills in information management to organize, maintain and use data generated under the country study process.

15. Building on an assessment of the successes and failure of past activities, UNEP launched the preparation of a multidisciplinary and multisectoral "Biodiversity Programme and Implementation Strategy" as a framework for supporting global conservation and sustainable use of biodiversity. It provides a framework for UNEP support to the implementation of Agenda 21 in the fields of biodiversity and biotechnology, the Convention on Biological Diversity (CBD) and other relevant conventions and agreements, as well as contributing to the formulation and implementation of the operation strategy of the Global Environment Facility (GEF) in this area.

16. As a major contribution to mobilizing the scientific community to help provide a solid basis for further decision-making and follow-up to the Biodiversity Convention and Agenda 21, UNEP initiated a Global Biodiversity Assessment, with funding from GEF, with the aim to provide an independent, critical peer-review scientific analysis of the current issues, theories and views regarding the main global aspects of biodiversity. The Assessment will serve as a basis for decision making to meet the objectives of the Biodiversity Convention and Agenda 21. It will also be an important tool for the scientific body of the Convention. The potential audience of the Assessment is large and includes international, regional and national environmental organizations, both governmental and non-governmental, as well as policy makers and scientists working in the field of biodiversity. The main text of the GBA and a Policy Makers Summary is expected to be ready by the second half of 1995.



## THE UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

### Biotechnology and Biodiversity Management Programme

1. Although it is reasonable to hold that conventional methods of conservation and utilization of genetic resources have largely been effective and should continue to be the main approach in developing countries, genetic engineering and biotechnology offer new tools and new approaches to germplasm conservation and utilization. UNIDO's programme operates on the principle that it is desirable to apply genetic engineering tools and techniques, whenever feasible, as adjuncts to conventional approaches.
2. The effective protection and preservation of *in situ* biodiversity requires the active participation of local people, communities and non-profit organizations. In addition, the private business sector has an important role to play in the rational and equitable use of genetic resources. In the past decade, commercial interests have become increasingly involved in the scientific development and targeting of biotechnology applications for genetic improvement of plants, animals and micro-organisms. In many cases, new and useful genetic varieties have been developed through research. The private sector has intensified efforts not only to create new variability, especially in micro-organisms and plants, but also to improve methods of collecting, assessing and conserving natural genetic resources. An innovative type of commercial venture has emerged to meet the growing demand for commercially viable genes and their products that can be of potential use to humans; it has come to be known as biodiversity or genetic resources prospecting. Developing countries, individually or within regions, can equitably benefit from collaborative efforts in such ventures with the private sector through negotiating favourable technology transfer agreements.
3. At the UNIDO/ICGEB-sponsored Scientists Forum in Trieste, Italy in October 1992, the participants resolved that a very special effort should be made to use modern biotechnologies to increase efficiency of conservation and utilization of the biodiversity of flora, fauna and microbial species. Specifically, UNIDO and ICGEB were requested to give special priority to programmes that will strengthen the capacity of member states to study the biodiversity of their endogenous natural resources at the molecular level. A resulting database that catalogues genetic characteristics of valuable species, including medicinal plants, will complement existing UNIDO databases on medicinal plants and their evaluation (UNMPD and MPDE).
4. In this context, UNIDO has been working in close collaboration with a number of developing countries to develop an institutional capacity in two developing regions of the world to serve as models and as ICGEB Affiliated Regional Centres for other developing countries. The technological and management capability of the regions' infrastructural and human resources will be strengthened. This capacity will enable nations to systematically catalogue plants and microbial species, basing the work on local needs, and to direct their potential development into commercially viable products. The private sector and NGOs are also included in this new initiative through technology transfer and the creation of new enterprises mechanisms.

## THE WORLD BANK

1. The World Bank's support for the conservation of plant genetic resources comes through its support for national plant genetic resources activities, including *in situ* conservation, and from the Bank's support of the Consultative Group on International Agricultural Research (CGIAR).

### World Bank Loans and Credits

2. The Bank support for plant genetic resources conservation and utilization comes through its support for national agricultural research projects, and for biodiversity in projects. The Bank supports its member countries through the inclusion of a plant genetic resources component in Bank loans and credits for individual countries, especially in support for national agricultural research systems (NARS).

3. The Bank considers biodiversity conservation, including plant genetic resources conservation, as an objective as well as a performance indicator of environmentally sustainable development. Including biodiversity considerations within Bank projects ensures that it becomes an integral component of the development dialogue and country assistance.

4. Currently the Bank addresses these concerns by working with governments through:

- maintaining a policy dialogue
- investment in priority setting and action plans for biodiversity
- financial assistance for institutional strengthening
- improved information for biodiversity management, and
- development and implementation of best practice guidelines

### Consultative Group on International Agricultural Research (CGIAR)

Consultative Group on International Agricultural Research (CGIAR)

5. The CGIAR is a voluntary association of donors supporting 16 International Agricultural Research Centres (IARCs) dedicated to the promotion of sustainable agriculture for food security in the developing countries. The CGIAR is co-sponsored by FAO, UNDP, UNEP and the World Bank. The Bank provides US\$ 40m per annum in core support to the IARCs.

6. The IARCs have, over time, accumulated a large collection of germplasm, which collectively may be considered the largest collection of basic agricultural biodiversity. This unique collection of agricultural germplasm is held in trust under international agreements between the IARCs and FAO, signed in October, 1994. The CGIAR Chairman, Mr. Ismail Serageldin, signed these agreements with FAO on behalf of the individual IARCs.

7. The agreements provide an international legal framework for a multilateral plant genetic resources system, especially for the world's major food crops. As the first institutions to join the international network of *ex situ* collections, the CGIAR centres are bringing approximately one-third of the world's currently collected and stored plant germplasm into FAO's international network. It is hoped that both industrial and developing nations and other institutions will follow the example of the CGIAR centres and make the FAO network a truly universal instrument for providing international auspices for plant genetic resources collections.

## THE WORLD TRADE ORGANIZATION (WTO)

1. On 1 January 1994/5, the Marrakesh Agreement Establishing the World Trade Organization entered into force and the World Trade Organization (WTO) came into existence. The Agreement provides the common institutional framework for a set of trade agreements covering trade in goods, trade in services and intellectual property, as negotiated in the Uruguay Round of Multilateral Trade Negotiations. The following WTO agreements would seem to be of some relevance to the conservation and use of plant genetic resources: the Agreement on Agriculture, the Agreement on the Application of Sanitary and Phytosanitary Measures, the Agreement of Technical Barriers to Trade and the Agreement on Trade-Related Aspects of Intellectual Property Rights.
2. It should also be noted that, as part of the results of the Uruguay Round, a Decision on Trade and Environment was adopted along with the Agreement Establishing the WTO. Within the framework of the WTO, a Committee on Trade and Environment will focus on the identification of the relationship between trade measures and environmental measures, in order to promote sustainable development. It is required to make appropriate recommendations (to the first meeting of the Ministerial Conference under the WTO in 1996) on whether any modifications of the provisions of the multilateral trading system are required, compatible with the open, equitable and non-discriminatory nature of the system, as regards, in particular:
  - the need for rules to enhance positive interaction between trade and environmental measures, for the promotion of sustainable development, with special consideration to the needs of developing countries, in particular those of the least-developed among them; and
  - the avoidance of protectionist trade measures, and the adherence to effective multilateral disciplines to ensure responsiveness of the multilateral trading system to environmental objectives set forth in Agenda 21 and the Rio Declaration, in particular Principle 12; and
  - surveillance of trade measures used for environmental purposes, of trade-related aspects of environmental measures which have significant trade effects, and of effective implementation of the multilateral disciplines governing those measures.
3. The text of the whole Decision can be found in the Annex to this report.
4. The Agreement on Agriculture lays down important obligations to ensure improved market access for agricultural products, fairer conditions of export competition and more predictable and stable conditions for trade in this sector. While Members undertake commitments to reduce domestic support measures that distort international trade, those with, at most, a minimal impact on trade are exempt. Such policies include general government services, for example in the areas of research, disease control, infrastructure and food security, as well as direct payments under environmental programmes and regional assistance programmes. Also excluded are certain government assistance measures to encourage agricultural and rural development in developing countries.
5. The Agreement on Technical Barriers to Trade (TBT Agreement) and the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) seek to ensure that technical regulations and standards, and sanitary and phytosanitary measures do not create unnecessary obstacles to trade. The Agreements recognize that Member countries have the right to adopt and enforce measures necessary, *inter alia*, for the protection of human, animal or plant life or health or the environment. For sanitary and phytosanitary measures countries must provide a science-based justification for not using the relevant standards of the FAO International Plant Protection Convention or of the FAO/WHO Codex Alimentarius Commission. For other technical requirements, countries are also encouraged to use international standards where these are appropriate, but are not required to change their levels of protection as a result of standardization. Where a Member chooses to establish its own regulations, the Agreements require it to notify the new regulations to its trading partners,

preferably in draft form in advance of taking definitive legislative action. The Agreements call for close contact and cooperation with the relevant international organizations in the fields covered, including the International Standards Organization, the FAO/WHO Codex Alimentarius Commission, the International Office of Epizootics and the Secretariat of the International Plant Protection Convention.

6. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) aims to promote technological innovation and the transfer and dissemination of technology, to the mutual advantage of producer and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations. It covers each of the main areas of intellectual property - copyright and related rights, trademarks, geographical indications, industrial designs, patents, layout-designs of integrated circuits and undisclosed information. In respect of each of these categories of intellectual property, it lays down the minimum level of protection that each Member must provide, based on the pre-existing international rules contained in the main conventions of the World Intellectual Property Organization, and specifies the procedures and remedies that must be available so that right holders can effectively enforce their rights. Differing transition periods to meet the Agreement's requirements are allowed according to the stage of development of the country concerned - generally one year for developed countries, five years for developing countries and 11 years with the possibility of an extension for least developed countries.

