



RATIONALE AND APPROACH FOR THE IDENTIFICATION OF GLOBALLY SIGNIFICANT CROP COLLECTIONS IN NATIONAL GENEBANKS AND PROVISION OF SUPPORT BY THE CROP TRUST



January 2015

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Executive Summary

An estimated 20% of plant diversity is under threat from habitat degradation, invasive alien species and over-exploitation; this is likely to be exacerbated by climate change. This threatened diversity is likely to hold the key to solving some of this century's major challenges in the areas of food security, energy availability, water scarcity, climate change, and habitat degradation.

Despite its importance to food security, much of the world's crop diversity is neither safely conserved, nor readily available to scientists and farmers who rely on it to safeguard agricultural productivity. Crop diversity is being lost, and with it the biological basis of our food supply.

The Convention on Biological Diversity, to which 194 countries are party, calls for: the conservation of biological diversity; the sustainable use of its components; and the fair and equitable sharing of its benefits. The CBD's Strategic Plan and Global Plant Conservation Strategy call for the conservation and safeguarding of crop genetic diversity.

The 2nd State of the World's Plant Genetic Resources in Food and Agriculture Report (2010) concludes that the loss of plant genetic resources in food and agriculture (PGRFA) has reduced options for the agricultural sector, and calls for better communication, collaboration and partnerships among institutions dealing with PGRFA management – from conservation to plant breeding and seed systems.

As part of the FAO Global System for the conservation and sustainable use of plant genetic resources for food and agriculture, the Global Plan of Action has been the key element used by the FAO Commission on Genetic Resources for Food and Agriculture to fulfill its mandate with respect to plant genetic resources. The 2nd Global Plan of Action for Plant Genetic Resources in Food and Agriculture (GPA, 2010) identifies 18 priority activities related to the conservation and use of PGRFA, including: supporting targeted collection of PGRFA; sustaining and expanding *ex situ* conservation of germplasm, and; regenerating and multiplying *ex situ* accessions. The GPA also identifies the strengthening of national facilities and international networks as priorities.

The International Treaty on Plant Genetic Resources in Food and Agriculture (ITPGRFA, 2001), to which 128 countries are now party, has built on the principles of the Nagoya Protocol of the CBD to establish a global, Multilateral System to provide farmers, plant breeders and scientists with access to plant genetic materials and to ensure that recipients share benefits they derive from the use of these genetic materials with the countries where they have originated. Article 14 of the ITPGRFA promotes the Global Plan of Action, and Article 15 establishes special status for the collections held in the International Agricultural Research Centers (IARCs) of the CGIAR, ensuring that these continue to be available to all. The Treaty has established a list of crops important to global food and agriculture and for which there is strong interdependence among countries. These are listed in the Treaty's Annex 1, and it is specified that collections of these crops are also to be included in the Multilateral System. In addition, the Contracting Parties are encouraged to provide access, on mutually agreed terms, to plant genetic resources for food and agriculture not listed in Annex I that are important to the programs and activities of the IARCs. Article 16 of the ITPGRFA calls for all relevant institutions, including governmental, private, non-governmental, research, breeding and other institutions, to participate in international networks so as to achieve as complete coverage as possible of plant genetic resources for food and agriculture.

FAO's Global System for the Conservation and Sustainable Use of Plant Genetic Resources in Food and Agriculture comprises all of the policy elements above: the SOWGRFA review process, the Global Plan of Action, and the International Treaty. In addition, the global system comprises the following technical implementation components:

- A network of international *ex situ* collections of major crops, particularly those of the CGIAR, which are given special status by the International Treaty.
- A global portal of accession-level data (Genesys)
- A universal crop gene bank information management system (GRIN Global).
- Advanced bioinformatics tools that allow users to mine phenotypic and genotypic characterization data associated with crop collections (DIVSEEK)

The technical components referred to above are all under development, and a key player in this process is the Global Crop Diversity Trust.

The Global Crop Diversity Trust (the 'Crop Trust') operates as an essential element of the funding strategy of the ITPGRFA and hence the global system, as established in a formal Relationship Agreement signed by the Crop Trust and the Governing Body of the Treaty in 2006. The Crop Trust's work directly supports the network of international *ex situ* collections of major crops that form the backbone of the FAO Global System for the Conservation and Sustainable Use of PGRFA.

The mission of the Crop Trust is to ensure the long-term conservation and use of crop diversity for food security worldwide. The specific goals of the Crop Trust are to:

- Promote an efficient, goal-oriented, economically efficient and sustainable global system of *ex situ* conservation, in accordance with the ITPGRFA and GPA;
- Safeguard collections of unique and valuable plant genetic resources for food and agriculture held *ex situ*, with priority being given to those included in Annex 1 of the International Treaty or included in Article 15 of the International Treaty;
- Promote the regeneration, characterization, documentation and evaluation of plant genetic resources for food and agriculture and the exchange of related information;
- Promote the availability of plant genetic resources for food and agriculture; and
- Promote national and regional capacity building, including the training of key personnel, with respect to the above

The Crop Trust will focus its activities in the next ten years, including and beyond those mandated under Article 15, to collections of the 25 Annex 1 crops, which are most important in Least Developed Countries (LDCs), as reflected by production statistics in these countries in 2010. This will also include the wild relatives of these crop species, where these fall under Annex 1 of the Treaty. This list and the Crop Trust's coverage will be re-evaluated every ten years.

The core activities of the Crop Trust fall into four mutually reinforcing areas:

- Sustainable grants provided forever, funding the backbone of the global crop conservation system;
- Shorter-term, carefully targeted project work to upgrade and build the capacity of key genebanks around the world;
- Building partnerships and raising funds for the endowment and essential projects, and

- Managing the endowment itself, investing in accordance with objectives and policies approved by the Executive Board as documented in the Investment Policy Statement.

Important tools in deciding where and how the Crop Trust invests its funds are the Crop Conservation Strategies and consultation with experts. The Crop Conservation Strategies provide important information on existing collections, gaps in conservation, and possibilities for building more rational and cost-effective conservation systems. The participation of internationally recognized experts who are actively involved in the conservation and use of genetic resources of a particular crop or group of crops will complement the baseline data gathered in the Crop Conservation Strategies. They will interact regularly with one another and a dedicated contact person at the Crop Trust, providing a current and inside view of the state of conservation and use of genetic resources.

In its Funding Disbursement Strategy, the Crop Trust has adopted four basic principles for eligibility for funding support: crop collections must be

- Of global significance;
- Accessible under the Multilateral System;
- In institutions committed to conserving and making collections available in the long term, and;
- In institutions committed to developing an efficient and effective global conservation system.

In addition to these principles, the Trust has developed a set of more specific criteria to be met before a collection will be considered for long-term funding support. These include: effective links to users; appropriate legal status of the collections and facilities; conformity with agreed scientific and technical standards of management, and; facilities maintained adequately to ensure long-term conservation.

The purpose of this paper is to develop a methodology, that builds on the mandate of the Crop Trust and the principles outlined in its Funding Disbursement Strategy, to identify, engage with and support globally significant genebank collections that are on Annex 1 of the ITPGRFA but are not represented in the CGIAR genebanks.

The methodology outlined is a four step process comprising assessments of: global significance of the collection; collection accessibility; institutional capacity to conserve, manage and supply material, and geopolitical and financial risk. In addition, recommendations are made for expert review, validation and endorsement of the proposed approach and outcomes.

1. INTRODUCTION

1.1 Policy context

1.1.1 Loss of biodiversity

Plants are essential for human and other animal life on Earth in that they alone capture energy from the sun and convert it into food in the form of their seeds, leaves and roots. Human life is further sustained by the medicines, building materials and fuel that they provide. Plants are central to many ecological processes such as climate regulation (including carbon dioxide absorption), soil fertility and the purification of both water and air.

Plant diversity exists in the form of algae, liverworts, mosses, ferns and seed-bearing species. The latter play the most obvious role in our lives and yet more than 80,000 species of plant (20% of the total) are currently under threat¹². This threat is largely due to habitat degradation, invasive alien species and over-exploitation; it is likely to be exacerbated by climate change. This threatened diversity is likely to hold the key to solving some of this century's major challenges in the areas of food security, energy availability, water scarcity, climate change, and habitat degradation.

Crop diversity is one of the world's least recognized but most valuable resources. Individual crop varieties, such as the 200,000 varieties of wheat, have different traits for drought or heat tolerance, nutritional quality, disease resistance and every other possible characteristic. Crop diversity is therefore the raw material for improving and adapting crops to meet all future challenges. Yet at the moment much of the world's crop diversity is neither safely conserved, nor readily available to scientists and farmers who rely on it to safeguard agricultural productivity. Crop diversity is being lost, and with it the biological basis of our food supply.

1.1.2 The Convention on Biological Diversity

In response to the global biodiversity crisis, the Convention on Biological Diversity (CBD) was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit") and entered into force on 29 December 1993. The Convention is the only international instrument *comprehensively* addressing biological diversity; however, the CBD works closely with other biodiversity-related conventions (see below). The Convention's three objectives are:

1. Conservation of biological diversity,
2. Sustainable use of its components and
3. Fair and equitable sharing of benefits arising from the utilization of genetic resources.

