ANNUAL REPORT 2002
of the CGIAR
System-wide Genetic Resources Programme
The Future Harvest Centres comprise 16 food and environmental research organizations located around the world, which conduct research in partnership with farmers, scientists and policy-makers to help alleviate poverty and increase food security while protecting the natural resource base. The Centres are principally funded through the 58 countries, private foundations, and regional and international organizations that make up the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is co-sponsored by the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), the United Nations Development Programme (UNDP) and the World Bank. See http://www.cgiar.org

The System-wide Genetic Resources Programme (SGRP) joins the genetic resources programmes and activities of the Future Harvest Centres in a partnership whose goal is to maximize collaboration, particularly in five thematic areas. The thematic areas—policy, public awareness and representation, information, knowledge and technology, and capacity building—relate to issues or fields of work that are critical to the success of genetic resources efforts. The SGRP contributes to the global effort to conserve agricultural, forestry and aquatic genetic resources and promotes their use in ways that are consistent with the Convention on Biological Diversity. The Inter-Centre Working Group on Genetic Resources (ICWG-GR), which includes representatives from the Centres and FAO, is the Steering Committee. IPGRI is the Convening Centre for SGRP and hosts its coordinating Secretariat. Japan, Netherlands, Switzerland and World Bank are donors to SGRP. See http://www.sgrp.cgiar.org

The International Plant Genetic Resources Institute (IPGRI) is a Future Harvest Centre whose mandate is to advance the conservation and use of genetic diversity for the well-being of present and future generations. IPGRI's headquarters is in Maccarese, near Rome, Italy, with offices in another 22 countries worldwide. See http://www.ipgri.cgiar.org

Cover photo: Women clean seeds before they are stored in the ICARDA genebank in Syria.

C. Boursnell/IPGRI

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INTRODUCTION

SGRP aims to strengthen the contribution of the Future Harvest Centres of the Consultative Group on International Agricultural Research to the effective management of genetic resources for the sustainable development of agriculture, forestry and fisheries. Individual Centres have long worked to research and manage genetic resources, and the SGRP was created to bring consistency and efficiency to the CGIAR system’s efforts, especially with regard to the collections of plant genetic resources held in trust for the global community. Since the inception of the SGRP some 150 institutes from around the world have taken part in specific programme activities.

The past two years have seen agriculture and the biodiversity that underpins it take a much more prominent position on the world stage. In 2001 the members of the Food and Agriculture Organization of the United Nations (FAO) adopted the new International Treaty on Plant Genetic Resources for Food and Agriculture, which ushers in a new era in the exchange of plant genetic resources and equitable benefit-sharing. The Treaty comes into force once 40 countries have ratified it, which at current rates will take place some time in 2004. SGRP has embraced the challenge of helping the CGIAR to fulfil its role as one of the world’s most important guardians of plant genetic resources.

In 2002 there were two even more prominent events, the five-year follow-up to the World Food Summit and the 10-year follow-up to the 1992 Earth Summit. Both meetings recognized the crucial role that diversity plays in enabling agriculture to advance. The World Summit on Sustainable Development in Johannesburg furthermore saw the launch of the campaign for the Global Crop Diversity Trust. The Trust’s goal of an endowment to secure the future of the world’s most important collections of crop diversity grew out of studies initiated by SGRP. Together, all these advances will enable us to move closer to the creation of an efficient and sustainable global system of ex situ conservation foreseen by the FAO Global Plan of Action for plant genetic resources.

This report examines the new Treaty and its ramifications for the Future Harvest Centres (p. 5). It also covers two of the crucial elements of developing a global system, the costing studies (p. 14) that supply part of the rationale for the Global Crop Diversity Trust, and the launch of the Trust itself (p.11).

There are articles too on recent developments in the System-wide Information Network for Genetic Resources (SINGER, p. 17) and on regular programme activities (p. 2).

In the period covered by this report, SGRP received funding from Japan, Netherlands, Switzerland and the World Bank. The CGIAR System-wide Program on Participatory Research and Gender Analysis in Technology Development and Institutional Innovation (PRGA) hosted at CIAT provided funding for the workshop on participatory plant breeding. SGRP is grateful for all the support it receives.

Packets of wheat at the Ethiopian genebank, awaiting distribution to plant breeders. F. Botts/FAO
As in previous years, annual workplans were approved at meetings of the Inter-Centre Working Group on Genetic Resources (ICWG-GR), which is SGRP’s Steering Committee. The ICWG-GR’s most recent meeting took place from 4 to 8 February 2002. It was hosted by IPGRI at its headquarters in Maccarese, Italy.