7. More specifically, in the area of patents, the general rule is that Members must make patent protection available in all fields of technology for inventions that are new, involve an inventive step, are useful and adequately disclosed. However, Members are allowed to exclude inventions from patentability if it is necessary to prevent their commercial exploitation for reasons of protecting *ordre public* or morality within their territory, including the protection of human, animal or plant life or health or to avoid serious prejudice to the environment. They are also allowed to exclude from patentability plants, animals and essentially biological processes for the production of plants or animals, other than micro-organisms and non-biological and microbiological processes. However, if a Member avails itself of this possibility to exclude plant varieties from patentability, it will be required to protect them by an effective *sui generis* system; it may also opt for any combination of patents and *sui generis* protection in respect of plant varieties. These provisions of the Agreement on the protection of inventions in the area of plants and animals will be reviewed four years after the entry into force of the WTO.

Annex to WTO's Report

**Trade and Environment**

Decision of 14 April 1994

*Ministers*, meeting on the occasion of signing the Final Act embodying the results of the Uruguay Round of Multilateral Trade Negotiations at Marrekesh on 15 April 1994,

*Recalling* the preamble of the Agreement establishing the World Trade Organization (WTO), which states that members' "relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development,"

*Noting:*

- the Rio Declaration on Environment and Development, Agenda 21, and its follow-up in GATT, as reflected in the statement of the Chairman of the Council of Representatives to the CONTRACTING PARTIES at their 48th Session in December 1992, as well as the work of the Group on Environmental Measures and International Trade, the Committee on Trade and Development, and the Council of Representatives;
- the work programme envisaged in the Decision on Trade in Services and the Environment; and
- the relevant provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights,

*Considering* that there should not be, nor need be, any policy contradiction between upholding and safeguarding an open, non-discriminatory and equitable multilateral trading system on the one hand, and acting for the protection of the environment, and the promotion of sustainable development on the other,

*Desiring* to coordinate the policies in the field of trade and environment, and this without exceeding the competence of the multilateral trading system, which is limited to trade policies and those trade-related aspects of environmental policies which may result in significant trade effects for its members,

*Decide:*

- to direct the first meeting of the General Council of the WTO to establish a Committee on Trade and Environment open to all members of the WTO to report to the first biennial meeting of the Ministerial Conference after the entry into force of the WTO when the work and terms of reference of the Committee will be reviewed, in the light of recommendations of the Committee,
- that the TNC Decision of 15 December 1993 which reads, in part, as follows:
  - "(a) to identify the relationship between trade measures and environmental measures, in order to promote sustainable development;

(b) to make appropriate recommendations on whether any modifications of the provisions of the multilateral trading system are required, compatible with the open, equitable and non-discriminatory nature of the system, as regards, in particular:

- the need for rules to enhance positive interaction between trade and environmental measures, for the promotion of sustainable development, with special consideration to the needs of developing countries, in particular those of the least developed among them; and
- the avoidance of protectionist trade measures, and the adherence to effective multilateral disciplines to ensure responsiveness of the multilateral trading system to environmental objectives set forth in Agenda 21 and the Rio Declaration, in particular Principle 12; and
- surveillance of trade measures used for environmental purposes, of trade-related aspects of environmental measures which have significant trade effects, and of effective implementation of the multilateral disciplines governing those measures;"

constitutes, along with the preambular language above, the terms of reference of the Committee on Trade and Environment,

- that, within these terms of reference, and with the aim of making international trade and environmental policies mutually supportive, the Committee will initially address the following matters, in relation to which any relevant issue may be raised:

- the relationship between the provisions of the multilateral trading system and trade measures for environmental purposes, including those pursuant to multilateral environmental agreements;
- the relationship between environmental policies relevant to trade and environmental measures with significant trade effects and the provisions of the multilateral trading system;
- the relationship between the provisions of the multilateral trading system and:
  - (a) charges and taxes for environmental purposes
  - (b) requirements for environmental purposes relating to products, including standards and technical regulations, packaging, labelling and recycling;
- the provisions of the multilateral trading system with respect to the transparency of trade measures used for environmental purposes and environmental measures and requirements which have significant trade effects;
- the relationship between the dispute settlement mechanisms in the multilateral trading system and those found in multilateral environmental agreements;
- the effect of environmental measures on market access, especially in relation to developing countries, in particular to the least developed among them, and environmental benefits of removing trade restrictions and distortions;
- the issue of exports of domestically prohibited goods;

- that the Committee on Trade and Environment will consider the work programme envisaged in the Decision on Trade in Services and the Environment and the relevant provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights as an integral part of its work, within the above terms of reference,
- that, pending the first meeting of the General Council of the WTO, the work of the Committee on Trade and Environment should be carried out by a Sub-Committee of the Preparatory Committee of the World Trade Organization (PCWTO), open to all members of the PCWTO,
- to invite the Sub-Committee of the Preparatory Committee, and the Committee on Trade and Environment when it is established, to provide input to the relevant bodies in respect of appropriate arrangements for relations with inter-governmental and non-governmental organizations referred to in Article V of the WTO.

### III. INTERNATIONAL AGRICULTURAL RESEARCH ORGANIZATIONS OF THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR)

#### INTRODUCTION

1. The 16 Centres of the Consultative Group on International Agricultural Research (CGIAR) constitute the world's largest international effort to conserve and use agricultural biodiversity. The 1994 Mid-Term Meeting of the CGIAR endorsed the development of an integrated system-wide programme on genetic resources, recognizing that greater programme coherence would significantly enhance the contribution of the CGIAR to global efforts to conserve and use genetic resources. The resulting System-wide Genetic Resources Programme (SGRP) comprises the individually managed genetic resources programmes of the CGIAR Centres, operating under a common policy framework and contributing to common goals through a shared strategy. The International Plant Genetic Resources Institute (IPGRI) is the SGRP's convening Centre and the Inter-Centre Working Group on Genetic Resources (ICWG-GR) serves as the SGRP's steering committee to guide policy and management of genetic resources.
2. The SGRP encompasses *ex situ* collections of genetic resources of the world's major food and forage crops, maintained in trust by the Centres of the CGIAR under the auspices of the FAO Global System and its Network of Base Collections. Over 450,000 accessions were designated by the Centres as being covered by the FAO/CGIAR agreements, which were signed in October 1994. The CGIAR genebanks strive to provide optimum security for the germplasm which they hold and provide free access to samples which are free from diseases, pests and other contaminants. A System-wide Information Network on Genetic Resources (SINGER) will seek to assure free access to information on the CGIAR collections in a standardized information system and database.
3. The CGIAR Centres have commissioned an external assessment of their current genebank operations in 1995. With the involvement of FAO, the assessment will provide a firm basis for the further development of the system's genebank facilities and operations, including completing the process of duplicating accessions for added security.
4. FAO and IPGRI signed a Memorandum of Understanding in 1994 which underscored IPGRI's role as an active partner of FAO in the International Conference and Programme on Plant Genetic Resources (ICPPGR). Closer collaboration in the ICPPGR on the part of the other CGIAR centres was endorsed by the members of the ICWG-GR at its recent (January 1995) meeting held at ICARDA in Aleppo, Syria.
5. The plant genetic resources programmes and activities of twelve of the CGIAR Centres, integrated in the SGRP, are summarized in the following sections.



## EL CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL (CIAT)

1. Germplasm collections held in trust at CIAT comprise 27,000 accessions of *Phaseolus* beans, of which 90% correspond to *P. vulgaris*; 21,000 accessions of Tropical Forages, including 90% legumes; and nearly 6,000 cassava accessions. CIAT's genetic resources activities' highlights for the period 1993-94 include:
2. **Germplasm acquisition and distribution:** Over 2,500 *P. vulgaris* accessions were collected/received from 7 countries and over 4,700 were shipped to national institutions of 27 countries. In the case of Tropical Forages, 606 accessions from 25 countries were acquired and 6,605 were distributed to 38 countries. In addition, 110 cassava clones were collected from 4 countries and 1,031 pathogen-tested clones were distributed to 22 countries in the two-year period.
3. **Varieties released by NARS using germplasm distributed from CIAT:** In the last two years, 23 common bean varieties have been released by national institutions. These materials were directly selected from, or bred in cooperation with CIAT Programmes using the germplasm accessions distributed from CIAT's genebank.
4. **Backup accessions for NARS' collections:** Upon request, CIAT has provided germplasm accessions to fill in gaps or to replace accessions lost from national genebanks. In 1993-94, a set of 349 wild *Phaseolus vulgaris* accessions were sent to Mexico, 493 accessions to Iran and 434 to Honduras. In addition, 311 accessions of the common bean collection of Rwanda were repatriated in order to re-establish seed multiplication programmes in that country. In tropical forages, 65 accessions were repatriated to genebanks of 7 developing countries.
5. **Germplasm evaluation and conservation:** The development of more efficient genetic resources evaluation and conservation is being tackled at CIAT through research on three topics:
  - a) **Development of core collections:** The core collections of common bean germplasm comprising 1,100 accessions, the wild *P. vulgaris* core collection comprising 100 accessions, and the cassava core collection comprising 630 accessions have been assembled using passport, agro-ecological and botanical-evolutionary data. Characterization of the wild *P. vulgaris* core collection has been completed, and those of cassava and common bean have been initiated using molecular markers (RAPDs and AFLPs).
  - b) **Identification of duplicates in germplasm collections:** Previous characterization of the cassava collection with morphological descriptors and isozyme fingerprinting allowed the identification of up to 25% of the duplications. Recent work using DNA-based fingerprinting has added more discriminatory power to identify further duplications in the collection.
  - c) **Towards a cassava cryopreserved collection.** Rapid progress in cassava cryopreservation at CIAT has paved the way for a pilot project for assessing the operational aspects of establishing a base genebank using liquid nitrogen. Collaboration between CIAT, IPGRI and key NARS will be developed.
6. **Characterization and analysis of genetic diversity:** CIAT has initiated a research approach integrating its scientific strengths in biotechnology and geographic information systems (GIS) for studying genetic resources at micro and macro levels, and has developed improved strategies for conservation and utilization. Initial work with the *Phaseolus vulgaris* cultivated and wild collections, has not only provided information about the dynamics of gene flow between wild and cultivated populations, but is becoming an effective mechanism for describing the spatial distribution of diversity by pointing out new sites for germplasm collection and potential *in situ* conservation of wild relatives and landraces.