The CBD is legally binding under international law and, to date, there are 194 parties and 168 signatories to the Convention. The CBD's objectives are met through National Biodiversity Strategies and Action Plans (NBSAPS), and progress is assessed and monitored through the provision of National Reports provided by National Focal Points.

¹ Plants under pressure a global assessment. The first report of the IUCN Sampled Red List Index for Plants. (2010) Royal Botanic Gardens, Kew, UK

² Millennium Ecosystem Assessment (2005)

In order to drive and monitor progress towards its first two objectives - the conservation and sustainable use of biological diversity - the CBD has developed a strategic plan (2011-2020) and a set of targets, known as the 'Aichi targets' (see <http://www.cbd.int/sp/targets/>). The Aichi Target specifically designed to address the loss of crop diversity is Target 13:

'By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.'

In addition, the CBD's Global Strategy for Plant Conservation (GSPC) comprises a set of targets specifically designed to achieve the conservation and sustainable use of *plant* diversity. The GSPC target most relevant to crop diversity is Target 9:

'70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge.'

The GSPC targets (2011-2020) can be found at <http://www.cbd.int/gspc/>

The CBD is addressing its third objective - the fair and equitable sharing of benefits arising from the use of genetic resources - through the Nagoya Protocol, adopted at the tenth meeting of the Conference of the Parties on 29 October 2010, in Nagoya, Japan. The Nagoya Protocol is intended to create greater legal certainty and transparency for both providers and users of genetic resources by:

- Establishing more predictable conditions for access to genetic resources.
- Helping to ensure benefit-sharing when genetic resources leave the contracting party providing the genetic resources

The Nagoya Protocol (see <http://www.cbd.int/abs/about/>) is monitored by the CBD Secretariat.

The CBD works in partnership with the six other biodiversity-related conventions:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- Convention on Wetlands (popularly known as the Ramsar Convention)
- World Heritage Convention (WHC)
- International Plant Protection Convention (IPPC)
- International Treaty on Plant Genetic Resources in Food and Agriculture (ITPGRFA)

1.1.3 State of the World's Plant Genetic Resources (SOWPGR)

The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture, published in 2010, provides a comprehensive overview of trends in crop conservation and use around the world (see www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/sow/sow2/en). It is based on information gathered from more than 100 countries, as well as from regional and international research and support organizations and academic programs. The report documents the current status of plant genetic resources diversity, conservation and use, as well as the extent and role of national, regional

and international efforts that underpin the contributions of PGRFA to food security. It highlights the most significant changes that have occurred in the sector since 1996, when the first report on The State of the World's Plant Genetic Resources for Food and Agriculture was produced by FAO, as well as the gaps and needs that remain for setting future priorities. The SoWPGR-2 provided the basis for the updating of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Some of the key conclusions of this report are:

- Loss of PGRFA has reduced options for the agricultural sector. The major causes of genetic erosion are land clearing, population pressures, overgrazing, environmental degradation and changing agricultural practices.
- Local PGRFA diversity found in farmers' fields or *in situ* is still largely inadequately documented and managed. There is now a growing awareness of the importance of this diversity and its contribution to local food security.
- There has been progress in securing PGRFA diversity in a larger number of national genebanks. However, much of the diversity, particularly of crop wild relatives (CWR) and underused species relevant for food and agriculture, still needs to be secured for present and future use.
- Significant policy developments have changed the landscape of PGRFA management. Many more countries have adopted national programs, laws and regulations for biodiversity following the adoption of the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).
- Better communication, collaboration and partnerships are needed among institutions dealing with PGRFA management – from conservation to plant breeding and seed systems. These are the key factors for an integrated conservation and utilization strategy and delivering sustainable solutions to build a world without hunger.

1.1.4 The Global Plan of Action for Plant Genetic Resources for Food and Agriculture (GPA)

Over the past 15 years, FAO's Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA) has been the main reference document for national, regional and global efforts to conserve and use plant genetic resources for food and agriculture sustainably and to share equitably and fairly the benefits that derive from their use. As part of the FAO Global System for the conservation and sustainable use of plant genetic resources for food and agriculture, the Global Plan of Action has been the key element used by the FAO Commission on Genetic Resources for Food and Agriculture to fulfill its mandate with respect to plant genetic resources.

Responding to the first SOWPGR report, FAO launched the first GPA in 1996 which was adopted by 150 countries. The GPA called for "safeguarding as much existing unique and valuable diversity as possible in *ex situ* collections of plant genetic resources for food and agriculture" and to "develop an efficient goal-oriented, economically efficient and sustainable system of *ex situ* conservation". The GPA further called on stakeholders to "develop and strengthen cooperation among national programs and international institutions to sustain *ex situ* collections". The GPA has recently been revised, but still maintains this system focus (see <http://www.fao.org/docrep/015/i2624e/i2624e00.htm>).

The new, revised GPA identifies 18 priority activities related to the conservation and use of plant genetic resources in food and agriculture, encompassing: *in situ* conservation and management; *ex situ* conservation; sustainable use, and; building sustainable institutional and human capacities. The priority activities for *ex situ* conservation of plant genetic resources are:

- Supporting targeted collection of plant genetic resources for food and agriculture
- Sustaining and expanding *ex situ* conservation of germplasm
- Regenerating and multiplying *ex situ* accessions

In addition, the GPA identifies the following priority capacity building activities:

- Building and strengthening national programs
- Promoting and strengthening networks for plant genetic resources for food and agriculture
- Constructing and strengthening comprehensive information systems for plant genetic resources for food and agriculture
- Developing and strengthening systems for monitoring and safeguarding genetic diversity and minimizing genetic erosion of plant genetic resources for food and agriculture
- Building and strengthening human resource capacity
- Promoting and strengthening public awareness of the importance of plant genetic resources for food and agriculture

1.1.5 The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

The International Treaty on Plant Genetic Resources for Food and Agriculture (see <http://www.planttreaty.org/content/texts-treaty-official-versions>) was adopted by the Thirty-First Session of the Conference of the Food and Agriculture Organization of the United Nations on 3 November 2001. The Treaty aims to:

- Recognize the enormous contribution of farmers to the diversity of crops that feed the world
- Establish a global system to provide farmers, plant breeders and scientists with access to plant genetic materials
- Ensure that recipients share benefits they derive from the use of these genetic materials with the countries where they have originated.

The Treaty's solution to access and benefit sharing - the Multilateral System (MLS) - complies with the Nagoya Protocol under the Convention on Biological Diversity (see above). It puts 64 of the world's most important crops – crops that together account for 80 percent of the food we derive from plants – into an easily accessible global pool of genetic resources that is freely available to potential users in the Treaty's ratifying nations for some uses. These are listed in Annex 1 of the Treaty.

The Treaty facilitates access to the genetic materials of the 64 crops in the MLS for research, breeding and training for food and agriculture. Those who access the materials must be from the Treaty's ratifying nations and they must agree to use the materials totally for research, breeding and training for food and agriculture. The Treaty prevents the recipients of genetic resources from claiming intellectual property rights over those resources in the form in which they received them, and ensures that access to genetic resources already protected by international property rights is

consistent with international and national laws. Those who access genetic materials through the Multilateral System agree to share any benefits from their use through four benefit-sharing mechanisms established by the Treaty.

The Treaty recognizes the enormous contribution farmers have made to the ongoing development of the world's wealth of plant genetic resources. It calls for protecting the traditional knowledge of these farmers, increasing their participation in national decision-making processes and ensuring that they share in the benefits from the use of these resources.

Most of the world's food comes from four main crops – rice, wheat, maize and potatoes. However, local crops, not among the main four, are a major food source for hundreds of millions of people and have potential to provide nutrition to countless others. The Treaty helps maximize the use and breeding of all crops and promotes development and maintenance of diverse farming systems.

Some 128 countries are now contracting parties to the Treaty. As such they commit to “cooperate to promote the development of an efficient and sustainable system of *ex situ* conservation” and require that all parties cooperate to promote the conservation, evaluation and documentation of these resources within a new Multilateral System for access and benefit sharing.

The International Treaty has established a Funding Strategy with the activities of the rolling GPA as priorities. Many new regional and crop networks and programs have been established, largely in response to the priority activities of the GPA. Networks remain very important for promoting cooperation, sharing knowledge, information and ideas, exchanging germplasm and carrying out joint research and other activities. Initiatives, such as the Global Crop Diversity Trust, that promote and support more rational *ex situ* conservation especially for the crops included in the Multilateral System of the International Treaty (i.e. the Annex I crops), build on this type of network. The network of international *ex situ* collections of major crops played an important role in the negotiations of the International Treaty. These collections continue to form the backbone of the FAO Global System for the Conservation and Sustainable Use of PGRFA. The Svalbard Global Seed Vault now provides an additional level of security to existing *ex situ* collections. Furthermore, the development of a global portal of accession-level data and the imminent release of an advanced gene bank information management system are additional important steps towards the strengthening and more effective operation of a global system for *ex situ* conservation.