Several ongoing activities can best be described as public awareness, though the nature of the ‘publics’ varies considerably. The SGRP represents the Future Harvest Centres and coordinates their contributions to international fora and global programmes on agricultural, forest and aquatic genetic resources. At the regular meeting of the FAO Commission on Genetic Resources for Food and Agriculture in October 2002 SGRP presented a report on the activities of the Future Harvest Centres in the broad area of genetic resources. The report was well received by the Commission. Several Centres took part in the 6th meeting of the Conference of the Parties to the Convention on Biological Diversity (COP6) in The Hague in April 2002. IPGRI staff represented the Centres in the debate on access and benefit-sharing, and COP6 adopted the Bonn Guidelines on access and benefit-sharing. SGRP also represented Centre interests at a meeting of the World Intellectual Property Organization in June 2002. For a wider public, posters and displays on SGRP activities were mounted at some of these meetings and elsewhere.

An Expert Consultation Meeting on ‘The evolving role of genebanks in the light of developments in molecular genetics’ took place in Spain in November 2002. IPGRI organized the meeting for SGRP, and it was co-sponsored by the host, Fundación Española para la Ciencia y la Tecnología. FECYT, the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA Spain), the US Agency for International Development (USAID), FAO and SGRP provided financial support. The meeting brought together 22 experts in genebank management and molecular genetics, including members of the ICWG-GR. The participants came to several interesting conclusions, among them the idea that genebanks might begin to base their minimum core collections on genes rather than phenotypes, and that it might be appropriate to shift more attention to wild relatives as a source of genes that breeders can make use of now. Making use of molecular biology will require a special emphasis on training and capacity building, which will necessitate global collaboration and strong networks of support. And the vexatious issues of policy and intellectual property will need to be approached very carefully and thoroughly, possibly through a special workshop to build stakeholder consensus. A full report on the meeting will be published in 2003.

SGRP continued to work on the management of genetic resources in ecosystems through its involvement with the CGIAR’s agenda on Integrated Natural Resource Management. The fourth INRM
Task Force workshop, held in Aleppo at ICARDA in September 2002, was attended by the SGRP Coordinator and CIFOR’s ICWG-GR representative, who is also a member of the CGIAR’s INRM Task Force. The meeting developed a framework for operationalizing the INRM approach, in which the multi-functional role of diversity—in production and ecosystem health—features prominently. A report of the meeting *Putting Practice into Action* is available from http://www.icarda.cgiar.org/INRM/INRM4_Site/index.htm

SGRP joined with the System-wide Programme on Participatory Research and Gender Analysis (PRGA) in hosting a workshop on ‘The Quality of Science in Participatory Plant Breeding’ at IPGRI headquarters in September 2002. This meeting brought together 33 participatory plant breeding (PPB) practitioners from NGOs, universities and other organizations around the world, including CG Centres. The agenda included an examination of PPB in agro-ecosystem approaches to genetic resources management, use and improvement. Several recommendations were made on how PPB can better combine production and diversity goals. The report of the meeting and its outcomes will be available in 2003. The report can be downloaded from http://www.prgaprogram.org/download/q_of_s_mtg/q_of_s_report.pdf
The International Rice Research Institute in Los Baños hosted a meeting in February 2002 to examine the Treaty’s call for agreements with Centres concerning the in-trust collections of plant genetic resources. In particular the meeting looked at the request from the FAO Commission for a new Material Transfer Agreement (MTA) that would accompany in-trust germplasm and would be used in the interim until the Treaty comes into force. SGRP organized the meeting, with the CGIAR Genetic Resources Policy Committee (GRPC), the CGIAR Central Advisory Service on Intellectual Property (CAS) and the CGIAR Secretariat. Participants included Directors General, senior managers, individual Centre trustees and genetic resources and intellectual property scientists from 12 of the Centres, as well as members of the GRPC, the SGRP Secretariat, CAS, the CGIAR Technical Advisory Committee (TAC), the CGIAR Secretariat and FAO.

At the meeting participants drew up a text for the agreement between Centres and the Governing Body of the Treaty, which will be negotiated on the coming into force of the Treaty. They also identified issues that will need to be addressed for the practical implementation of the agreement. And they produced a draft for the new interim MTA.

The Treaty: its provisions and background

The Treaty operates at the intersection of agriculture, trade and the environment. It provides agriculture with a new legally binding instrument on a par with trade and environmental instruments and is intended to promote harmony and synergy and to encourage sustainable agriculture and to improve food security.

The Treaty’s objectives are the conservation and sustainable use of plant genetic resources and the fair and equitable sharing of benefits arising from their use, in harmony with the Convention on Biological Diversity. It aims to ensure that the inherited capital that plant genetic resources represent is conserved and continues to supply the flow of services on which food security and development depend.

The Treaty covers all plant genetic resources relevant to food and agriculture, although it sets up a multilateral system of access and benefit-sharing for an agreed list of crops that was established on the basis of interdependence and food security. The list of species on Annex 1, which are subject to the multilateral system, currently covers 35 food crops and 29 genera of forage plants, representing more than 80% of the world’s intake of calories. The Treaty pools the genetic resources of these listed species which means that the benefits will be shared on a multilateral basis.