7. **Development of inter-specific gene pools:** Inter-specific hybridization between *Phaseolus vulgaris* and *P. acutifolius*, aided by *in vitro* embryo rescue and molecular markers, are being used to develop hybrid populations for bridging the transfer of useful traits from otherwise non-accessible *Phaseolus* species to common bean populations. We have generated large numbers of recurrent and congruity hybrid lines with increased fertility levels in advanced generations. Field evaluations have served to select hybrid lines showing significantly high levels of resistance to bacterial blight. Work is underway to evaluate the transfer of traits such as resistance to leaf hopper and drought tolerance, as well as to monitor the exchange of chromosome segments using mapped molecular markers.

8. **Institutional capacity building in genetic resources:**

- a) The Centre has created a Scientific Resource Group on Genetic Diversity as a means of stimulating and coordinating scientific initiatives for securing the conservation and use of genetic resources, including recommendations for maintaining the operations of the CIAT genebank at international standards. Some initiatives have been recommended in the form of project proposals to help position CIAT in the context of the CBD, the CGIAR System Wide Genetic Resources Programme, and the needs of LDCs in relation to access/exchange of GR.
- b) In 1993-94, CIAT organized the following events to contribute towards developing capacities in genetic resources research and operations of LAC countries:
  - i. Training course on *in vitro* germplasm management, for 15 scientists from 13 LA countries, in collaboration with IPGRI, CIP and CATIE.
  - ii. Training course on documentation of genetic resources for 16 professionals from 10 Latin American countries, with the collaboration of IPGRI.
  - iii. Training course on biotechnology for the conservation of agrobiodiversity, offered to 18 scientists from 9 Latin American countries, with the support of the OAS, ICETEX and COLCIENCIAS.

## THE CENTRE FOR INTERNATIONAL FORESTRY RESEARCH (CIFOR)

1. The Centre for International Forestry Research (CIFOR), located in Bogor, Indonesia, is an international research centre under the Consultative Group on International Agricultural Research. CIFOR conducts collaborative, strategic research on tropical forests, in partnership with national research agencies, with the aim of improving the benefits accruing from forests to the rural poor in tropical countries. CIFOR's work on genetic resources encompasses both the conservation and utilization of forest genetic resources.
2. **Conservation of tropical forest genetic resources:** Forest trees are undomesticated, wild species. Therefore, *in situ* conservation in natural ecosystems offers by far the best approach for genetic conservation. However, in most parts of the tropical world, forests are under increasing pressure. Unsustainable agricultural practices, population growth, and infrastructure development all result in clearing of natural forests. Commercial logging operations often result in degradation of the remaining forest lands. Land set aside as protected areas is also subject to encroachment, and the protection regulations often serve to alienate local people, who may have previously relied on the forest for at least part of their livelihood.
3. For these reasons, CIFOR's research on conservation of tropical forest genetic resources concentrates on determining the impact of various types of disturbance (e.g., extractivism and selective logging) on the genetic resources of tropical forest ecosystems. This, in turn, will allow the formulation of new *in situ* conservation policies that respect the socio-economic needs of local people, while still permitting effective conservation. This research is not focussed solely on tree species but, by selection of model species that represent contrasting life history strategies, the impact of disturbance on a wide variety of tropical forest plant species will be determined.
4. The initial research projects on this subject are located in Malaysia, Thailand, and India, and the research is being conducted by national government research institutions and universities. It is intended to extend future research to Indonesia, Bangladesh, and central America. In keeping with CIFOR's philosophy, the research integrates genetic and socio-economic considerations, and will also examine the underlying processes that result in the conservation of genetic resources. As IPGRI shares similar concerns for conservation of tropical forest genetic resources, the two centres are partners in coordinating the work.
5. **Utilization of tropical forest genetic resources:** In many parts of the tropics, there are large areas of under-utilized and/or degraded lands. Reforestation of these lands offers several benefits, including the provision of goods, such as fuelwood and construction timber to local people, and sequestration of atmospheric carbon. However, the environmental constraints to tree growth are often severe, requiring careful selection of genetic resources that are biologically capable of survival and growth on degraded lands, and that are socially acceptable. The long rotation age of forest trees makes selection of genetic resources time-consuming and expensive. CIFOR is therefore conducting research to develop new methodologies to allow rapid assessment of the potential of genetic resources.
6. Some research is being conducted, in collaboration with the Oxford Forestry Institute, on developing molecular marker techniques for forest trees that may allow for marker-aided selection in the future. The utility of physiological assessments of young seedlings under artificially induced environmental stress is also being investigated for its potential in predicting future performance in the field. The role of mycorrhizal associates in promoting tree survival and growth, and the potential of plantations of mixtures of species will also be subjects of research projects.

## THE INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTRE (CIMMYT)

1. CIMMYT, with its headquarters in Mexico, harnesses useful genetic diversity in maize and wheat through plant breeding, preserves for the future diversity which may not appear useful now, and helps others (especially national agricultural research programmes) engaged in similar activities.
2. **Maize:** During 1994, a panel of international experts met at CIMMYT with the principal researchers of the Latin American Maize Regeneration Project - begun in 1992 to save endangered holdings of maize landraces - for review and planning sessions. The panel praised work to date and recommended that the project be extended to 1996. Thus far, participating germplasm banks from Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Guatemala, Mexico, Peru and Venezuela have regenerated more than 3,000 endangered accessions and will eventually regenerate some 5,500 more. Backup samples of seed have been shipped to CIMMYT and NSSL for long-term storage, and CIMMYT has compiled the related regeneration and passport data.
3. To promote widespread use of maize genetic resources, representatives of the Latin America Maize Evaluation Project (LAMP), now in its final stages, met at CIMMYT last year and approved updating the project's 1992 CD-ROM. The compact disc contains passport and evaluation data for some 12,000 maize accessions and has been distributed to hundreds of researchers. The LAMP group also made plans to evaluate accessions regenerated under the USAID-USDA-CIMMYT project and seek additional funding for future work.
4. Finally, as part of in-house regeneration and evaluation efforts and to improve the efficiency of preservation and utilization, CIMMYT germplasm bank staff have used morpho-agronomic data from field trials to develop core subsets for major Mexican landrace complexes and are progressing in similar work for Caribbean collections.
5. **Wheat:** Under a project supported by the "Comision Nacional para el Conocimiento y Uso de la Biodiversidad" (CONABIO), staff travelled to 13 states in the central plateau of Mexico to collect some 6,000 single spikes of wheat landraces originally introduced from Spain around 1560. The landraces are grown on a decreasing area mostly by indigenous people. The samples collected are being multiplied and characterized for several useful traits, including novel types of resistance to certain wheat pathogens.
6. To ensure international use of valuable wheat genetic resources, CIMMYT staff are loading passport information on such resources into the Wheat Bank System (WBS), which is part of the International Wheat Information System (IWIS). The IWIS can be operated off a CD-ROM and should be distributed to cooperators in 1996. Using IWIS, for example, researchers found that there has been a steady increase over time in the average number of landraces in the genealogies of CIMMYT wheat varieties (6 in 1950, compared with 64 in 1992).
7. Finally, staff have compiled genealogies for some 84,000 wheat cultivars, lines and genetic stocks, and the information will eventually be distributed through IWIS to wheat scientists worldwide.