Under Article 14, the Treaty calls on all contracting parties to implement the Global Plan of Action.

Under Article 15 (see box), the Treaty has established a special status for the international collections held in trust by the CGIAR Centers, ensuring that these continue to be available to all. In addition, the Treaty has established a list of crops important to global food and agriculture and for which there is strong interdependence among countries. These are listed in the Treaty's Annex 1, and it is specified that collections of these in trust crop collections are also to be included in the Multilateral System. Furthermore, the Contracting Parties are encouraged to provide International Agricultural Research Centers (IARCs), such as those of the CGIAR, with access, on mutually agreed terms, to plant genetic resources for food and agriculture not listed in Annex I that are important to the programs and activities of the IARCs. Finally, the Governing Body of the Treaty will seek agreements with other relevant international institutions, including those with globally significant

collections.

This latter point is reinforced in Article 16, which states that:

- Existing cooperation in international plant genetic resources for food and agriculture networks will be encouraged or developed on the basis of existing arrangements and consistent with the terms of this Treaty, so as to achieve as complete coverage as possible of plant genetic resources for food and agriculture.
- The Contracting Parties will encourage, as appropriate, all relevant institutions, including governmental, private, non-governmental, research, breeding and other institutions, to participate in the international networks.

1.1.6 The Global System

FAO's Global System for the Conservation and Sustainable Use of Plant Genetic Resources in Food and Agriculture comprises all of the policy elements referred to above:

- The SOWGRFA review process, providing information on the state of the world's plant genetic resources in food and agriculture;
- The Global Plan of Action setting out what needs to be achieved to conserve and use plant genetic resources sustainably, and;
- The International Treaty that establishes a multilateral framework for access to plant genetic resources, and a platform for technical cooperation between countries.

In addition, the global system comprises the following technical implementation components:

- A network of international *ex situ* collections of major crops, particularly those of the CGIAR, which are given special status by the International Treaty.
- A global portal of accession-level data (Genesys)
- A universal crop gene bank information management system (GRIN Global).
- Advanced bioinformatics tools that allow users to mine phenotypic and genotypic characterization data associated with crop collections (DIVSEEK)

The technical components referred to above are all under development, and a key player in this process is the Global Crop Diversity Trust.

Article 15 - *Ex Situ* Collections of Plant Genetic Resources for Food and Agriculture held by the International Agricultural Research Centres of the Consultative Group on International Agricultural Research and other International Institutions

15.1 The Contracting Parties recognize the importance to this Treaty of the *ex situ* collections of plant genetic resources for food and agriculture held in trust by the International Agricultural Research Centres (IARCs) of the Consultative Group on International Agricultural Research (CGIAR). The Contracting Parties call upon the IARCs to sign agreements with the Governing Body with regard to such *ex situ* collections, in accordance with the following terms and conditions:

- (a) Plant genetic resources for food and agriculture listed in Annex I of this Treaty and held by the IARCs shall be made available in accordance with the provisions set out in Part IV of this Treaty.
- (b) Plant genetic resources for food and agriculture other than those listed in Annex I of this Treaty and collected before its entry into force that are held by IARCs shall be made available in accordance with the provisions of the MTA currently in use pursuant to agreements between the IARCs and the FAO. This MTA shall be amended by the Governing Body no later than its second regular session, in consultation with the IARCs, in accordance with the relevant provisions of this Treaty, especially Articles 12 and 13, and under the following conditions:
 - (i) The IARCs shall periodically inform the Governing Body about the MTAs entered into, according to a schedule to be established by the Governing Body;
 - (ii) The Contracting Parties in whose territory the plant genetic resources for food and agriculture were collected from *in situ* conditions shall be provided with samples of such plant genetic resources for food and agriculture on demand, without any MTA;
 - (iii) Benefits arising under the above MTA that accrue to the mechanism mentioned in Article 19.3f shall be applied, in particular, to the conservation and sustainable use of the plant genetic resources for food and agriculture 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; and
 - (iv) The IARCs shall take appropriate measures, in accordance with their capacity, to maintain effective compliance with the conditions of the MTAs, and shall promptly inform the Governing Body of cases of non-compliance.
- (c) IARCs recognize the authority of the Governing Body to provide policy guidance relating to *ex situ* collections held by them and subject to the provisions of this Treaty.
- (d) The scientific and technical facilities in which such *ex situ* collections are conserved shall remain under the authority of the IARCs, which undertake to manage and administer these *ex situ* collections in accordance with internationally accepted standards, in particular the Genebank Standards as endorsed by the FAO Commission on Genetic Resources for Food and Agriculture.
- (e) Upon request by an IARC, the Secretary shall endeavour to provide appropriate technical support.
- (f) The Secretary shall have, at any time, right of access to the facilities, as well as right to inspect all activities performed therein directly related to the conservation and exchange of the material covered by this Article.
- (g) If the orderly maintenance of these *ex situ* collections held by IARCs is impeded or threatened by whatever event, including force majeure, the Secretary, with the approval of the host country, shall assist in its evacuation or transfer, to the extent possible.

15.2. The Contracting Parties agree to provide facilitated access to plant genetic resources for food and agriculture in Annex I under the Multilateral System to IARCs of the CGIAR that have signed agreements with the Governing Body in accordance with this Treaty. Such Centres shall be included in a list held by the Secretary to be made available to the Contracting Parties on request.

15.3. The material other than that listed in Annex I, which is received and conserved by IARCs after the coming into force of this Treaty, shall be available for access on terms consistent with those mutually agreed between the IARCs that receive the material and the country of origin of such resources or the country that has acquired those resources in accordance with the Convention on Biological Diversity or other applicable law.

15.4. The Contracting Parties are encouraged to provide IARCs that have signed agreements with the Governing Body with access, on mutually agreed terms, to plant genetic resources for food and agriculture not listed in Annex I that are important to the programmes and activities of the IARCs.

15.5. The Governing Body will also seek to establish agreements for the purposes stated in this Article with other relevant international institutions

1.2 The Global Crop Diversity Trust

1.2.1 Background

The Global Crop Diversity Trust (Crop Trust) was established in October 2004 as an independent international organization under international law. This status was conferred on it through the signing of an Establishment Agreement by seven states from five of the regions referred to in the basic texts of FAO.

The Crop Trust operates as an essential element of the funding strategy of the ITPGRFA and hence the Global System, as established in a formal Relationship Agreement signed by the Crop Trust and the Governing Body of the Treaty in 2006. The Crop Trust's work directly supports the system of *ex situ* conservation described in the Treaty; it is complementary to on-going *in situ* conservation efforts, which are however outside the Crop Trust's mandate as defined in its Constitution. The Governing Body of the Treaty nominates four members to the Executive Board of the Crop Trust, and the Board presents an annual report on Crop Trust activities to the Governing Body of the International Treaty. To further strengthen the relationship, the Secretary of the Treaty is also an observer to the Board.

The Executive Board is the principal decision-making body of the Crop Trust. The Board normally meets twice each year. It currently comprises eleven members who are appointed by key Trust stakeholders:

- Four members appointed by the Governing Body of the International Treaty
- Four members appointed by the Donors' Council of the Crop Trust
- One non-voting member appointed by the Director General of FAO
- One non-voting member appointed by the Chair of CGIAR
- The Executive Secretary of the Trust, *ex officio*.

The Donors' Council of the Crop Trust was established in 2005 and consists of public and private donors who have made a sizable contribution to the Crop Trust. It functions as a forum for the Crop Trust's donors to express their views on the organization's activities and operations – an innovative mechanism to bring government donors, foundations and private companies together in a genuine public-private partnership with shared interest in the Crop Trust.

Upon signing a Headquarters Agreement with the government of Germany in June 2012, the Crop Trust attained legal status as an independent entity based in that country. It has established its headquarters in the city of Bonn in January 2013, and looks forward to deepening ties with its German hosts during the next ten years.

1.2.2 Mandate

The mission of the Global Crop Diversity Trust is to ensure the long-term conservation and use of crop diversity for food security worldwide.

The specific goals of the Crop Trust are to:

- Promote an efficient, goal-oriented, economically efficient and sustainable global system of *ex situ* conservation, in accordance with the International Treaty on Plant Genetic Resources for Food and Agriculture (2001) and the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (1996);

- Safeguard collections of unique and valuable plant genetic resources for food and agriculture held *ex situ*, with priority being given to those that are plant genetic resources included in Annex 1 of the International Treaty or included in Article 15 of the International Treaty;
- Promote the regeneration, characterization, documentation and evaluation of plant genetic resources for food and agriculture and the exchange of related information;
- Promote the availability of plant genetic resources for food and agriculture; and
- Promote national and regional capacity building, including the training of key personnel, with respect to the above.

1.2.3 Strategic Work Plan 2014-2024

The Crop Trust's Strategic Work Plan 2014-2024 is available in full at <http://www.croptrust.org/sites/default/files/documents/files/GCDT%20Strategic%20Work%20Plan%20Revised%20final.pdf>

As stated above, the goals established in the Crop Trust's Constitution specify that it will “safeguard collections of unique and valuable plant genetic resources for food and agriculture held *ex situ* with priority being given to those that are plant genetic resources included in Annex 1 to the International Treaty or referred to in Article 15 of the International Treaty”.