Benefits go beyond the purely financial and include information exchange, access to technology and transfer of technology. The Treaty envisages a mechanism for sharing benefits whereby the ‘owners’ of a commercialized product that incorporates material obtained from the
The new International Treaty and the Future Harvest Centres
SGRP produced a guide to the Treaty specifically to help Centres and their Boards of Trustees, although it is also available to anyone who would like a copy. 'The International Treaty on Plant Genetic Resources for Food and Agriculture: a Primer for the Future Harvest Centres of the CGIAR' focuses on the obligations that Centres will assume when they formally associate themselves with the Treaty by signing an agreement with the Governing Body. It is available on request from the SGRP Secretariat or for download electronically from http://sgrp.cgiar.org/publications

multilateral system will pay a royalty into a specially designated fund. The royalty will be mandatory if the product is not available for further research and breeding because it is covered by specific forms of intellectual property rights. It is voluntary when the product can be freely used for breeding and research. The Treaty further provides for the realization of equitable participation of farmers in benefit-sharing. National governments are encouraged to grant farmers rights through the protection of relevant traditional knowledge and participation in national decision-making about the conservation and use of plant genetic resources for food and agriculture.

The Treaty calls for the development of a funding strategy to help mobilize funds for priority activities, plans and programmes, taking into account the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture adopted in Leipzig in 1996. Developing countries and countries with economies in transition will be favoured in any such funding.

The International Treaty will enter into force 90 days after it has been ratified by 40 countries. Within a year of that date a Governing Body, composed of all Contracting Parties to the Treaty, will be convened. Until then, the FAO Commission on Genetic Resources for Food and Agriculture will act as the Interim Committee for the Treaty, and will oversee a number of tasks to be undertaken in the interim period. As of October 2003, 32 countries have ratified the Treaty. Progress can be monitored at http://www.fao.org/Legal/treaties/033s-e.htm
The Treaty and the Future Harvest Centres

In 1994 the Centres signed agreements with FAO, which placed the Centres’ collections of germplasm ‘in trust’ for the benefit of all humanity, under the auspices of FAO. It was always understood that these in-trust agreements were temporary, pending completion of intergovernmental negotiations on the Treaty. The Treaty, now adopted, specifically recognizes the importance of the ex situ collections held in trust, and Article 15 provides for agreements concerning ex situ collections to be signed between the Treaty’s Governing Body and the Future Harvest Centres (and other relevant international institutions). The Treaty provides a new kind of agreement to govern the movement of plant genetic resources for food and agriculture. Species covered in the Treaty’s Annex 1 will be distributed by countries and Centres alike under the terms of a standard MTA to be agreed by the Governing Body. Accessions of crops not covered in Annex 1 but held in trust by the Centres before the coming into force of the Treaty, will also be covered, possibly by a different MTA to be agreed by the Governing Body.

Access to plant genetic resources for food and agriculture of Annex 1 species should become routine and easy—‘facilitated’ in the language of the Treaty. Acquisition of material of other crops will require, as it does now, a specific agreement with the country providing the access. In sum, the Treaty should help to reduce international tensions over the transfer and use of plant genetic resources for food and agriculture, and thus should make it easier to collect and exchange material.
New Material Transfer Agreement

Following the workshop at IRRI, the draft interim MTA was finalized in consultation with FAO, and presented to the FAO Commission at its 9th regular session in October 2002. The Commission agreed on the text with some modification and in December its Secretariat circulated it to Centres for review and endorsement by their Boards of Trustees. The new MTA came into use on 1 May 2003, following its approval by all Boards of Trustees.

This MTA does not require the signature of the recipient of the germplasm. Instead, it utilizes the so-called software approach, which binds the recipient to the terms and conditions spelled out in the MTA provided that the recipient accepts and retains the material. The MTA is posted on Centre and CGIAR Web sites and is available in FAO’s five official languages.

This MTA covers materials which are being transferred before the entry into force of the International Treaty on Plant Genetic Resources for Food and Agriculture. The Treaty envisages that the [Centre] will enter into an agreement with the Governing Body of the Treaty, once the Treaty enters into force. The [Centre] has indicated its intention to conclude such an agreement with the Governing Body. This agreement, in line with the Treaty, will provide for new MTAs and benefit-sharing arrangements for materials transferred after the entry into force of the agreement.

The [Centre] is making the material described in the attached list available as part of its policy of maximizing the utilization of material for research, breeding and training. The material was either developed by the [Centre]; or was acquired prior to the entry into force of the Convention on Biological Diversity; or if it was acquired after the entering into force of the Convention on Biological Diversity, it was obtained with the understanding that it could be made available for any agricultural research, breeding and training purposes under the terms and conditions set out in the agreement between the [Centre] and FAO dated 26 October 1994.

The material is held in trust under the terms of this agreement, and the recipient has no rights to obtain Intellectual Property Rights (IPRs) on the material or related information.