## EL CENTRO INTERNACIONAL DE LA PAPA (CIP)

1. CIP's Genetic Resources Programme is concerned with: methods for the storage of genetic resources; comprehensive, manageable germplasm collections; germplasm databases; methods for the detection, mapping, and isolation of genes; and methods for genetic engineering. These areas cover the maintenance, conservation, enhancement and utilization of genetic resources of potato, sweetpotato, and Andean root and tuber crops (ARTC).
2. During 1993-94, emphasis was given to conservation (*ex situ* and *in situ*) and enhancement in order to facilitate the use of existing genetic resources by national programmes, NGOs, and other institutes and organizations in developed and developing countries and to give them an opportunity to apply the technology and information developed at CIP.
3. The following activities took place during 1993-94:
  - The inter-genebank wild potato species inventory that comprises 11,256 accessions has been completed. Passport data for this collection are ready for publication in both hard copy and as a microcomputer data file. Isozyme characterization has been carried out for 2,800 additional accessions. Using these data, a core collection is being established at CIP.
  - CIP, in collaboration with different Peruvian universities, has been able to increase seed for more than 60 wild potato species. These seeds will be used for different purposes (conservation, enhancement, prebreeding, etc.) all over the world.
  - Diploid populations and clones have been assembled in order to provide new sources of resistance to potato tuber moth, bacterial wilt and late blight. These populations and clones were generated using wild and cultivated genetic resources. These clones are free of known pathogens and are ready for distribution to NARS programmes worldwide.
  - The field genebank of sweetpotato maintained at CIP has been reduced in numbers by using both morphological and electrophoretic evaluations. Duplicate accessions will be converted to true seed. This reduction is helping CIP reduce costs and save space.
  - CIP has been supporting the *in situ* conservation of ARTC through the identification of microcentres of diversity, and by monitoring the handling of ARTC by farmers at four sites in Peru and one in Bolivia.
  - *In vitro* distribution of potato and sweetpotato to NARS, NGOs, universities and other institutes in developed and developing countries has increased about three to four times in comparison with last year.
  - The development of a potato population with horizontal, R- gene-free resistance to late blight disease was confirmed. The new population should provide more durable resistance than is found in existing late-blight-resistant varieties and should be more easily exploited by national plant improvement programmes. An emergency plant breeding effort that responds to a new late blight disease population - the so-called A2 - was also begun. The project will explore resistant genes found in wild potato species.
  - CIP late-blight-resistant varieties continued to perform well in 1993-94. In Peru, two resistant varieties were released in August, 1993. Both produce high yields (30-40 t/ha) under high levels of A1 late blight infection. These materials are now available for distribution.
  - CIP applies molecular markers for the improvement and characterization of potato, sweetpotato and ARTC germplasm. The institute is mapping insect and late blight resistance traits to find

DNA markers associated with major loci. RFLP markers associated with glandular trichome-mediated resistance have been identified and marker information for parental genotype selection has been used in CIP-Cornell University collaboration for developing potatoes with glandular trichomes and good agronomic attributes. Several segregating populations for horizontal leaf resistance to late blight have been established. CIP has produced field and laboratory data on the segregation of the trait.

- Germplasm collections are currently evaluated by marker technology to eliminate duplicates and to assess their genetic diversity. DNA fingerprinting using the random amplified polymorphic DNA (RAPD) technique has begun with several diploid potatoes (*Solanum phureja* accessions), cultivated and wild sweetpotato species, and maca and oca root and tuber crops.
- Germplasm enhancement using non-conventional techniques, such as genetic engineering, led to the development of hundreds of transgenic potatoes that were for the first time tested under natural conditions with the appropriate legal regulations. Their potential value covers resistance to potato tuber moth, bacterial diseases and fungal disease.
- Some potato germplasm from the world collection has also for the first time been successfully cryopreserved at headquarters. Research is focused on the establishment of a simple screening of cryopreservation potential for potato, and will be expanded to sweetpotato germplasm.

**THE INTERNATIONAL CENTRE FOR AGRICULTURAL  
RESEARCH IN THE DRY AREAS (ICARDA)**

1. The West Asia and North Africa (WANA) region is the centre of origin and primary diversity of some of the world's major food crops, including those under ICARDA's mandate - wheat, barley, chickpea, lentil and faba bean, as well as several important pasture and forage legume species. The genetic resources originating from WANA region have a global importance for crop improvement and related research and for providing basic material for the development of improved germplasm adapted to the farming systems in the region. Due to several factors, the genetic diversity of these plants is endangered. Conserving the indigenous germplasm and evaluating its usefulness is an important task for ICARDA.
2. The objective of the Centre is thus to collect, acquire, conserve, evaluate, document and promote use of the genetic resources of barley, wheat, lentil, chickpea, faba bean and pasture and forage legume species originating in the WANA region.
3. The number of plant accessions now held at ICARDA totals 110,000. Of these, some 70,000 originate from the WANA region and 20,000 have been collected in 64 missions organized by the Centre. Germplasm has been characterized and evaluated for a number of descriptors, and catalogues for barley, durum wheat, lentil, chickpea and faba bean have been published. All passport information and characterization data have been computerized. A seed stock control system has been developed and added to the germplasm database management system. The utilization of the genetic resources held at ICARDA has been further enhanced through closer interaction with national programmes in the region and through crop improvement programmes at ICARDA. In 1994, some 33,000 seed samples were distributed, of which 8,000 went to users at the national programmes in the WANA region and 12,000 to ICARDA crop improvement programmes.
4. The WANA Collaborative Network on Plant Genetic Resources (WANANET) was established jointly with IPGRI, FAO and WANA NARS in 1992 and Phase I was successfully completed in 1994. Six working groups are now fully operational.
5. In the future, the focus will continue to be on ICARDA's mandate crops, on germplasm indigenous to West Asia and North Africa, with special emphasis on areas where key stresses are experienced, and on landraces, wild relatives and primitive forms of crops. Research related to complementary conservation strategies will be enhanced through close collaboration with NARS in the WANA region.
6. ICARDA will contribute to the joint CGIAR effort in the system-wide programme on genetic resources. The Centre will also assist, in collaboration through WANANET with IPGRI's WANA Regional Office and with FAO, national programmes in human resources development and in other genetic resources activities.

### THE INTERNATIONAL CENTRE FOR RESEARCH IN AGROFORESTRY (ICRAF)

1. The work of ICRAF's Genetic Resource Unit (GRU) is to explore, collect, characterize, document and conserve germplasm of priority tree species, and to facilitate the supply and exchange of research quantities of germplasm to collaborating institutions in developing countries.
2. In 1993, the Multipurpose Tree Germplasm Resource Unit coordinated and conducted a collection of 107 accessions of *Sesbania sesban* and its close relatives in five southern African countries: Botswana, Malawi, Namibia, Zambia and Zimbabwe. The collection was done in collaboration with national institutions and with IPGRI, ILCA and the SADC Regional Genebank. The focus of this collection was on perennial woody species for improved fallows. Rhizobium strain collections were made at the same time, for both characterization and conservation. The MPT Germplasm Resource Unit also provided support to ICRAF scientists and collaborators, by facilitating the supply of seed and planting material of various MPTS species. In total 186 requests for seed were met.
3. Collection of germplasm of *Prosopis africana* was carried out in 1993 in the Sahel with 23 provenances in Niger and 5 provenances from Burkina Faso. Further collections were made in May 1994 in Burkina Faso (7 provenances) and in Mali (19 provenances).
4. During 1994, the inaugural meeting of the GRU Advisory Committee was held with a review of ICRAF's GRU strategy. This involved forward planning for the implementation of the Convention on Biological Diversity and transfer of ICRAF's germplasm collections to global ownership under the auspices of the FAO. ICRAF was represented at the Inter-Centre Working Group on Genetic Resources and also assisted in the development of the system-wide strategy. Two triculture meetings were held between IPGRI, CIFOR and ICRAF to discuss responsibilities and complementarities for handling forest genetic resource issues within the CGIAR. One result of this was the production of a public awareness brochure entitled "Keeping Faith with the Future: Forests and their Genetic Resources".
5. GRU staff in collaboration with ICRAF's Characterization and Impact Programme (Programme 1) and ISNAR, have developed general guidelines for priority setting of MPT species which includes five components, namely:
  - i) team building and planning workshop;
  - ii) assembling secondary information;
  - iii) farmers' surveys to determine farmers' preferences for MPT species;
  - iv) scientific workshop to analyze collected information and discuss research priorities; and
  - v) valuation survey.
6. In 1994, MPT priority setting was carried in the Humid Lowlands of West Africa. Guidelines and a questionnaire were developed to evaluate farmer preferences and used successfully in interviews in Nigeria, Cameroon and Ghana. The outcome of this was the identification of overall farmer priorities across the Region, in which *Irvingia gabonensis* came out as the highest priority, followed by *Dacryodes edulis/klaineana*, *Chrysophyllum albidum*, *Ricinodendron heudelotii* and *Garcinia kola/afzelii*. Prior to initiating germplasm collection activities of *Irvingia gabonensis* a regional workshop was organized in Ibadan, Nigeria. Following this workshop 52, 60 and 6 accessions were collected in Cameroon, Nigeria and Gabon respectively. The collected seeds, which are recalcitrant and thus only viable for a few weeks, were developed for transit to the nursery for future establishment in *ex situ* germplasm banks in Nigeria (Onne) and Cameroon (Mbalmayo).



**THE INTERNATIONAL CROP RESEARCH INSTITUTE  
FOR THE SEMI-ARID TROPICS (ICRISAT)**

1. Among the highlights of ICRISAT's 1993-94 plant genetic resources activities were twelve collection expeditions which were launched in priority areas - Brazil (groundnut), Cameroon (groundnut), Nigeria (pigeonpea), Uganda (pigeonpea, sorghum and minor millets) and Tanzania (chickpea), India (sorghum, chickpea, pigeonpea and minor millets). A total of 1,647 samples were collected.
2. 5,498 germplasm samples were added to ICRISAT genebank raising the total number of conserved accessions to 113,002 from 128 countries. 5,491 germplasm accessions were processed for long-term conservation at IAC genebank.
3. ICRISAT supplied 1,500 accessions of sorghum and 500 accessions of minor millets to SADC Plant Genetic Resources Centre in Zambia, and 1,000 accessions of sorghum and 500 of pigeonpea to the National Genebank, Kenya Agricultural Research Institute (KARI), in Kenya for multiplication and duplicate conservation. In addition, 97,280 samples of mandate crops were distributed in response to request for germplasm.
4. The following transfers were made: 1,702 pigeonpea accessions to the National Bureau of Plant Genetic Resources, ICAR, India, 4,000 groundnut germplasm to ICRISAT Sahelian Centre, Niger; 3,000 sorghum to Southern African Development Community, Zambia; and 2,000 cereals and pigeonpea germplasm to the Genebank of Kenya, for duplicate conservation.
5. Over 5,000 crop germplasm accessions were evaluated jointly with NARS of India, Nepal, Thailand, Vietnam, Zambia, Kenya and Malawi. Specific research projects were continued in pearl millet genepool development and long-term germplasm conservation of mandate crops.
6. ICRISAT plans to continue its research activities in various aspects of plant genetic resources in close collaboration with IPGRI, other IARCs, FAO, NARS and NGOs. More emphasis will be placed on inter-disciplinary efforts in germplasm collection, maintenance, conservation, evaluation and enhancement as well as in the utilization of germplasm in crop improvement programmes in different production systems. In order to realize future goals and to strengthen team efforts with a view to making research projects relevant to the needs of NARS, ICRISAT's former 19 separate genetic resource research projects were consolidated into one major research project and four sub-projects as listed below:

**Main Research Title: Genetic Resources Assembly, Evaluation  
and Management for Conservation and Utilization**

**Sub-Projects:**

- i. Germplasm characterization, preliminary evaluation for documentation and development of database and core collections.
- ii. Germplasm collection, biodiversity studies, and ecoregional survey on mandate and some non-mandate crops jointly with NARS.
- iii. Germplasm maintenance, *ex situ*, and *in situ* conservation of mandate crops at IAC and other locations.
- iv. Germplasm distribution for crop improvement and its impact assessment. (To be conducted in close collaboration with ECON 1)

## THE INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)

1. The IITA's plant genetic resources activities conducted or initiated during the period 1993-1994 covered the following:
2. **Agreement with FAO to hold plant genetic resources in trust for the world community:** IITA has concluded the agreement with FAO to place the plant genetic resources it holds in trust for the world community under the auspices of FAO as part of the International Network of Ex-situ collection. A total of 36,411 accessions of germplasm, consisting of cowpea (14,964), rice (12,091), yam (2,772), *Bambara* groundnut (2,035), cassava (1,655), wild *Vigna* (1,536), and soybean (1,358) have been designated. IITA shall in the future update the list with the inclusion of other crop/plant species available at IITA (about 350 accessions of *Musa*, 300 of agroforestry species, 450 of sweet potato, 60 of taro and several hundreds of minor food legumes and maize), after the materials have been multiplied/rejuvenated and their germplasm data have been properly documented.
3. **Collecting and acquisition of germplasm:** During 1993 an IITA collector completed the collecting of 103 distinctly named varieties of local cassava, previously identified by the Collaborative Study of Cassava in Africa, in 72 villages throughout Nigeria. In addition, some named varieties which had not previously been recorded were also collected. A total of 171 varieties were sampled and duplicates of these varieties had been given to the National Root Crop Research Institute (NRCRI) at Umudike, Nigeria, for their use and for conservation. IITA also acquired 289 accessions of cassava assembled by the NRCRI, but the identity of these accessions is yet to be determined.
4. The IITA/Ugandan multicrops collecting expedition collected a total of 195 germplasm samples, consisting of cassava (78), yam (33) and cowpea (84), in 5 districts in North and North Western Uganda during 1993.
5. In 1994, an IITA plant collector successfully used the *in vitro* culture technique to collect and transfer 300 cassava germplasm samples from the Niaouli Station in the Republic of Benin to IITA. These cassava germplasm samples were collected by the Benin/IITA germplasm collecting projects between 1989 and 1993. Also in 1994 another collector transferred 54 germplasm samples of yam maintained at SRCV-Ina, N'Dali, Benin, and previously collected by the same project, to IITA.
6. Since 1992 IITA has collaborated with CENARGEN/EMBRAPA to explore and collect wild *Manihot* species in Brazil. Two joint exploration missions were conducted in 1992 and 1993, and an independent trip by CENARGEN/EMBRAPA in 1994 collected a total of 178 seed samples of 18 wild *Manihot* species, consisting primarily of the wild relatives belonging to the primary genepool of *M. esculenta*. Seed samples (111) collected in 1992 and 1993 had already been added to IITA's collection in Ibadan.
7. In 1994, a total of 2,285 accessions of soybean germplasm were introduced from the USDA collection in the University of Illinois, U.S.A. (1211), the Asian Vegetable Research Institute in Taiwan (997) and the Bogor Research Institute for Food Crop in Indonesia (77).
8. **Germplasm multiplication/rejuvenation and conservation:** IITA multiplied/rejuvenated a total of 9,420 accessions of seed collections of cowpea (6,889), wild *Vigna* (793) and rice (1,660) and miscellaneous legumes (78). All seed collections of about 34,000 accessions of grain crops and their wild relatives available at IITA were preserved in active collection seed stores, maintained at 5°C and 30% R.H., and at base collection seed store, maintained at -20°C, with a seed moisture content of 5-6% sealed in aluminium tubes or foil envelopes.
9. Vegetatively propagated crops, cassava (1,950 accessions), yam (2,772 accessions) and *Musa* (400 accessions) were maintained as live collections in field genebank and partly in *in vitro*, under

reduced growth storage conditions. Sweet potato (450 accessions) and taro (60 accessions) were maintained in *in vitro* only.

10. IITA, in collaboration with ICRAF, maintained about 270 accessions of multipurpose tree and shrub species (165) in IITA's arboreta in Ibadan and Onne in Nigeria and in Mbalmayo in Cameroon. About 240 accessions of seed collections of these multipurpose trees and shrubs were also maintained in an active collection seed store at IITA. In addition, IITA maintained a large area of nature reserve within its 1,000 ha headquarters in Ibadan, where 15 endangered tree species were found and preserved.

11. **Characterization and evaluation of germplasm:** IITA characterized about 800 accessions of cassava for up to 57 characters, 1,500 of yams for up to 126 characters and 183 of cowpea for up to 31 characters, following standardized descriptors published by IBPGR (IPGRI) or IITA. During this period, numerous germplasm accessions were evaluated for resistance to insect pests and diseases. These included:

- 3,200 accessions of cowpea for resistance to *Striga*, *Alectra*, scab, and bacterial blight;
- 900 accessions of cowpea for resistance to *Ascochyta* blight;
- 200 accessions of wild *Vigna* for resistance to post-flowering insect pests;
- 1,500 accessions of yam for resistance to yam mosaic virus disease;
- 800 accessions of cassava for resistance to African cassava mosaic virus.

12. Sources of resistance to these pests and diseases were identified. IITA scientists had also characterized/evaluated multipurpose shrub and tree species (13), for traits that included biomass and root distribution or branching characteristics.

13. **Genetic Resources Research:** Studies conducted or initiated during the 1993-94 period included:

- the variability of about 450 accessions of wild cowpea (*Vigna unguiculata*) and taxonomic treatment of this species; inter-specific hybridization study that involved crosses among more than 20 wild *Vigna* species and between cowpea and wild *Vigna*;
- variability of 100 accessions of cultivated cowpea, based on molecular markers;
- storage of seeds and pollens of yam species;
- diversity of local cassava collected in Nigeria;
- genetic diversity and molecular taxonomy of *Dioscorea*;
- investigation of appropriate storage methods for storing aerial bulbils of *Dioscorea alata*;
- investigation on genetic stability of yam germplasm maintained in *in vitro*;
- IITA and Plant Germplasm Institute of Italy collaborative study on intra- and inter-specific isozyme variation in *Vigna unguiculata*, *V. vexillata* and species of Section *Vigna*.

14. **Plant health activities related to germplasm distribution included:**

- a study of the effectiveness of the process of eradicating cowpea plants that showed virus symptoms from the field, for virus clean-up of cowpea germplasm;
- the development of diagnostic techniques for detecting the banana streak virus and yam virus disease;
- the elimination of diseases from vegetatively propagated crops through shoot- tip/meristem culture;
- the completion of virus clean-up of about 1,500 accessions of cowpea and wild Vigna, and 80 accessions of Bambara groundnut, African yam bean and lablab bean.

15. **Germplasm distribution:** IITA's genebank distributed free-of-charge a total of 1,697 germplasm samples, consisting of cowpea (636), rice (310), wild Vigna (135), Bambara groundnut (182), cassava (175), yam (28), soybean (26) and miscellaneous legumes (205) to non-IITA research workers in many countries throughout the world free. In addition, IITA's breeding programmes distributed elite breeding lines to many national researchers in the developing countries.

16. **Specialized Group Training Course on Plant Genetic Resources:** IITA organized two IITA/IPGRI/FAO joint training courses on plant genetic resources collection, conservation and management in its headquarters in Ibadan. A total of 33 participants from 14 African countries attended the courses.