These two components of the Treaty define what material is included in the Multilateral System. Annex 1 is a list of crops that are covered under the system, while Article 15 gives special coverage to all of the collections formerly held in trust by the CGIAR Centers under agreement with FAO, some of which are not Annex 1 crops. Since the Treaty was established, other International institutions have made their collections available under Article 15 through separate agreements with the Governing Body of the Treaty. The Crop Trust currently supports Article 15 collections held by 10 of these institutions through long-term grants.

The Crop Trust defines its coverage in terms of crops, not institutions. In theory, it could support all collections of all crops listed in Annex 1, not just collections covered by Article 15. However, appropriate targeting of crops will have a far greater impact where it matters most: on the foundations of food security and sustainable livelihoods.

Drawing on statistics available in the FAOSTAT database, the Crop Trust will focus its activities in the next ten years, including and beyond those mandated under Article 15, to collections of the 26 Annex 1 crops which are most important in Least Developed Countries (LDCs), as reflected by production statistics in these countries in 2010 (see **Table 1**). This will also include the wild relatives of these crop species, where these fall under Annex 1 of the Treaty. This list and the Crop Trust's coverage will be re-evaluated every ten years.

Table 1: Ranking of top 26 Annex 1 Crops by production value within LDCs*

1	Rice	11	Yam	21	Aroids
2	Cassava	12	Cowpea	22	Pea
3	Maize	13	Citrus	23	Eggplant
4	Banana & plantain	14	Coconut	24	Apple
5	Potato	15	Barley	25	Lentils
6	Sorghum	16	Brassicas	26	Forages**
7	Sweet potato	17	Sunflower		
8	Wheat	18	Pigeon pea		
9	Millet	19	Broad beans and vetches		
10	Beans	20	Chickpea		

*Some of these include multiple crop species, for which production value is calculated together.

**Not ranked.

The core activities of the Crop Trust – present and future – fall into four mutually reinforcing areas.

1. Sustainable grants provided forever, funding the backbone of the global crop conservation system, will continue to make up the main long-term work of the Crop Trust.
2. This is supported by shorter-term, carefully targeted project work to upgrade and build the capacity of key genebanks around the world – helping them to fulfill more effective roles in the global system as a whole.
3. All of these activities are made possible by building partnerships and raising funds for the endowment and essential projects.
4. Finally, the Crop Trust manages the endowment itself, investing in accordance with objectives and policies approved by the Executive Board as documented in the Investment Policy Statement.

Important tools in deciding where and how the Crop Trust invests its funds are the Crop Conservation Strategies and experts from the crop conservation and use communities.

1.2.4 Crop Conservation Strategies and Crop Conservation and Use Communities

Between 2004 and 2010, the Crop Trust brought together groups of experts from around the world to agree a series of global crop conservation strategies – in short ‘Crop Strategies’ (see <http://www.croptrust.org/content/crop-strategies> and **Annex 1**).

Crop by crop, these documents describe the holdings of existing collections, gaps in conservation, and possibilities for building more rational and cost-effective conservation systems. The completed Crop Strategies do not include beans, citrus, brassicas, sunflower, pea, eggplant, apple, and forages. All of these, except beans and forages, are non-CGIAR crops that require the development of partnerships to engage the community.

While the Crop Strategies have provided informed guidance to the Crop Trust’s activities, they are not living documents and will not continue to offer a reliable picture of changing conservation landscapes – particularly as the Crop Trust itself has an effect on these. In the coming years, the Crop Trust will need to confer with experts from these communities, like those who developed the Crop Strategies, to assess and monitor progress towards a fully functioning global system.

The broader crop community of collection holders, users of the collections, and other stakeholders constitute *conservation and use communities* for each crop. This community participated to some extent in the development of the Crop Strategies but will need to be consulted further during the revisions. This consultation may be with individual experts, *ad hoc* groups or with formal groups such as the Conservation and Use Advisory Committees for specific crops developed under the CRP.

Rooted in the Crop Trust's core value of participation, this community guidance will inform the Crop Trust's understanding of requirements and priorities for long-term funding, as well as provide a basis for short-term projects such as capacity building or emergency support. All decisions on funding will continue to be made by the Crop Trust Executive Board within a fully transparent system.

1.2.5 Crop Trust Funding Disbursement Strategy

The Trust has limited funds at its disposal and is constrained by its Constitution to use those funds in the most cost-effective way to ensure the attainment of its objective of ensuring the long-term conservation and availability of plant genetic resources for food and agriculture (PGRFA) - with a view to achieving global food security and sustainable agriculture. In particular the Trust is required to focus on safeguarding collections of unique and valuable PGRFA held *ex situ*, and to promote an efficient goal-oriented, economically efficient and sustainable global system of *ex situ* conservation. The Trust's Fund Disbursement Strategy (available in full at: www.croptrust.org/content/governance-policy) is based on the principles and strategies in the Global Plan of Action and the principles within the International Treaty. It is developed around a number of assumptions, including the assumption that an efficient and effective conservation system must build on existing institutions and facilities. It is also based on the realization that the objectives of the Crop Trust cannot be achieved by distributing available resources among all of the world's existing genebanks and that the Crop Trust must focus its support on collections of unique PGRFA of global significance. The Crop Trust's Funding Disbursement Strategy focuses on three major areas:

- 1) Securing PGRFA of global significance;
- 2) Promoting Participation and Increasing Benefits; and
- 3) Increasing Efficiency and Effectiveness within and between collections.

In working towards an efficient and effective global conservation system, the Crop Trust has adopted four basic principles for eligibility for funding support, as well as a set of more specific eligibility criteria (see **Figure 2**).

The four basic principles are:

- The plant genetic resources are of global importance; priority will be given to plant genetic resources of crops included in Annex 1 or referred to in Article 15.1 (b) of the International Treaty.
- The plant genetic resources are accessible under the internationally agreed terms of access and benefit sharing provided for in the Multilateral System established by the International Treaty, and set out in the Standard Material Transfer Agreement.
- Each holder of plant genetic resources for food and agriculture commits itself to long-term conservation and availability of the collection for which support is requested.

- Each recipient of funds from the Trust shall undertake to work in partnership with the aim of developing an efficient and effective global conservation system that will also encompass financially independent collection holders not funded by the Trust.

In addition to, or to amplify these principles, the Crop Trust has developed a set of more specific criteria to be met before a collection will be considered for long-term funding support. In cases where a collection meets the principles and is prioritized for Crop Trust support, but is unable to meet the funding criteria, the Crop Trust will consider providing support for the necessary upgrading and capacity building, where this will facilitate its meeting the criteria in the near future. The long-term funding criteria and the way in which they are applied will be kept under review and revised as needed. However, initially there will be five criteria.

- The recipient has effective links to users of plant genetic resources.
- The plant genetic resources are judged to be important or potentially important within the context of and according to the needs of a rational global system of *ex situ* conservation.
- The legal status of the collection and holder is such that their ability to meet the eligibility principles with respect to access and benefit-sharing, and their commitment to long-term conservation are assured.
- The recipient has the human resources and management systems needed to maintain the plant genetic resources and can demonstrate conformity with agreed scientific and technical standards of management.
- The facilities in which the collection is maintained are adequate to ensure long-term conservation.

1.2.6 A Global System for *ex situ* crop conservation

As stated in the Crop Trust's Strategic Work Plan 2014-2024:

'It is essential – and not only desirable – that such a global system for *ex situ* conservation be rational and cost-effective. A rational system is one in which the key actors have clearly defined roles, and coordinate in order to provide the services that are most needed and that they are best placed to provide. A cost-effective system is one in which efforts are not unnecessarily duplicated, beyond the duplication required for the long-term safety and security of collected material.'

The components of such a system are illustrated in **Figure 1**, below. In this scheme, all the components will have roles that are complementary and interdependent, with free exchange of material, information and expertise.

Within the 'Global System Collections' tier it is expected that there might be a total of ca. 100 or more globally significant collections of the 26 crops prioritized by the Trust, in addition to the Article 15 collections. All collections will be accessible through the Multilateral System, and all will need to meet the technical standards devised by the Crop Trust (see **section 2.3**). For the gene bank performance targets (**Annex 3**) and Quality Management System that is being developed by the Crop Trust. It is important to note that not all of the institutions/collections will meet all of the technical standards in full immediately, but with support for upgrading, all will be expected to make progress towards meeting those standards. Eligible institutions will receive long term funding to manage collections provided that they are able to maintain the standards set. Additional funding will be sought and provided for *additional* activities such as: adding to or improving collections or data; increasing the availability of collections or data; backing up collections in Svalbard, and so on (see **section 2.6**).