The recipient may utilize and conserve the material for research, breeding and training and may distribute it to other parties provided...
such other parties accept the terms and conditions of this agreement.  

The recipient, therefore, hereby agrees not to claim ownership over the material, nor to seek IPRs over that material, or its genetic parts or components, in the form received. The recipient also agrees not to seek IPRs over related information received.

The recipient further agrees to ensure that any subsequent person or institution to whom he/she may make samples of the material available, is bound by the same provisions and undertakes to pass on the same obligations to future recipients of the material.

The [Centre] makes no warranties as to the safety or title of the material, nor as to the accuracy or correctness of any passport or other data provided with the material. Neither does it make any warranties as to the quality, viability, or purity (genetic or mechanical) of the material being furnished. The phytosanitary condition of the material is warranted only as described in the attached phytosanitary certificate. The recipient assumes full responsibility for complying with the recipient nation’s quarantine and biosafety regulations and rules as to import or release of genetic material.

Upon request, the [Centre] will furnish information that may be available in addition to whatever is furnished with the material. Recipients are requested to furnish the [Centre] with related data and information collected during evaluation and utilization.

The recipient of material provided under this MTA is encouraged to share the benefits accruing from its use, including commercial use, through the mechanisms of exchange of information, access to and transfer of technology, capacity building and sharing of benefits arising from commercialization. The [Centre] is prepared to facilitate the sharing of such benefits by directing them to the conservation and sustainable use of the plant genetic resources in question, particularly in national and regional programmes in developing countries and countries with economies in transition, especially in centres of diversity and the least developed countries.

The material is supplied expressly conditional on acceptance of the terms of this Agreement. The recipient’s acceptance of the material constitutes acceptance of the terms of this Agreement.

1 The attention of the recipient is drawn to the fact that the details of the MTA, including the identity of the recipient, will be made publicly available.

2 This does not prevent the recipients from releasing the material for purposes of making it directly available to farmers or consumers for cultivation, provided that the other conditions set out in this MTA are complied with.
Several international conventions, agreements and guidelines govern the use of genetic resources and the related issues of biotechnology and intellectual property rights. The Future Harvest Centres are committed to operating in conformity with all relevant international instruments and have developed and agreed on various policy instruments, guidelines and position statements to guide and validate their decisions on these matters.

SGRP, through the Inter-Centre Working Group on Genetic Resources (ICWG-GR) and in consultation with FAO, formulates, reviews and recommends for System-wide adoption, policy instruments and guidelines concerning the management of genetic resources, including those governing the in-trust plant genetic resources collections held in accordance with agreements signed between Centres and the FAO in 1994. The SGRP and the CGIAR Genetic Resources Policy Committee (GRPC) first collated these various documents in a booklet in 2001. An updated version, with the new interim Material Transfer Agreement, has been prepared for issue in 2003. The booklet contains the common genetic resources related policies of the Future Harvest Centres, endorsed for System-wide use by the CGIAR Members, the GRPC and the Centre Directors Committee.

The first section of the booklet concerns the policies and guidelines for managing the in-trust plant genetic resources collections. The second section concerns the policies for acquiring, managing and transferring animal, aquatic and microbial genetic resources. The final section presents CGIAR and Centre Committee statements on several genetic resources and related issues.

The booklet is intended primarily as a reference for the Future Harvest Centres. It is available to outside parties upon request from the SGRP Secretariat.
The Global Crop Diversity Trust is an initiative of SGRP arising from the series of studies on genebank operations and their costs detailed elsewhere in this report (see p. 14). These studies concluded that the only way to ensure practical success of the long-term commitment of the Centres to the management of the crop diversity collections in their care was through the establishment of an endowment. The Future Harvest Centres hold their crop diversity collections in trust for humanity, as part of the FAO International Network of Ex Situ Collections. Under agreements with FAO, the Centres maintain the collections according to internationally agreed standards and ensure that they remain in the public domain.

Importantly, the costing studies at last put a price tag on the long-term costs of conserving the Future Harvest collections, allowing for a clearer estimation of the funds needed to endow them. However, important collections of crop diversity are also held in national and regional genebanks around the world. A priority of the Global Plan of Action for plant genetic resources is to sustain existing ex situ collections within the framework of a rational global conservation system. Thus, in 2001, SGRP supported a feasibility study on the funds needed to endow key collections worldwide, including those held in trust by the Centres. This study indicated that a preliminary goal of US$260 million is reasonable.

The partners announced their plans to establish the Trust at the World Summit on Sustainable Development in Johannesburg. The announcement followed on the heels of the release of a study by Imperial College, UK, ‘Crop Diversity at Risk: The Case for Sustaining Crop Collections’.