## THE INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE (ILRI)

1. The forage genetic resources activities at ILCA are carried out under the theme of conservation of biodiversity; the project is characterized by the conservation of forage germplasm and the evaluation for development of livestock feeds.
2. **Background and justification:** Leguminous forages provide a high quality dietary source for livestock. The basis of any forage production programme is adapted germplasm with available disease-free seed for incorporation in sustainable crop livestock farming systems. In addition, there is an urgent need to conserve forage biodiversity for current and future use.
3. The objectives of this project are to:
  - collect and conserve genetic diversity and develop methods for improved germplasm storage, seed multiplication to conserve genetic integrity and elimination of seed-borne pathogens;
  - characterize and evaluate a wide range of forage germplasm for adaptive and nutritional traits in order to identify suitable germplasm for livestock feed in different environments;
  - distribute disease-free seeds of selected forages to NARS to develop feeds to incorporate into livestock production systems.
4. **Collection and acquisition:** An additional 1,088 accessions of forage germplasm were added to the in-trust collection in 1993 and 1994. These included 109 accessions of *Sesbania* species jointly collected with national programmes in SADC with ICRAF and 423 accessions from Nigeria, collected in collaboration with NAPRI. Another 456 accessions of forages were added to the ILCA genebank in 1994 from earlier IBPGR (IPGRI) collections in Botswana, Lesotho, Tanzania and Yemen. Except for the collections of *Sesbania* which have restrictions on their distribution imposed by the donor countries, all available germplasm was placed under the auspices of FAO in October 1994 as part of their global network.
5. **Genebank operations:** The service functions in the production and supply of forage seeds from the ILCA genebank were continued in 1993 and 1994, with over 2,500 accessions planted in the field in a range of environments for multiplication. Over 4,500 samples of forage germplasm were distributed in response to 285 requests, mostly to national programmes in sub-Saharan Africa. Viability monitoring of accessions was also continued.
6. Construction began on an extension of the forage genetic resources facilities with funding from Germany to house seed health and *in vitro* culture laboratories. An additional medium term coldroom is ordered and deep freezers have been purchased to increase seed storage capacity.
7. **Characterization of germplasm resources:** The characterization of the germplasm collection to assess use as livestock feed was continued. The morphological, agronomic and phytochemical characterization of *Sesbania sesban* was completed. Morphological characterization of the napier grass (*Pennisetum purpureum*) collection was also completed. Principle component and cluster analyses were used to group accessions.
8. **Research activities:** Studies on seed storage behaviour and equilibrium moisture contents of seven major forage species were completed. A long term experiment to determine the effects of threshing grass seeds before drying and storage was also initiated.
9. Considerable emphasis was placed on the development of germplasm health testing and materials from the germplasm collection were screened for viruses. Research commenced on refining suitable methods for meristem culture and thermotherapy to eliminate seedborne virus. Experiments were

continued on the use of fungicides as media additives for the elimination of smut from the *Cynodon* collection.

10. **Strengthening national capacity:** A joint ILCA/ICRAF/IBPGR training workshop on collection of *Sesbania sesban* was held in 1993 and was attended by ten national scientists. A joint ILCA/ICARDA training course in forage seed production was also held at ILCA in 1993 for fourteen trainees from sub-Saharan Africa and four trainees from northern Africa and West Asia. Training in forage seed production was given in 1994 to a group of fourteen Ethiopian trainees. In 1994 two postdoctoral scientists from Cameroon and Kenya joined the project to work on plant virology and tissue culture.

## THE INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE (IPGRI)

1. The International Board for Plant Genetic Resources (IBPGR) officially became the International Plant Genetic Resources Institute (IPGRI), a fully autonomous CGIAR centre, after its Headquarters Agreement with the Italian Government was ratified by the Italian Parliament in December 1993. In pursuing its mandate to advance the conservation and sustainable use of plant genetic resources, IPGRI has constructed a programme based on four objectives:

- a) to assist countries, particularly developing nations, to assess and meet their needs for plant genetic resources;
- b) to foster international collaboration in the conservation and use of plant genetic resources;
- c) to develop and promote improved strategies and technologies for plant genetic resources; and
- d) to provide an international and information service.

2. To carry out its strategy for meeting these objectives, IPGRI has organized its programme activities in multidisciplinary projects and has divided these between three thematic groups (Germplasm Maintenance and Use; Genetic Diversity; Documentation, Information and Training) and five regional groups (Americas; Asia, Pacific and Oceania; Europe; Sub-Saharan Africa; West Asia and North Africa). In May 1994 this organizational structure was augmented by the integration of the programme activities of the International Network for the Improvement of Banana and Plantain (INIBAP), which came under the governance and administration of IPGRI when a Memorandum of Understanding was signed by the two organizations. Brief reports of IPGRI's plant genetic resources programme highlights are provided in the following paragraphs.

3. **International Collaboration:** In addition to the ongoing collaboration with other international organizations, NGOs and national programmes - collaboration which is an integral component of IPGRI's programmatic activities - the institute was also regularly involved in global biodiversity concerns in 1993-94. As a result of its participation in meetings directly related to the Convention on Biological Diversity in 1994, IPGRI is contributing to the establishment of the clearing house mechanism for promoting scientific and technological cooperation in carrying out the aims of the Convention. IPGRI also played a prominent role in international efforts to ensure the safe and effective use of germplasm through Material Transfer Agreements, for which the institute provides a repository, and was active in international fora such as the Crucible Project, which examined intellectual property rights options in plant genetic resources conservation and breeding. A relationship of close collaboration has been maintained between IPGRI and FAO, highlighted by IPGRI's role in preparing the agreements between FAO and the CGIAR Centres, which in 1994 placed the international germplasm collections of the Centres under the auspices of FAO as part of the International Network of *Ex-Situ* Collections, and by contributions to the International Conference and Programme on Plant Genetic Resources (ICPPGR).

4. **The Genetic Diversity Group** has given priority to broadening the scope of IPGRI's activities through the development of a programme on forestry genetic resources and one on the socio-economic and cultural aspects of conserving plant genetic resources. Forestry initiatives included database development and support for work on conservation of bamboo and rattan. During 1994 an *In Situ* Task Force began work on the contribution that IPGRI should make to support *in situ* conservation of useful plants and a project to investigate on farm conservation of crop plants was initiated. The Group continued its work on locating genetic diversity in crop species and their wild relatives through studies in *Phaseolus* spp. and wild wheats and on developing better agroecological survey methods to locate useful diversity and monitor genetic erosion. A number of collecting missions were carried out in collaboration with national programmes and a manual, *Collecting Plant Diversity: Technical Guidelines*, was prepared for publication. Work on the use of core collections to improve the accessibility of

national genetic resources collections was also continued with a programme to develop a sesame core collection in China.

5. **The Germplasm Maintenance and Use Group** promotes and coordinates research on conservation strategies and technologies, including seed conservation, *in vitro* conservation, plant pathology and genebank management. In 1993-94 the Group continued its activities in *in vitro* conservation of vegetatively propagated crops by slow growth and cryopreservation techniques, developed improved phytosanitary procedures for germplasm handling and examined low-input techniques for processing and storing orthodox seeds. Complementary funded projects coordinated by the Group included a study of cryopreservation techniques for the conservation of potatoes in collaboration with DSM/FAL (Germany), research on the conservation of recalcitrant seeds in collaboration with NBPGR in New Delhi and a study of seed containers for long-term storage. Work began in 1993 on a project which is concerned with promotion of the conservation of neglected crops by gathering and publishing information on a selected set of under-utilized crops. As part of the evaluation of a cacao conservation project, a proposal was finalized in 1994 to examine the conservation and use of cacao. Three *Guidelines for the Safe Movement of Germplasm* (for sugarcane, coconut and small fruit) were published together with FAO and other institutions, and technical bulletins were drafted which deal with the use of silica gel in drying seeds, moisture content testing, seed conservation options and a protocol to assess seed storability of species.

6. **IPGRI's Documentation, Information and Training Group** coordinates activities on germplasm documentation, library services, publications, public awareness, and training and impact assessment. Activities in documentation have included the development of new applications including multimedia software and the publication of updated directories of germplasm collections, several descriptor lists and a *Guidebook for Genetic Resources Documentation* with genebank management software and user's guide. A wide range of other publications have been produced, including technical reports, IPGRI's strategy (*Diversity for Development*) and the *Plant Genetic Resources Newsletter* (co-published with FAO). Public awareness materials, including audiovisuals and posters have been produced, and the potential for using public awareness initiatives to influence support to national programmes has been promoted. IPGRI and CAB International have collaborated to produce *Plant Genetic Resources Abstracts* and *PlantGeneCD*. IPGRI has worked with developing country universities to provide postgraduate training, has organized short technical courses and offered individual training opportunities through an Italian-funded scheme and through the Vavilov-Frankel fellowships. A project has been initiated to assess the impact of IPGRI's activities. IPGRI participated in a CGIAR Information Workshop held at ISNAR in the Hague and will be involved in the first phase of the CGIAR's Integrated Voice and Data initiatives, including the System-wide Information Network on Genetic Resources (SINGER).

7. **The Americas Group** works closely with ecoregional networks on plant genetic resources projects in Mesoamerica, the Andes, the Amazon, the Caribbean and the Southern Cone. In 1993 IPGRI sponsored germplasm collecting missions for cassava in Brazil and Argentina and *Lupinus* in Argentina as well as the regeneration of a sweet potato collection in Ecuador. In 1994 the Group focused on implementing an Inter-American Development Bank-funded project on biodiversity, conservation and sustainable use of native fruit germplasm of tropical America, concentrating on *Sapotaceae* and *Passifloraceae*. In addition, IPGRI was active in several training/public awareness activities in the framework of existing plant genetic resources networks.

8. **Through its Asia, Pacific and Oceania Group**, IPGRI provided assistance to national programmes and regional networks concerned with germplasm conservation and use. Activities in 1993-94 were concerned with *Allium*, *Musa*, okra, buckwheat, sesame, taro and yams, bamboo and rattan and tropical fruit trees. The development of the Coconut Genetic Resources Network (COGENT) was an area of high priority. Attention continues to be given to strategies for maintaining the genetic diversity and integrity of *ex situ* collections, and for developing training in the region on plant genetic resources, both at technical and postgraduate levels.