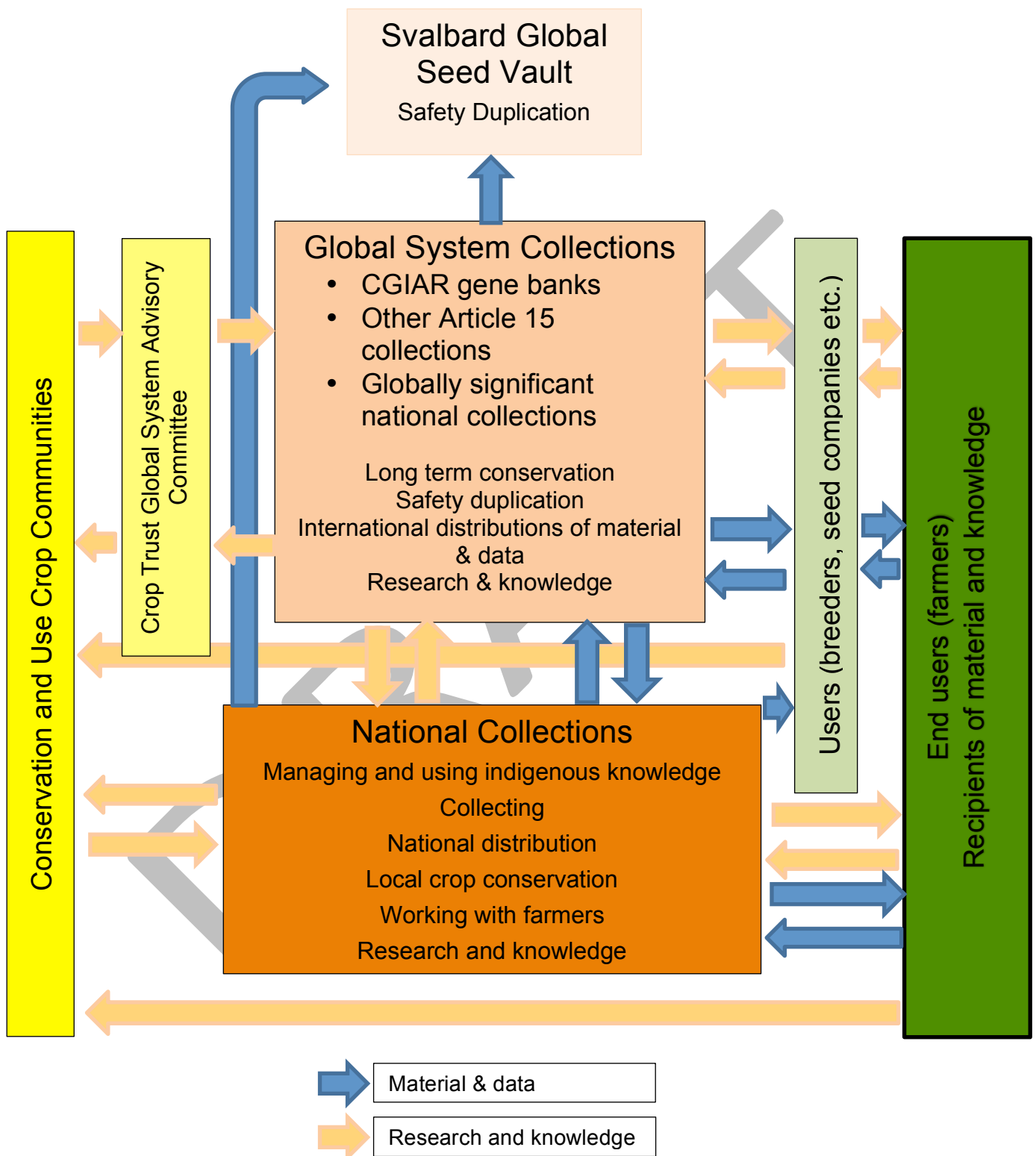
Generally, oversight and support for the Global System for *ex situ* crop conservation will be provided by experts from the crop conservation and use communities (see **section 2.6**). In addition, the Crop Trust will establish a Global System Advisory Committee with experts from these communities. The committee will advise the Executive Board of the Crop Trust on the priorities and needs of the Global System for support.

1.3 The purpose of this paper

The purpose of this paper is to develop a methodology, that builds on the mandate of the Crop Trust and the principles outlined in its Funding Disbursement Strategy (**Figure 2**), to identify, engage with and support globally significant genebank collections that are covered by Article 15 of the ITPGRFA or are from national collections that have been identified by the Crop Trust as a priority. The paper also includes suggested Terms of Reference and skill sets required for the experts that will provide oversight and advice for the Crop Trust in support of the development and maintenance of the Global System for *ex situ* crop conservation.

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Figure 1: Components of a rational and cost-effective Global System for *ex situ* conservation of crop diversity

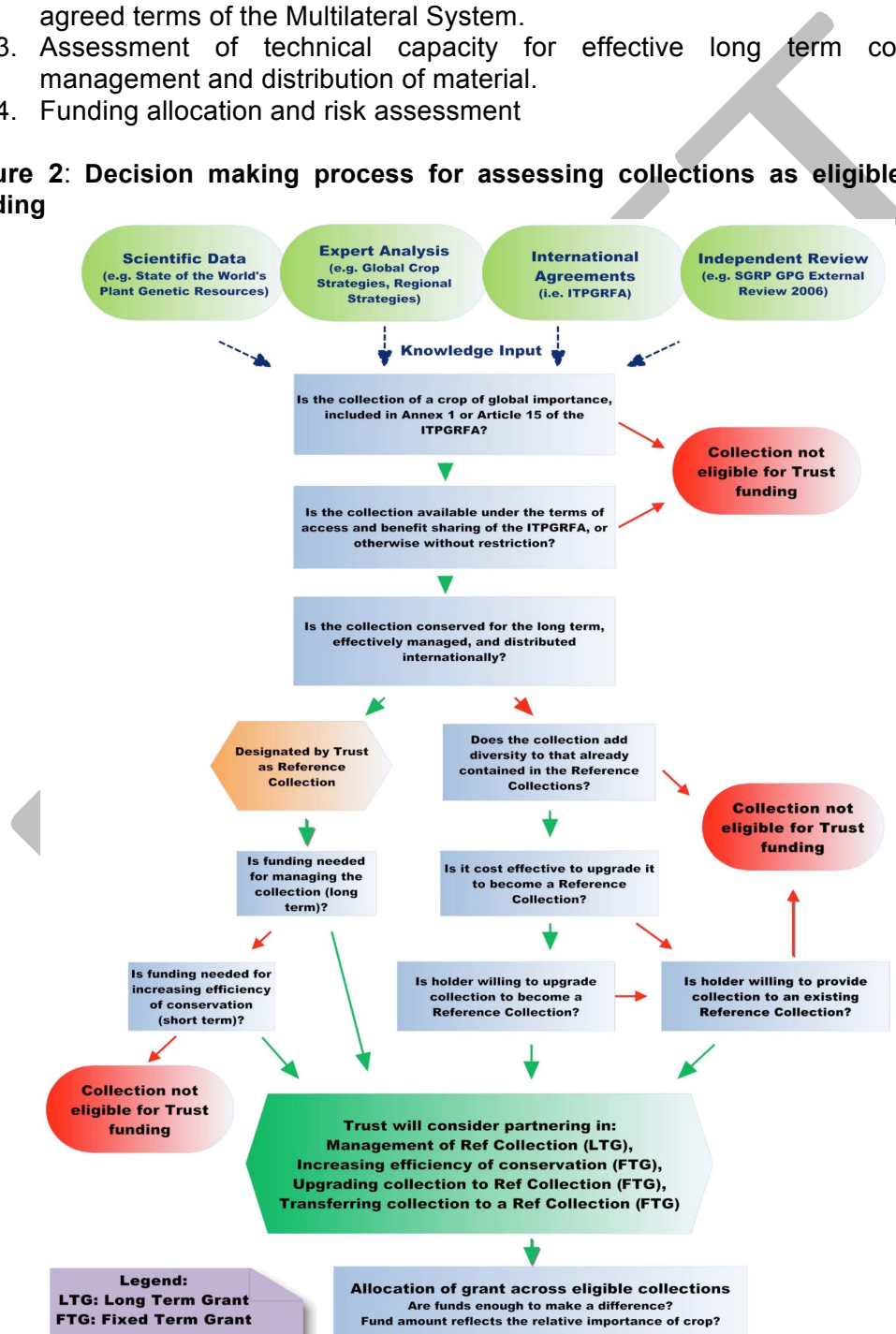


2. ENGAGING WITH NATIONAL GENE BANKS: CRITERIA AND PRIORITISATION METHODOLOGY

The framework for deciding which institutions to engage with and support financially is provided in the Crop Trust’s Funding Disbursement Strategy as outlined above. The methodology below is derived from this Strategy, and comprises the following steps (see **Figure 2**):

1. Assessment of the global significance of collections housed in national institutions
2. Assessment of the accessibility of those collections under the internationally agreed terms of the Multilateral System.
3. Assessment of technical capacity for effective long term conservation, management and distribution of material.
4. Funding allocation and risk assessment

Figure 2: Decision making process for assessing collections as eligible for Trust funding



Note: the term 'Global System Collection' is preferred to the term 'Reference Collection', and is used instead throughout this document.