After two years of stakeholder discussions and feasibility studies, the campaign for the Global Crop Diversity Trust was formally launched in 2002. The campaign, a partnership between IPGRI (for the Future Harvest Centres) and FAO, seeks to establish an endowment to support the conservation—in perpetuity—of the world’s most critical crop diversity collections. The goal is to raise US$260 million from multilateral and bilateral agencies, corporations, foundations and governments. In addition to conservation, the Trust will support training and other upgrading assistance to crop collections in need. National and international collections will be eligible for funding by the Trust.
The study drew largely on information gathered by FAO in 2000 from about 100 countries. Its findings were alarming: not only is crop diversity disappearing from the fields, a large proportion of the crop resources ‘safeguarded’ in genebanks around the world could soon be lost due to lack of funding.

The report found that while the number of samples held in crop collections has increased in 66% of countries since 1996 (the last time FAO gathered such data), genebank budgets have been reduced in 25% of countries and have remained static in another 35%. Not surprisingly, the majority of budget cutbacks have taken place in the poorest countries, which are home to the diversity of the world’s most critical crops.

The issue of regeneration is perhaps even more revealing. The new data show that some 52% of developing countries have more samples in need of urgent regeneration than they did in 1996. Among developed countries, 27% reported increased need.

Individual genebanks have barely averted disaster: when duplicate seeds held in other lands have been used to replace collections lost in the course of war or natural disaster. Rwanda, Burundi, Somalia and Romania provide a few such examples. Other genebanks have lost or are at risk of losing portions of their collections, Albania, Fiji and Nigeria among them.

Until now, the world community has dealt with genebank crises in an ad hoc manner. The Imperial College report made it clear that such an approach cannot work indefinitely. Even some of the world’s largest genebanks are facing severe budget cuts: the Future Harvest Centres have seen their core funding—the funds that support the genebanks—drop by 50% since 1994. The report endorsed the conclusions of SGRP by recommending the establishment of a global endowment fund for ex situ conservation as the best way to ensure humanity’s ability to meet the long-term nature of its conservation needs.

Public awareness is at the heart of the campaign to establish the Global Crop Diversity Trust. It is a vital way to reach donors—particularly ‘new’ donors who are likely to be unfamiliar with genebanks and their importance. In addition, the intensely political nature of genetic resources issues and the great interest shown by countries in the Trust means that it is critical to ensure openness and transparency in every step taken towards its establishment.

Global media coverage of the Trust has been intense, spanning five continents. The Trust’s communications programme was honoured with a bronze award in 2002 by Agricultural Communicators in Education (ACE), an international professional society of communicators. (See the Trust’s Web site at http://www.startwithaseed.org)

A lengthy process of research and consultation with stakeholder groups during 2002 examined options for the oversight and governance of the Trust, as well as for stakeholder involvement in decision-making, structure,
financial management, allocation of resources, tax efficiency and transaction costs. At the request of and in consultation with a number of key stakeholder groups, FAO and IPGRI, on behalf of the Future Harvest Centres, appointed an Interim Panel of Eminent Experts (IPEE) to oversee the establishment of the Trust. The panel contains representatives from all stakeholder groups, each a key person in agricultural research.

The IPEE will decide the preferred legal status, governance and financial mechanisms for the Trust, based on consultations with a large number of governments, individuals and organizations, South and North. The Interim Panel will also decide upon questions like the proper balance to be achieved in the allocation of funds. The Panel will hold its first meeting in early 2003. (Further information on Trust governance can be found at http://www.startwithaseed.org/pages/governance.htm)

The Global Crop Diversity Trust initiative (formerly called the ‘Global Conservation Trust’) was presented to the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture in October 2002. The Commission strongly endorsed the initiative, saying in its report:

“The Commission heard a presentation from the Director General of the International Plant Genetic Resources Institute, Mr Geoffrey Hawtin on the joint efforts of FAO and the CGIAR to establish a Global Conservation Trust, to provide, in perpetuity, a flow of funds for ex situ conservation by national and international institutions, and for relevant capacity-building. The Trust would operate in the framework of the International Treaty, and be an essential element of its Funding Strategy. The overall policy guidance to the Trust would come from the Governing Body of the Treaty.

“This initiative was universally appreciated and supported, and appeals were made to donors to assist in the establishment of the Trust. The Trust would, it was hoped, attract new and additional funds from a wide-range of donors. The Commission stressed the need for the Governance of the Trust to work in a transparent and efficient manner, as proposed, and requested progress regarding the Trust to be reported at sessions of the Inter-governmental Technical Working Group on Plant Genetic Resources.”

By year’s end, the Trust had received significant commitments from public and private sector sources and from developed and developing countries. It is expected that the Trust will reach its first goal of US$100 million by the end of 2003. In that case, the first call for proposals will take place in mid-2004 with the initial grants awarded at the end of that year.