9. In Europe, IPGRI's long-standing involvement in the European Cooperative Programme on Crop Genetic Resources Network (ECP/GR), has continued through the coordination of crop-specific networks. A new initiative in the area of European forest genetic resources (EUFORGEN) was begun in 1994 through combined FAO/IPGRI efforts. Substantial progress has already been made for two of its four pilot networks (*Populus nigra* and *Quercus suber*). For both ECP/GR and EUFORGEN, all programme costs are borne by participating countries. In 1993, a new project was launched on under-utilized crops of the Mediterranean region, involving the development of four informal networks (oregano, primitive wheats, rocket and pistachio). In the case of pistachio, activities are planned in close collaboration with the FAO ESORENA Network. Support to eastern Europe plant genetic resources programmes has continued through external financial support, enabling the purchase of equipment required to secure collections at risk. In 1994, the series of joint FAO/IPGRI missions to survey the plant genetic resources programmes was extended to the Baltic States, Central Asia and the Caucasus.
10. The Sub-Saharan Africa Group continued to provide technical advice to national programmes on all aspects of plant genetic resources development, from institution building to specific activities such as collecting, evaluation and documentation of germplasm. In collaboration with the National Genebank of Kenya, Somalian germplasm (maize, sorghum and millet) was multiplied in Kenya in preparation for repatriation. In May 1994 the Group contributed to a forum of Francophone countries which reviewed issues regarding the implementation of the Convention on Biological Diversity in Africa. The SSA Group was active in establishing links between the African Coffee Research Network and coffee-producing countries in Latin America and in the course of the last year launched three regional working groups (on food crops, forages/fodder and *in situ* and under-utilized plants) in the Southern Africa Development Community.
11. The key development in recent years in the West Asia and North Africa Group has been the co-sponsorship, together with FAO and ICARDA, of the WANA Plant Genetic Resources Network (WANANET), in which ten countries have become active and through which research activities based on recommendations from six Working Groups have been initiated. These activities focus on building databases, identifying gaps in collections and gathering information on genetic erosion and involve cereals, horticultural crops, pasture and forage crops and *in situ* conservation strategies. In a recent meeting of the CGIAR's ICWG-GR in Aleppo, the achievements of WANANET's Phase I were reviewed and Phase II was initiated. IPGRI's WANA Group has worked closely with FAO's Regional Office for the Near East and North Africa, based in Cairo, to establish the Forage Working Group of WANANET as well as to contribute to the establishment of the UNDP Regional Rangeland Seed Information Network. Among the Group's other activities, almond germplasm and survey data were collected from seven ecogeographical regions of Pakistan and Iran in 1994 and an *in vitro* collection of wild almond germplasm was established in Jordan.
12. **INIBAP:** The International Network for the Improvement of Banana and Plantain has continued its plant genetic resources conservation activities following the integration of its programme with that of IPGRI. These activities include the collection, conservation, and dissemination of *Musa* germplasm in addition to maintaining databases and providing information to *Musa* users. **Collection:** During 1993-94, 72 new accessions from nine sources were acquired by the INIBAP Transit Centre (ITC) in Leuven (Belgium) for inclusion in the INIBAP germplasm collection and 277 accessions of germplasm collected in Papua New Guinea were made available for distribution. In 1994 several missions organized jointly by Vietnamese institutions, INIBAP and IPGRI yielded over 90 accessions which will be characterized in the field and then duplicated in the ITC. At the end of the year, the active *in vitro* collection included 1,050 accessions representing a large genetic diversity within the genus *Musa*. **Conservation:** INIBAP is sponsoring the development of protocols for efficient, economic, long-term storage methods at the Laboratory of Tropical Crop Husbandry using embryonic cell suspensions and shoot-tips. **Dissemination:** In 1993-94, 712 accessions were distributed to institutes involved with *Musa* research. In 1993, the ITC began the duplication of its *in vitro* genebank at TBRI (Taiwan) in order to secure this unique collection. At present, TBRI maintains duplicates of 414 accessions representing 39% of the ITC

collection. **Information:** Important advances were made in 1994 to create and define the links with curators, to agree on the required software development and to advance the elaboration of a users' guide for morpho-taxonomic description.

### THE INTERNATIONAL RICE RESEARCH INSTITUTE (IRRI)

1. **Germplasm collecting and acquisition:** The IRRI genebank received a total of 1,695 samples of *O. sativa*, and 58 samples of wild species from several national programme genebanks and the IPGRI Seed Handling Units in Singapore and Costa Rica. Only one IRRI-sponsored collecting mission to Zambia and Botswana to collect wild rices was undertaken in 1993.
2. In November 1993, the International Rice Research Institute and the Government of Switzerland, represented by the Swiss Development Cooperation (SDC) signed an agreement for the Project: *Safeguarding and Conservation of the Biodiversity of the Rice Genepool*. The project has a focus on Asia, and aims to:
  - a) accelerate the collection and *ex situ* conservation of wild and cultivated rices;
  - b) conduct research related to on-farm conservation of traditional rice varieties; and
  - c) strengthen rice germplasm conservation activities of the national programmes, NGOs and farmers' organizations.
3. To initiate the project, two workshops were organized at Los Baños:
  - a) A Discussion Workshop on On-Farm Conservation of Crop Genetic Resources, held from February 24-26, 1994 with 16 participants representing broad expertise in the biological and social sciences; and
  - b) 5-year Action Plan Meeting held from February 28 - March 3, 1994, and attended by 16 representatives from NARS, CIAT, WARDA, IITA, IPGRI and the donor. A Steering Committee was elected by the group with representation from the Peoples Republic of China, India, Philippines, Vietnam, IPGRI and IRRI. A germplasm collector and a social anthropologist have been hired for this project; they will be complemented in April 1995 by a population geneticist from the French research organization, ORSTOM.
4. **Conservation:** The renovation to the genebank was completed in 1994. Cooling and dehumidification units were replaced in the storage vaults of the Base and Active Collections, a seed drying room at 15%RH and 15°C was installed, and a seed testing and germplasm characterization laboratory added to the facilities of the genebank. The screenhouse area for growing the wild species, and low seed stock accessions was doubled to  $\pm 2,000$  m<sup>2</sup>. An up-dated inventory of germplasm collection was completed in 1993. At present more than 80,000 accessions are stored in the genebank at IRRI, including 21 vegetative stock accessions. About 10,000 accessions were added to the Base Collection, and 7,060 accessions to the Active Collection in 1993-94. To date, about 80% of the entire collection is conserved in the Base Collection.
5. Viability monitoring of the accessions in the Active Collection was completed in 1993. Monitoring of germplasm in the Base Collection was initiated during 1994, and tests on 8,211 cultivated rice accessions and more than 2,700 samples of wild rices were completed.
6. More than 15,000 accessions were rejuvenated for long term storage during the dry seasons of 1993 and 1994. Studies on seed longevity were also conducted to determine the most appropriate and favourable season for seed production of the different rice eco-geographic races. Under field conditions at Los Baños, sowing in October permits seed ripening to coincide with the cooler and drier portion of the dry season, and harvesting 35 days after flowering improves the potential longevity of japonica cultivars.

7. IRRI continues to send accessions for "black box" duplicate safety storage at the National Seed Storage Laboratory (NSSL), Fort Collins, Colorado, U.S.A., under the terms of a Memorandum of Understanding concluded in 1993 between IRRI and the United States Department of Agriculture, Agricultural Research Service. About 8,700 accessions were sent to NSSL in 1993.
8. **Documentation:** A new information system for all genebank operations, from acquisition of germplasm through multiplication, conservation, rejuvenation and distribution to end-users, became operational at the end of 1994. The different major data files on all rice accessions in the collection have been merged to create a comprehensive database. The system allows efficient management of information and genebank activities, and give users easy access to information on the rice germplasm collection and status.
9. **Germplasm characterization:** A total of 4,093 accessions were characterized for morpho-agronomic traits in the field and in the laboratory. Changes made in the scoring of the germplasm descriptors facilitated data gathering.
10. **Germplasm dissemination:** In 1993 and 1994, IRRI distributed to national programmes, Universities/Institutes, and other international and regional centres, a total of 19,386 samples of cultivated rices and 2,781 samples of wild species. Of these, 5,311 accessions from the Assam Rice Collection were restored to the National Bureau of Plant Genetic Resources (NBPGR), New Delhi, and another 1,034 accessions to the Agricultural Research Station of the Andhra Pradesh Agricultural University at Maruteru, India. Some accessions from Indonesia and Thailand conserved in the genebank at IRRI were also restored to their respective genebanks in 1994.
11. For IRRI's own research, distribution was made to different research divisions, and projects, 29,111 accessions of cultivated rice and 814 wild species for evaluation for resistance/tolerance to various biotic and abiotic stresses.