2.1 Assessing the global significance of collections housed in national institutions

The question that the global significance assessment is trying to answer is:

- Is this an Annex 1 or Article 15 crop collection of global significance?

2.1.1 Criteria and indicators assessing the global significance of collections

The global significance criteria that the Crop Trust applies in its Funding Disbursement Strategy are:

- The plant genetic resources are of global importance; priority will be given to plant genetic resources of crops included in Annex 1 or referred to in Article 15.1 (b) of the International Treaty.
- The plant genetic resources are judged to be important or potentially important within the context of and according to the needs of a rational global system of *ex situ* conservation

Assessing the **global significance** of a collection within a crop can be carried out according to the indicators listed in **Table 2**, below.

Table 2: Indicators for measuring the global significance of collections

Indicator	Score 1-5 (5 high)	Sources of information
Relative importance of the crop to food security in Least Developed Countries		Already done. See Table 1 , above.
Size of the collection and/or number of significant crop collections		Crop strategies, questionnaires, WIEWS, expert knowledge
Collection diversity in the institute and/or landrace diversity available in the country. Institute situated in a country of high use.		Crop strategies, expert knowledge, FAOSTAT (production and area)
Uniqueness of collections		Crop strategies, expert knowledge
Collections are comprehensive or important for specific or sought after traits		Crop strategies, expert knowledge
The host institution is situated in the crop center of origin, creating potential for improving collections		Crop strategies, expert knowledge, CWR gap analysis data
Institute located in area of low biosecurity risk		Expert knowledge
Collections not backed up in Svalbard or CG genebanks		GENESYS, expert knowledge
Collections under threat due to neglect, poor management practices, or pest/disease/ climate-related threats		Crop Strategies, questionnaires, expert knowledge

2.1.2 Methodology for assessing the global significance of collections

A critical first step is to prepare the long list of potentially eligible institutions thought to hold globally significant collections of the 26 target crops. The main source of information about the global significance of collections is the Crop Strategies already developed by the Crop Trust, the responses to the survey forms associated with these studies (see **Annex 2**) and, where they exist, groups of experts such as the Crop Conservation and Use Advisory Committees established under the CRP (see **section 1.2.4.** above), other existing crop germplasm groups, or individual consultations with crop experts. Crop Strategies will soon be completed for 22 of the 26 priority crops identified by the Trust in its Strategic Work Plan (see **Annex 1**). Similar Crop Strategies will need to be developed for the remaining 4 crops, and expert groups assembled in parallel.

Once complete and up to date lists of eligible collections are assembled for each crop, they can be assessed and ranked according to the indicators in **Table 2**, above. It is important to stress that the relative importance of the indicators will vary from crop to crop. For example, for some crops that are under-represented in genebanks (e.g. yams), supporting genebanks that occur in centers of origin may be more important than supporting genebanks with large, homogeneous collections. In many cases it will be desirable to support a mixed portfolio of collections, i.e. some in centers of origin, some with large collections/capacity, some close to users and producers. Using the methodology presented in this paper – and with appropriate expert input – indicators can be weighted accordingly.

This work can be carried out as a desk study, in-house at the Crop Trust Secretariat. The ranked lists of potentially significant global collections will be **reviewed** and **validated** by experts consulted by the Crop Trust, as described above.

2.2 Assessing the accessibility of collections housed in national institutions

The starting point for this assessment will be the list of globally significant collections identified in Step 1 (**Section 2.1** above). The question that the accessibility assessment is trying to answer, as articulated in **Figure 2**, is:

- Is the collection available under the terms of access and benefit sharing of the ITPGRFA, or otherwise without restriction?

2.2.1 Criteria and indicators for the assessment of accessibility of collections

The criteria related to the **accessibility of collections** that the Crop Trust applies in its Funding Disbursement Strategy are:

- The plant genetic resources are accessible under the internationally agreed terms of access and benefit sharing provided for in the Multilateral System established by the International Treaty, and set out in the Standard Material Transfer Agreement.
- The legal status of the collection and holder is such that their ability to meet the eligibility principles with respect to access and benefit-sharing, and their commitment to long-term conservation are assured.
- Each holder of plant genetic resources for food and agriculture commits itself to long-term conservation and availability of the collection for which support is requested.
- The recipient has effective links to users of plant genetic resources

In effect, this means that the host country ideally should be a signatory to the ITPGRFA, and have ratified the Treaty to qualify for support from the Crop Trust. This information is available on the Treaty Secretariat's website at http://www.planttreaty.org/list_of_countries.

To this end, the first indicator of the availability of material will be the status of the host country with regard to the ITPGRFA.

However, it is recognized that many countries are in the process of signing up to, or ratifying, the International Treaty. For these countries, commitment and/or adherence to the principles of the Multilateral System will need to be demonstrated.

All eligible countries will be expected to score highly against the indicators in **Table 3**, below.

Table 3: Collections accessibility indicators

Indicator	Score 1-5 (5 high)	Sources of information
National legislation and permitting procedures are in place and supportive of material transfer into Multilateral System		<ul style="list-style-type: none"> • Crop Strategies • Questionnaires • Recipient records • Government manifestos • Institutional constitutions, mandates or terms of reference • ITPGRFA Secretariat website • CBD/ITPGRFA national focal points • Scientific literature (e.g. Bjørnstad <i>et al.</i>, 2013)
Good institutional track record in application of the Treaty, use of SMTA or material transfer to Multilateral System, across sectors and across a wide geographical range		
There are no ideological or constitutional barriers to working with all countries and sectors (e.g. the private sector)		
Collections have been acquired legally and meet eligibility principles with respect to access and benefit-sharing		

2.2.2 Methodology for assessing the accessibility of collections

The assessment of collections accessibility is likely to be straightforward for some institutions but much more difficult for others. As mentioned above, countries that have ratified the ITPGRFA are listed on the Treaty Secretariat's website at http://www.planttreaty.org/list_of_countries. However, ratification of the Treaty is not always an accurate indication of whether the Treaty is being implemented. Likewise, non-ratification doesn't mean that countries or institutions are not committed to being part of the Multilateral System (MLS). In some countries, there may be political processes to be followed that have not been completed in relation to the ITPGRFA. Thus, the assessment method must also take into account commitment to the MLS or alternative instruments or policies that adhere to the principles of the MLS, particularly given that the process of ratification, signature, and implementation of the Treaty is on-going in many countries.

The ITPGRFA Secretariat records collections available under the MLS on its website at <http://www.planttreaty.org/inclusions>. However, some institutions may be unable or reluctant to share records of material being sent out. In addition, some institutions have distribution policies that exclude certain sectors (e.g. the private sector) or geographic areas. Such policies may not always be overt or written down.

The Crop Strategy questionnaires (see **Annex 2**) include questions on the availability of material (section 6), and are the starting point for assessing whether institutions make their material available under the Multilateral System. However, these questionnaires are often incomplete and it may be necessary to verify that material has been supplied under the Multilateral System by cross-checking with recipients, and consulting with experts or users. Some legal expertise may also be required to help assess whether distribution policies are legally binding or negotiable.

As with **2.1**, above, this work could be carried out as a desk study in-house at the Crop Trust Secretariat. The ranked list of accessible, significant global collections will be **reviewed** and **validated** by experts (see **Section 2.6**).

2.3 Technical assessment of the effective conservation, management and international distribution of collections

The starting point for this assessment will be the list of institutions identified as housing globally significant collections that are also accessible to users under the Multilateral System (Steps 1 and 2 in **Sections 2.1** and **2.2** respectively). The questions that the technical assessment is trying to answer, as articulated in **Figure 2**, are:

- Is the collection conserved for the long term, effectively managed, and distributed internationally?
- Does the collection add diversity to that already contained in the Global System?
- Is it cost effective to upgrade it to become a Global System Collection?
- If yes, is the holder willing to upgrade the collection to become a Global System Collection?
- If not, is the holder willing to provide the collection to an existing Global System Collection?
- Has the holder demonstrated a willingness to work in partnership with the aim of developing an efficient and effective global conservation system

2.3.1 Criteria and indicators for assessing the effective management of collections

Important technical criteria to be assessed relate to the capability of the host institution to **conserve**, **manage** and **supply** the collections effectively. The willingness or past experience in partnership to contribute to the global conservation system also needs to be assessed. The Crop Trust's Funding Disbursement Strategy seeks the following as a minimum:

- The recipient has the human resources and management systems needed to maintain the plant genetic resources and can demonstrate conformity with agreed scientific and technical standards of management.
- The facilities in which the collection is maintained are adequate to ensure long-term conservation.
- Each recipient of funds from the Trust shall undertake to work in partnership with the aim of developing an efficient and effective global conservation system that will also encompass financially independent collection holders not funded by the Trust.

Assessing the capability of an institution to effectively conserve, manage and supply collections will give the Crop Trust an indication of the support needed to elevate a collection to Global System status. It also serves as a baseline against which improvements can be measured. Effective conservation and management of collections can be assessed according to the indicators set out in **Table 4**, below.