A farmer in Zimbabwe examining open pollinated sorghum. The local genebank is making varieties available for farmers to use and improve. A. King/IPGRI
In 1995 the SGRP commissioned an external review of the operations of the Future Harvest Centre genebanks, in association with FAO. While this review identified actions that would improve genebank performance, a subsequent external review of SGRP in 1998 drew attention to the fact that Centres lacked the funds to implement fully and in a timely fashion the recommendations that had been made. SGRP therefore sought the support of the CGIAR Technical Advisory Committee (TAC) and Finance Committee/World Bank for developing a costed plan to address the shortcomings and for studies to determine the comparative costs of crop conservation in the Future Harvest Centres’ 11 genebanks. The International Food Policy Research Institute (IFPRI) led the studies on the costs of conservation at Future Harvest Centre genebanks which were instrumental to the launch of the Global Crop Diversity Trust campaign in 2002 (see p. 11). The plan for upgrading genebank operations to bring all the Centres up to the expected international standards of genebank management led, in 2003, to support from the World Bank for a short-term influx of funds to enable Centres to meet their long-term obligations.

IFPRI worked over the past several years with genebanks at five Future Harvest Centres: the International Center for Tropical Agriculture (Centro Internacional de Mejoramiento de Maíz y Trigo—CIMMYT); the International Center for Agricultural Research in the Dry Areas (ICARDA); the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); and the International Rice Research Institute (IRRI). These five Centres collectively account for nearly 90% of the in-trust material held by the Future Harvest Centres.

The ultimate goal of the studies is the answer to a big question: “how costly is it to conserve genetic resources in genebanks and to maintain their viability and sample sizes in perpetuity?” It all depends, of course, on many factors. But in essence the big question can be broken down into smaller ones.

How much does it cost to hold a sample for a year? This is essentially the annualized capital cost of the storage facility, plus the cost of electricity and a small amount to maintain equipment in good condition. In general the cost is very low, less than US$1.50 per accession. Maize, because its seeds are large and so take up more room, is more expensive, at US$2.16 per accession. And cassava, which is stored in vitro at CIAT, is expensive at US$11.98 per accession. Some Centres, for example IRRI and ICARDA, have cheap electricity and low labour costs; both cost US$0.47 per accession. At ICRISAT costs are higher, US$1.32 per accession, largely the result of expensive electricity.

Merely storing a sample, however, is not enough. Its viability also has to be maintained, and that means...
regular testing and, when necessary, regeneration. How much does that add? The costs of testing and regeneration are not incurred every year, but they have a marked effect on the cost of conservation. In general wild and weedy relatives, cross-pollinating crops, and vegetatively propagated crops, all of which are more expensive to regenerate because they require more labour, become much more costly over the long term. Thus long-term storage of forages at CIAT costs US$89.35 per accession while wild rice at IRRI is US$68.76. By contrast chickpeas and sorghum at ICRISAT cost US$15.48 and US$14.66 per accession for storage in perpetuity, because the labour costs of regeneration are so much lower.

Then there is the cost of distribution. One of the purposes of _ex situ_ collections is to make diversity available to breeders and others. This is something that the Centres have normally borne as part of their responsibility to make accessions available, but it is not inconsiderable. One can assess the costs of distribution in two ways. Partial costs include multiplying the accession and shipping, but not characterization or storage. (These can be apportioned and assigned to the full cost, although they add very little, an average of about 16%) The cost of distribution varies greatly depending on crop, even at the same Centre. For example, wheat costs CIMMYT US$12.56 per accession to distribute, while maize costs US$264.31.

_A synthesis report of the costing studies of Future Harvest Centre genebanks conducted by the International Food Policy Research Institute (IFPRI) in 2000 and 2001, 'Endowing Future Harvests: the Long-term Costs of Conserving Genetic Resources at the CGIAR Centres' was published by the SGRP in March 2002. This report provided the basis for estimating the endowment needed for the in-trust collections and has been widely distributed and used in support of the Global Crop Diversity Trust._
Costing the conservation of plant genetic resources

Management implications

For the first time, given the detailed cost analyses now available, genebank managers can begin to consider some operational questions in economic terms. For example, maintaining cultures of crops stored in vitro is very expensive because the culture has to be refreshed frequently. For cassava at CIAT the cost of sub-culturing every year represents almost 90% of the in-perpetuity costs of conservation. CIAT has been experimenting with a technique that slows the growth of the cassava plantlets, which can mean that they need be sub-cultured half as often. That reduces the long-term storage cost from US$537 to US$307. Summed over the 6080 cassava accessions in the CIAT genebank, that represents a potential saving of US$1.4 million. As the authors of the study comment, “if the method can be developed for anything less than US$1.4 million, the research is a worthwhile investment, even taking a narrow, CIAT-centric perspective.”

Using a similar approach it is possible to look at the costs of different aspects of storage. At ICRISAT groundnuts have traditionally been stored as pods, in their shells. Like maize, the large size of the pods means that accessions require 5-litre containers, so the entire collection of more than 15 000 accessions fills two large storage modules. ICRISAT has been experimenting with shelling the pods before storage. This would halve the volume occupied by the collection, so it would fit in a single module. Given the high costs of electricity and low costs of labour at ICRISAT, such a change could save almost 20% of the in-perpetuity costs.