## THE WEST AFRICA DEVELOPMENT ASSOCIATION (WARDA)

1. The West Africa Rice Development Association (WARDA) is an intergovernmental research association with a mandate to conduct rice research, training and communication activities for the benefit of the West African region. Since its inception in 1971, WARDA has recognized the importance of collecting rice germplasm from key areas in West Africa and the subsequent preservation of that germplasm. WARDA also evaluates, multiplies and distributes promising germplasm to interested scientists and institutions in West Africa and elsewhere in the world.
2. **Germplasm collection and assembly:** The WARDA germplasm collection and assembly programme started in 1978 following a collaborative agreement signed by WARDA, IRRI, IITA, and IRAT for germplasm collection in West Africa.
3. Activities of the programme initially centred on:
  - a) compilation of information from 17 WARDA member states on the status of rice germplasm collection in the region;
  - b) maintenance of a working collection at WARDA's main research station; and
  - c) receiving seed samples of collections from IITA, IRAT, ORSTOM, and other organizations. Most of the major rice growing countries in West Africa have been explored by IITA, IRAT, ORSTOM, IDESSA and WARDA during the past several years. The countries explored include Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, The Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. Many remote areas in each of these countries, and others like Mauritania, need to be further explored.
4. Between 1979 and 1985, 1,547 accessions were collected from Nigeria, Mali, Sierra Leone, Guinea and Guinea Bissau. They consisted primarily of *O. sativa*, *O. glaberrima*, *O. barthii* and *O. stapfii*. From 1985 to 1993 additional collections were received from IRAT, IITA and ORSTOM. More than 6,000 accessions were obtained comprising *O. sativa* (4800), *O. glaberrima* (1,200) *O. longistaminata* (10), *O. barthii* (6) and *O. stapfii* (3) species. These are currently retained as a working collection in a cold room at WARDA headquarters in Bouake, Côte d'Ivoire. About 4,000 of these accessions are "FAO Designated Germplasm" held in trust at WARDA.
5. **Germplasm conservation:** WARDA's accessions are currently stored as working collections at each of WARDA's main research stations. The programme at Bouake, Côte D'Ivoire, is conserving over 8,000 seed samples of upland rice varieties. The irrigated sahel program at St. Louis in Senegal is maintaining about 2,000 irrigated rice varieties. Over 10,000 rainfed lowland and deep water rice varieties are conserved at WARDA's lowland breeding Unit at IITA, Ibadan, Nigeria. For conservation, seed is produced at each of WARDA's main research stations during the post-rainy season when good quality disease free seed can be produced. The standing crop is inspected by experts and only disease and insect free seed is harvested. Moisture content is brought down to 6-8% before storage in the cold room. At each station a 500-2000g seed sample of each accession is kept in appropriate containers in air conditioned rooms with temperatures ranging from 18-20°C and relative humidity from 20- 30%.
6. **Characterization, evaluation and germplasm utilization:** Rice accessions are grown in the main growing season and characterized by a range of morphological and agronomic traits using descriptors recommended by the IBPGR Rice Advisory Committee. Special efforts have been made at WARDA to screen available germplasm for resistance/tolerance to major stresses such as salinity, iron toxicity, rice blast, rice yellow mottle virus, African rice gall midge and stem borers. Sources of resistance to drought have been identified and are being utilized in the breeding programme. Moreover,

weed-suppressing plant morphological characteristics, for which progenies of sativa/ glaberrima crosses have proved very promising, are being exploited.

**7. Training:** Training is an important component of WARDA's rice germplasm work. WARDA has trained a number of scientists from the region in a number of topics including seed multiplication and certification. There is need for individual training to Msc and PhD levels and group short courses on genetic resources collection and conservation.

#### IV. OTHER INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS

##### GENETIC RESOURCES INTERNATIONAL (GRAIN)

###### Background

1. Genetic Resources Action International (GRAIN) was established in 1990 to help further a global movement of popular action against one of the world's most pervasive threats to world food and livelihood security: genetic erosion. The loss of biological diversity, particularly in the "gene rich" countries of the Third World, undermines the very sense of sustainable agriculture as it destroys choices for the future and robs people of a key resource base for survival. Genetic erosion is more than just the loss of genes. It is the loss of options for development.
2. Genetic diversity in agriculture allows crops and animals to adapt to different environments, growing conditions and social needs. This diversity is extremely valuable for many reasons. It allows crops and livestock to withstand terrible stress (disease, pests, poor soils or floods); it allows farmers to design and choose the very kind of production system they want; and it gives all of us some basis for hope that food security might be a possibility for all.
3. Central to GRAIN's approach is the conviction that the management, use and conservation of genetic diversity is too important to leave to scientists, governments and industry alone. Farmers, indigenous peoples and other local communities have nurtured biological diversity for millennia and continue to do so. Any initiative to do something about the problem of the loss of biological diversity - and its intrinsic cultural component - should take their experience as a starting point.

###### Objectives

4. The foundations of GRAIN's work lie in daily networking, communications, novel research and broad information activities. Upon this basis only are we able to strengthen our capacities and those of our many NGO colleagues throughout the world to mobilize popular concern and constructive action to safeguard and enhance biological diversity. We are also increasingly working with partner NGOs in developing countries in supporting efforts to develop practical alternatives in local genetic resources management under control of peasant farmers and indigenous communities.
5. As stated in its statutes, GRAIN aims to:
  - Stimulate public awareness about the importance of genetic resources for society, and about developments and factors that threaten this diversity;
  - Increase knowledge and understanding about structural causes behind the destruction of biological diversity and the implications of this loss for the poor;
  - Stimulate activities and policies that lead to better conservation and use of genetic diversity at the local, national and international level, with a special focus on the interests of the poor in developing countries;
  - Support the activities of individuals and public interest groups concerned about these issues - such as Third World, consumer, farmer and church-linked organizations, as well as trade unions, lawyers and researchers - and facilitate communication and cooperation between them.
6. GRAIN's programme is designed to meet these aims through research, information and documentation work, policy analysis, advocacy and joint activities with others NGOs. GRAIN is incorporated in Spain as an international, non-profit foundation. A wholly autonomous organization,

GRAIN is financed by grants from NGOs, governments and intergovernmental organizations. GRAIN's programme of work is implemented by a team of five people, representing different nationalities and experiences, and is governed by an international Board of Directors.

#### GRAIN and FAO

7. As an organization that has closely followed development within FAO in relation to agricultural genetic resources, GRAIN is closely following the discussions both in relation to the renegotiation of the International Undertaking on Plant Genetic Resources and the process leading towards the Global Plan of Action and the Fourth International Technical Conference. We think these are very important processes. We especially see opportunities that these negotiations lead to a strong commitment to an expanded concept of Farmers' Rights, that:

- a) strengthens on-farm genetic resources use and conservation as an integral part of the Global System;
- b) recognizes and implements the rights of local communities and indigenous people as innovators and holders of agricultural genetic resources and knowledge; and
- c) implements, with sufficient resources and guarantees, an international fund to compensate farmers and local communities for their genetic resources and associated knowledge.

8. At the same time, we are convinced that a strong, participatory and democratic multilateral system on the management of agricultural biodiversity should emerge for these negotiations which includes all approaches (in-situ, ex-situ and on-farm) and all actors (the formal and informal innovation sectors). In the light of this, we feel that negotiation process would benefit from a much broader participation from NGOs, indigenous peoples organizations and peasant movements. Together, they would be able to provide input in order to establish a truly integrated approach to the conservation and equitable use of agricultural biodiversity.



## THE WORLD CONSERVATION UNION (IUCN)

1. The conservation of plant genetic resources has long been recognized by IUCN as a major theme. Since 1993 the main focus of IUCN's plant conservation activities has been through the Species Survival Programme, which services the Species Survival Commission (SSC), a volunteer network of over 6,000 experts with a mission to conserve biological diversity by developing and executing programmes to save, restore and manage wisely species and their habitats. In addition the IUCN Law Programme has been engaged in a specific plant genetic resource conservation project for the Andean Pact.

2. Major activities relating to plant genetic resource conservation include:

- **Centres of Plant Diversity.** In 1994 volume 1 of the 3 volume set *Centres of Plant Diversity: a guide and strategy for their conservation* was published in collaboration with WWF, covering Europe, Africa, South West Asia and the Middle East. Volume 2 (Asia, Australasia and the Pacific Ocean) and Volume 3 (The Americas) shall be published in 1995. This work includes 15 regional overviews and over 250 detailed data sheets for individual sites of high plant diversity, including information on genetic resources.
- **Development of plant conservation Action Plans.** Plant conservation work has been carried out through some 25 Plant "Specialist Groups", which are based on taxonomic as well as geographic lines. Since 1993 this network of botanists have had a full-time Plants Officer to work with. These groups have been working on plant conservation in general and several Specialist Groups, including those on Cactus and Succulent Plants, Orchids, Pteridophytes, Palms, Carnivorous Plants, Bryophytes, Conifers, China Plants and Southern South American Plants, have been writing "Action Plans" for the conservation of plant species under their purview. These Action Plans incorporate priority actions for plant genetic resources where appropriate. The IUCN/SSC plant Action Plans shall be published in 1995, and will include an Action Plan for the Conservation of Orchids, and an Action Plan for the Conservation of Cacti and Succulent Plants.
- **Global Plant Red List.** Through the above plant Specialist Groups, IUCN provides up-to-date data on the conservation status of plant species to the World Conservation Monitoring Centre, which manages this data. The first ever *IUCN Plant Red List* has been prepared and will be published in 1995. This will list all the globally threatened plant species, many of which are of importance to plant genetic resources as wild relatives of useful plants.
- **Collecting Plant Genetic Diversity-Technical Guidelines.** This manual, a project of IPGRI in association with IUCN, FAO and UNEP, was finished in 1994 and provides information on the conservation of plant genetic resources.
- **IUCN/SSC Plant Conservation Subcommittee.** A Subcommittee to the SSC Steering Committee, under the Chairmanship of Drs Charles Stirton and Judy West, was created in 1993 to advise on IUCN's plant work. This Subcommittee includes representation by IPGRI, and has been looking at how IUCN should work in future in this area. Discussions have also been held on possible collaboration with IPGRI on the conservation of wild plant relatives.
- **Medicinal Plant Specialist Group.** As a follow-up to the IUCN/WWF/WHO *Guidelines for Medicinal Plant Conservation* published in 1993, a Medicinal Plant S.G. has been formed and will look at the conservation of medicinal plants. Their goals are to:
  - identify threatened taxa and the highest priorities regions for urgent action for medicinal plant conservation;

- identify common causes, solutions and research survey methods for medicinal plant conservation;

- promote the rational and sustainable utilization of medicinal plants.

- **The Andean Pact project.** At the request of the Commission of the Cartagena Accord, IUCN's Law Programme provided a technical legal report on possible elements for regional legislation on access to genetic resources.