Table 4: Indicators for measuring the effective conservation and management of collections

Indicator	Score 1-5 (5 high)	Sources of information
Technical capacity		
Physical infrastructure (buildings, equipment) fit for purpose		<ul style="list-style-type: none"> • Crop strategies • Questionnaires • Interviews • Site-based assessments • Training needs assessment • Seed testing
Human capacity (skills, knowledge) in place and of international standard		
Administration and logistical infrastructure fit for purpose		
Institution demonstrates willingness to upgrade collection to Global System status		
Institute demonstrates willingness to work in partnership with the aim of developing an efficient and effective Global System		
Crop Trust Performance targets and challenges being met or have the potential to be met (see Annex 3)		
Minimum elements of Quality Management System (as defined by Crop Trust Partnership) are in place.		
Institute has strong capacity for collection, regeneration and multiplication.		
Collections held in long term storage in at least two locations		
Collections are free of seed borne pathogens		
Biosecurity protocols robust and well-managed		

2.3.2 Methodology for assessing the effective management of collections

Three main steps are envisaged for the technical assessment:

- 1) Questionnaire-based desk survey
- 2) Follow up interviews by telephone or Skype
- 3) On-site technical assessments

A questionnaire will be prepared and sent out to **all** national institutions identified as having accessible, globally significant collections. The questionnaire will seek to address the capacity of the institution with regard to the criteria in **Table 4**, above, i.e.

- Physical infrastructure
- Human capacity
- Administration and logistical infrastructure
- Partnerships and contribution to Global System
- Quality Management System
- Baseline data (e.g. numbers of accessions, viability testing etc.)
- Capacity to improve breadth and depth of collections (i.e. collection, regeneration)

As a starting point, the technical capacity of the institutions will be assessed according to the information gathered through the questionnaire. However, the experience from the development of the Crop Strategies suggests that responses to questionnaires may be limited, and the data provided is often patchy. It is therefore suggested that telephone or Skype interviews with genebank managers are scheduled in order to help to ensure that questionnaires are completed and to cover any gaps in the information provided.

For some institutions, a site-based visit using relevant expertise may be necessary to validate or provide more detail than that provided through the questionnaires.

Technical assessments will not necessarily lead to funding from the Crop Trust, and will be carried out in a participatory way, the Crop Trust working closely with genebank staff and management to validate the questionnaires, and to gain a fuller understanding of the state of the genebank and its partnerships. The technical assessment will also help genebanks to identify what they need to do to improve their collections and the upgrade options available to them.

2.4 Synthesis of analysis

The steps outlined in **Sections 2.1 to 2.3**, above will result in the following for each of the 26 crops:

- A list of globally significant collections and their host institutes
- Understanding of the status of the collections in relation to their accessibility under the Multilateral System
- Gaps in existing collections' content and availability
- An assessment of technical capacity within the Global System
- Gaps in technical capacity within the Global System

The Crop Trust Secretariat will collate this information into individual Global System Collection Strategies for each crop, with input from external experts and review by the Crop Trust's Global System Advisory Committee (see **Section 2.6**).

Once these Global System Collection Strategies are complete for all 26-target crops, they will be synthesized into a draft Global System Strategy that describes a **portfolio** of eligible collections across all 26 crops, a proportion of which will be considered for Crop Trust long-term support. This portfolio of collections will be selected on the basis of the criteria described in **Sections 2.1-2.3**, and the type and amount of support available from the Crop Trust will be specified for each eligible collection.

The Crop Trust Global System Advisory Committee will review and validate the draft Global System Strategy. I validate the Strategy, including funding priorities, before it goes to the Crop Trust Executive Board for approval.

2.5 Funding allocation and due diligence

Before Crop Trust funding is allocated – particularly in the case of long term grants – it is recommended that the Crop Trust carries out a due diligence or risk assessment that considers indicators of the economic, geopolitical and financial investment climate. Some suggested indicators are listed in **Table 5**, below.

Table 5: Geopolitical, economic and financial assessment indicators

Indicator	Score 1-5 (5 high)	Source of information
The host country is politically stable, is secure and likely to remain so.		Worldwide Governance Indicators http://info.worldbank.org/governance/wgi/index.aspx#home
The host Government and institution are respected regionally and		Expert knowledge

internationally, and able to lead by example		
The host Government gives high priority to the crop(s) that the collection represents		% of GDP from agriculture Target crop production figures Target crop R & D expenditure trends
The host Government has demonstrated commitment to long term institutional funding		Government spending trends on institution Institutional Annual Reports
Institutional leadership receptive to participation and adoption of agreed standards		Expert knowledge
Institutional leadership stable		Expert knowledge High level discussions
Country is likely to attract international donor funding		World Bank Overseas Development Assistance Index http://data.worldbank.org/indicator/DT.O DA.ODAT.PC.ZS
Costs of upgrading and maintaining seed bank are not excessive and likely to remain so.		The Economist Worldwide Cost of Living Index http://www.eiu.com/public/topical_report.aspx?Campaignid=Wcol2014 World Bank Inflation Index http://data.worldbank.org/indicator/FP.C PI.TOTL.ZG
Financial rigor demonstrated by Institution		Institutional Annual Reports and accounts
Overheads and running costs are competitive and represent good value for money		Annual accounts

One option is that a due diligence risk assessment is carried out by independent consultants working closely with Crop Trust personnel.

The rationale for carrying out this analysis as a separate, discrete component of the methodology is based on the fact that this assessment needs to be:

- Objective and consistently applied. This cannot be achieved by a committee.
- Handled with sensitivity and discretion. Issues of governance and financial propriety are, by their nature, sensitive.
- Credible. Apart from objectivity, the rationale for engaging an independent consultancy firm with the right investment/financial expertise and a good reputation is that they will bring credibility to the process.
-

Consulting firms such as PwC, Deloitte, Ernst & Young etc. specialize in assessing the same kinds of criteria the Crop Trust is interested in, i.e. policy, governance and financial frameworks. Whoever is selected to carry out the work would need guidance from the Crop Trust about indicators such as regional reputation and commitment to crops and agriculture.

2.6 Review and validation of the Global System for *ex situ* crop conservation

As indicated in the sections above, each stage of the methodology will be reviewed, validated and endorsed by experts.

2.6.1 Expert review and validation of the desktop analysis and technical assessments

The analysis outlined in **Sections 2.1-2.3** will result in a preliminary list of significant collections weighted according to priority criteria for each crop. The Crop Trust will carry out this work in-house but expert opinion will be sought to:

- Review the list of globally significant collections identified by the Crop Trust, to validate it, and ensure that no potentially significant collections are omitted;
- Review the weighting of criteria for ranking the importance of collections
- Review and validate the assessment of accessibility carried out by the Crop Trust
- Review and validate the technical capacity questionnaires

Experts may also be called upon, where appropriate, to:

- Participate in the site-based technical assessments and/or
- Review and validate site-based technical reports and plans for upgrading collections into the Global System

Once complete, this analysis will be collated into individual Global System Collection Strategies for each crop (see **Section 2.4**). These Collection Strategies will be reviewed and validated by the Crop Trust's Global System Advisory Committee (see below).

2.6.2 Global System Strategy review and long term monitoring of the Global System for *ex situ* crop conservation

The individual crop Global System Collection Strategies described above will already have included expert input throughout the process of compilation. However, ultimately, the Global System Collections (see Figure 1) will comprise a *portfolio* of globally significant, accessible collections across all Annex 1 crops and Article 15 collections, a proportion of which will be eligible for support from the Crop Trust. To help ensure that this portfolio of collections is representative and fit for purpose, it will be necessary to consult more widely beyond individual crop experts to ensure that the process is inclusive and to give it credibility and buy-in from the wider crop community.

To this end, the Crop Trust will convene a Global System Advisory Committee, which will include the following expertise as a minimum:

- Respected crop community leadership, with expert knowledge and experience of institutional politics, and national and global policy frameworks (e.g. CGIAR, ITPGRFA Secretariat, Commission for Genetic Resources, FAO, etc.).
- Regional representation, encompassing centers of origin of crops as well as areas of production and use.
- The genebank user community, i.e. farmers or producers, with a thorough knowledge of supply and value chains

- Genebank managers with up to date knowledge of the processes, methodologies, skills and infrastructures needed to effectively conserve and supply high quality material of the focus crops.
- Crop breeders, with practical knowledge of desirable crop characteristics, trait selection methodologies and gaps in existing collections.
- The crop research community with up to date knowledge of the research challenges associated with the focus crops, including conservation, use and biosecurity.

The composition of this Committee would also depend on where the challenges to creating a sustainable Global System for *ex situ* crop conservation are identified. It is probable, for example, that the political challenges related to access and benefit-sharing will be equal to or greater than the technical challenges associated with building comprehensive collections.

One way of helping to ensure the buy-in of the wider crop community might be to ask the crop communities to nominate individuals to constitute the Global System Advisory Committee. This can be carried out in confidence, ensuring that the Crop Trust has final say but also allowing a degree of consensus and broader participation in the process. Providing that clear terms of reference are set out, including maximum group size, this needn't be cumbersome or over-complicated.