The bottom line

One reason for the costing studies was to provide clear data. Based on the studies, the Future Harvest Centres need some US$5.7 million a year to conserve their in-trust holdings in perpetuity. Using reasonable expectations of interest rates and inflation, this could be provided by an endowment fund of US$149 million. If interest rates are higher and storage times longer the sum drops to US$100 million. Under lower interest rates and shorter periods between regeneration it climbs to US$325 million. Neither is a huge amount.

The real problem lies in estimating the benefits. “Attributing an appropriate part of the agronomic improvement in a plant to the use of conserved germplasm is a daunting, if not intractable, inferential challenge,” say the authors of the costing studies. And even if that could be done, germplasm also has value in terms of future demand, its so-called option value, and the sheer value of its very existence, as opposed to its extinction. Hard though these may be to calculate, it seems obvious that they must far outweigh the present costs of US$149 million for the Future Harvest Centres, or US$260 million for the beginnings of a rational system of crop conservation as anticipated by the Global Crop Diversity Trust.

Costing exercises can help curators to manage their genebanks more effectively. CIAT
SINGER is a conduit. Through it flows information from the Future Harvest Centres about the crop diversity that they hold in trust under agreements with FAO. SINGER also represents an important part of the Centres’ commitment to supporting the development of global information systems. Work to fulfil these functions (and others) has brought about considerable changes, although the original function of linking all with an interest in crop diversity remains the foundation of SINGER’s activities.

Behind the scenes, there has been a fundamental change in the software used to power SINGER. After an extensive review, the project decided to adopt Open Source Software as the basis for the SINGER Toolkit, the applications developed by the SINGER team for the display and querying of the data. For example, advanced GIS applications allow users to map the source of samples against various environmental parameters. Curators of genebank information systems now have cost-effective tools that offer maximum compatibility with different computer platforms as well as greater flexibility.

Adding value to the information it presents is another driving force behind SINGER’s development. Work has begun on the creation of a portal that will give access to additional information beyond that in the databases. This portal links to more than 500 relevant sources on the Web sites of Future Harvest Centres. All the sources have been catalogued and categorized with metadata that will allow powerful searching and also enable links to be built between queries on SINGER and sources relevant to the species concerned. To begin with the sources are restricted to crops covered by the in-trust agreements, but it is hoped to extend coverage in the future.

Strategically, the most far-reaching activities have been to forge links with other genetic resources information systems. These have tended to be based either on particular crops or geographical regions.
Pilot networks linking holders of wheat and barley collections are being established under the lead of the Future Harvest Centres mandated for those crops; CIMMYT for wheat and ICARDA for barley.

On the regional front, the European Co-operative Programme for Crop Genetic Resources (ECP/GR) contracted SINGER to implement the technological infrastructure of EURISCO. EURISCO is a regional catalogue with passport data on more than one million samples held in genebanks across Europe. SINGER staff designed and implemented the searchable Web site that will give access to European genebank information. They have worked closely with ECP/GR in the training and capacity building needed to ensure that all 41 of the countries involved in EURISCO were able to supply data that met the highest standards of quality. When the SINGER-EURISCO alliance is fully in place, towards the end of 2003, it will list more than 1,500,000 accessions, more than one third of the global total.

The collaboration between SINGER and ECP/GR that resulted in the creation of EURISCO is being seen as a model for other regional and crop networks. Discussions have been sought with the US Germplasm Resources Information Network (GRIN), which may bring opportunities to develop regional networks in the Americas. Interest has also been shown by the Genetic Resources Network for West and Central Africa (GRENEWEC), which will be working with ECP/GR and SINGER to develop an information network for its members.

SINGER is now placed as a key player in the development of a global information system for genetic resources, as foreseen under the new International Treaty on Plant Genetic Resources for Food and Agriculture.
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Reports

Report of the Twelfth Meeting of the Inter-Centre Working Group on Genetic Resources, held at the International Plant Genetic Resources Institute (IPGRI), Maccarese (Rome), Italy, 4–8 February 2002.

Publications


Fowler, C., Moore, G. and Hawtin, G.C. 2003. The International Treaty on Plant Genetic Resources for Food and Agriculture: A Primer for the Future Harvest Centres of the CGIAR. International Plant Genetic Resources Institute, Rome, Italy.
Imperial College of Science, Technology and Medicine. 2002. Crop Diversity at Risk: the Case for Sustaining Crop Collections. The Department of Agricultural Sciences, Imperial College of Science, Technology and Medicine, Wye, United Kingdom.

IPGRI. 2002. Start with a Seed [brochure and video film]. International Plant Genetic Resources Institute, Rome, Italy.


This report presents income and expenditures for SGRP for the period 1 January 2002 to 31 December 2002.

### 2002 Income

<table>
<thead>
<tr>
<th>Country</th>
<th>US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>50 000</td>
</tr>
<tr>
<td>Netherlands (DFL 650 000)</td>
<td>276 597</td>
</tr>
<tr>
<td>Switzerland (CHF 250 000)</td>
<td>147 065</td>
</tr>
<tr>
<td>CIAT</td>
<td>23 238</td>
</tr>
<tr>
<td>World Bank</td>
<td>140 542</td>
</tr>
<tr>
<td><strong>Total funds available in 2002</strong></td>
<td><strong>637 442</strong></td>
</tr>
</tbody>
</table>

### 2002 expenditures

<table>
<thead>
<tr>
<th>Activity</th>
<th>US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGRP coordination</td>
<td>166 486</td>
</tr>
<tr>
<td>ICWG-GR meeting</td>
<td>22 123</td>
</tr>
<tr>
<td>Global Crop Diversity Trust related activities</td>
<td>157 249</td>
</tr>
<tr>
<td>SINGER</td>
<td>265 815</td>
</tr>
<tr>
<td>Technical and capacity-building activities</td>
<td>28 378</td>
</tr>
<tr>
<td>Administrative costs</td>
<td>140 079</td>
</tr>
<tr>
<td><strong>Total expenditures</strong></td>
<td><strong>780 130</strong></td>
</tr>
</tbody>
</table>

Opening balance includes carryforward of US$194 000 restricted funding for SINGER and SGRP work in support of the Global Crop Diversity Trust and SGRP’s operating reserve. IPGRI policy requires reserves to cover 60 days of operating expenses.

<p>| Opening balance†                                   | 529 441 |
| Funds available in 2002                            | 637 442 |
| Expenditures in 2002                               | 780 130 |
| Closing balance                                    | 386 753 |</p>
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS</td>
<td>CGIAR Central Advisory Service on Intellectual Property</td>
</tr>
<tr>
<td>CGIAR</td>
<td>Consultative Group on International Agricultural Research</td>
</tr>
<tr>
<td>CIAT</td>
<td>Centro Internacional de Agricultura Tropical</td>
</tr>
<tr>
<td>CIFOR</td>
<td>Center for International Forestry Research</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>Centro Internacional de Mejoramiento de Maíz y Trigo</td>
</tr>
<tr>
<td>CIP</td>
<td>Centro Internacional de la Papa</td>
</tr>
<tr>
<td>ECP/GR</td>
<td>European Co-operative Programme for Crop Genetic Resources</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic information systems</td>
</tr>
<tr>
<td>GPA</td>
<td>Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture</td>
</tr>
<tr>
<td>GRPC</td>
<td>Genetic Resources Policy Committee</td>
</tr>
<tr>
<td>ICARDA</td>
<td>International Center for Agricultural Research in the Dry Areas</td>
</tr>
<tr>
<td>ICRISAT</td>
<td>International Crops Research Institute for the Semi-Arid Tropics</td>
</tr>
<tr>
<td>ICWG-GR</td>
<td>Inter-Centre Working Group on Genetic Resources</td>
</tr>
<tr>
<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
</tr>
<tr>
<td>IITA</td>
<td>International Institute of Tropical Agriculture</td>
</tr>
<tr>
<td>ILRI</td>
<td>International Livestock Research Institute</td>
</tr>
<tr>
<td>INIBAP</td>
<td>International Network for the Improvement of Banana and Plantain</td>
</tr>
<tr>
<td>INRM</td>
<td>Integrated natural resource management</td>
</tr>
<tr>
<td>IPGRI</td>
<td>International Plant Genetic Resources Institute</td>
</tr>
<tr>
<td>IPR</td>
<td>Intellectual property rights</td>
</tr>
<tr>
<td>IRRI</td>
<td>International Rice Research Institute</td>
</tr>
<tr>
<td>ISNAR</td>
<td>International Service for National Agricultural Research</td>
</tr>
<tr>
<td>IWMI</td>
<td>International Water Management Institute</td>
</tr>
<tr>
<td>LI-BIRD</td>
<td>Local Initiatives for Biodiversity and Development</td>
</tr>
<tr>
<td>MTA</td>
<td>Material Transfer Agreement</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
</tr>
<tr>
<td>PPB</td>
<td>Participatory plant breeding</td>
</tr>
<tr>
<td>SGRP</td>
<td>CGIAR System-wide Genetic Resources Programme</td>
</tr>
<tr>
<td>SINGER</td>
<td>CGIAR System-wide Information Network for Genetic Resources</td>
</tr>
<tr>
<td>TAC</td>
<td>CGIAR Technical Advisory Committee</td>
</tr>
<tr>
<td>WARDA</td>
<td>The Africa Rice Center</td>
</tr>
</tbody>
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