In the medium to long term, the Global System Advisory Committee will play a monitoring role of the support provided by the Crop Trust to the Global System for *ex situ* crop conservation as it is built and refined.

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Annex 1: Status of Crop Strategies and crop communities for the Crop Trust's top 25 crops

Crop	Crop Strategy	Formal Crop Community Group exists	Comments
Rice	Yes	Under way	Survey forms are a comprehensive source of information
Maize	Yes	Under way	39 institutes surveyed. Number of respondents not stated. Survey information is summarized in the Crop Strategy.
Wheat	Yes	Under way	19 out of 50 genebank survey forms returned. 33 out of 50 breeders. Survey information is summarized in the Crop Strategy.
Cassava	Yes	No	34 out of 50 survey forms returned. Comprehensive source of information.
Potato	Yes	No	35 survey questionnaires were completed.
Sweet potato	Yes	No	82% response to survey. Survey information is summarized in the Crop Strategy.
Banana & plantain	Yes	No	29 respondents to survey questionnaire.
Sorghum	Yes	No	19 out of 57 surveys completed. Survey information is summarized in the Crop Strategy.
Millet	Yes	No	32 out of 40 surveys completed. Survey information is summarized in the Crop Strategy.
Cowpea	Yes	No	15 out of 34 surveys completed. Survey information is summarized in the Crop Strategy.
Barley	Yes	No	28 out of 55 surveys completed. Comprehensive source of information.
Broad beans & vetches	Yes	No	Crop Strategy comprehensive source of information. Two sets of questionnaires sent out.
Chickpea	Yes	No	36 survey forms sent out. Not stated how many responses received.
Lentils	Yes	No	36 survey forms sent out. Not stated how many responses received ('low'). Survey information is summarized in the Crop Strategy.
Aroids	Yes	No	Survey sent out to 80 Aroid collection curators. Number of respondents not stated. Survey information is summarized in the Crop Strategy.
Coconut	Yes	No	No survey forms sent out.
Yam	Yes	No	
Pigeon pea	Yes	No	
Beans	Under way	Under way	
Forages	Under way	No	
Citrus	Under way	No	
Apple	Under way	No	
Brassicac	No	No	
Sunflower	No	No	
Pea	No	No	
Eggplant	No	No	

Annex 2: Crop Strategy Survey form**Increasing Efficiency and Effectiveness of Conservation of the Genetic Resources of Rice³
SURVEY****Background**

The Global Crop Diversity Trust (“The Trust”) is supporting efforts to develop strategies for the more efficient and effective conservation of crop diversity, particularly in *ex situ* collections. The Trust has commissioned the International Rice Research Institute (IRRI) to coordinate the development of a rice conservation strategy through an independent external consultant. This questionnaire has been developed in order to seek the advice and input of representatives of relevant stakeholders around the world in the development of the conservation strategy. In particular the questionnaire seeks to assess the status of rice conservation throughout the world.

If you curate a collection that includes accessions of rice, we please will you to complete all sections of the questionnaire. If there are no *ex situ* collections of rice in your institute, please complete sections 9-10 only. Please return the questionnaire to IRRI as soon as possible. IRRI will then compile all answers and forward them to the external consultant for analysis.

IRRI is keen to have your active participation in the development of the rice conservation strategy and will be pleased to keep you informed on its progress and consult you during the development until completion. If you have any questions about this questionnaire or about the proposed strategy in general, please contact r.hamilton@cgiar.org.

1. Organization information:

Name and address of organization holding/maintaining the rice collection	
Address:	
City:	
Postal Code:	
Country:	
Web site:	
Curator in charge of the rice collection:	
Name:	
Address:	
City:	
Telephone:	
Fax:	
Email:	
Name of respondent to this questionnaire if not as above	

³ For the purposes of this questionnaire and of the global rice conservation strategy, “Rice” includes all species of the genus *Oryza*, including the two cultivated (*Oryza sativa* and *O. glaberrima*), and all wild species. All of these are included in Annex 1 of the International Treaty on Plant Genetic Resources for Food and Agriculture. Related genera, and the product sold commercially in North America as “wild rice” (*Zizania*) are not included because they are not in Annex 1 of the Treaty.

Contact details:	
Date of response:	

1.2 Additional key contact persons for the above germplasm collections:

Name	Title/Function	Email Address

1.3 Please describe the organization:

- 1 Governmental organization
- 1 University
- 1 Private organization
- 1 Other: please describe:

1.4 Is the institution in charge of the rice collection the legal owner of the collection?

1 yes 1 no

1.4.1. If no, who is the owner (including no owner identified)?

1.4.2. Is the collection subject to the terms and conditions of the International Treaty on Plant Genetic Resources for Food and Agriculture? 1 yes 1 no

1.4.3. If no, is it expected to become under the International Treaty in the near future?
1 yes, indicate expected date: _____ 1 no

2. Overview of the rice collection:

2.1 Main objective of the collection (long-term conservation, working collection, breeding collection)

2.2 Current size of the rice collection:

Type of germplasm (where known)	Number of species	Number of accessions	% available for distribution
Wild related species			
Landraces			
Obsolete improved varieties			
Advanced improved varieties			
Breeding/research materials			
Inter-specific derivatives			
Unknown			
Other, specify:			

2.3 Origin of the collection: please indicate the proportion (%) of accessions on the total amount that were:

	Percentage %
- collected originally in your own country (national origin)	
- collected originally in your own region (regional origin)	
- introduced from a collection abroad	
- from other origin (please define):	

2.4 Are there any major gaps in the collection?

Species coverage of the crop: 1 yes 1 no

Population (sample) representation per species: 1 yes 1 no

Ecological representation of the species: 1 yes 1 no

Other, please specify: _____

2.4.1 If yes, are there any plans to fill such gaps and if so please provide details on the plans.

2.5 What would you consider to be the most interesting aspects of your collection, making it unique?

2.6 Please describe the main potential/importance of your collection for use and breeding:

3. Conservation status (germplasm management):

3.1. Conservation facilities:

Please indicate the proportion of the accessions maintained under: (Note: if accessions are maintained under more than one storage condition the total percentage may exceed 100%)	Percentage %
Short-term storage conditions	
Medium-term storage conditions	
Long-term storage conditions	
Other, please specify:	

3.2 Storage form:

Please indicate the proportion of the accessions stored as:	Percentage %
Seeds	
Field accessions	
<i>In vitro</i>	

Cryopreservation	
Pollen	
DNA	
Other, please specify	

3.3 Please describe the storage facilities (if more than one, please use the different columns):

	Facility 1	Facility 2	Facility 3 etc
Type of facilities:			
Temperature:			
Relative Humidity (%):			
Packing material:			
Other, please specify:			

3.4 Have you established a genebank management system or written procedures and protocols for:

- 1 Acquisition (*including collecting, introduction and exchange*)
- 1 Regeneration
- 1 Characterization
- 1 Storage and maintenance

- 1 Documentation
- 1 Health of germplasm
- 1 Distribution
- 1 Safety-duplication

1 Other please specify: _____

3.4.1 In case you have procedures and protocols, are you able to provide the Global Crop Diversity Trust with this information (i.e. provide a copy)? 1 yes 1 no

3.5 Please describe your quality control activities (in terms of frequency, protocols/methods and actions upon results):

Germination tests	
Viability testing	
Health testing	
True-to-typeness of <i>in vitro</i> plantlets	
Other, please specify:	

3.6 Is the collection affected by diseases that can restrict the distribution of the germplasm?
 1 yes 1 slightly, only few accessions 1 no

3.6.1 *If yes or slightly, are knowledge and facilities available at your institution for eradication of these diseases?* 1 yes 1 limited 1 no

3.7 Please indicate the proportion (%) of the collection that requires urgent regeneration (apart from the normal routine regeneration):

Type of germplasm	% of accessions with urgent regeneration need
Wild related species	
Landraces	
Obsolete improved varieties	
Advanced improved varieties	
Breeding/research materials	
Inter-specific derivatives	
Unknown	
Other, specify:	

3.8 Please indicate the current and expected situations of the collection with respect to the following factors, where: 1 = high/good, 2 = adequate/moderate, 3 = not sufficient/bad, NA = not applicable:

Factors	Current situation	Expected situation in 2010
Funding for routine operations and maintenance		
Retention of trained staff		
Interest for Plant Genetic Resource Conservation by donors		
Genetic variability in the collection as needed by users/breeders		
Access to germplasm information (passport, charact., evaluation)		
Active support/feedback by users		
Level of use by breeders		
Other factors (please specify):		

4. Safety duplication (defined as the storage of a duplicate/copy of an accession in another location for safety back-up in case of loss of the original accession):

4.1 Are accessions safety-duplicated in another genebank? 1 yes 1 no

4.1.1. If yes, please specify:

Name of institute maintaining your safety duplicates:	Number of accessions	Storage conditions (short, medium, long term)	Nature of the storage (e.g. black box, fully integrated in host collection, etc.)
Add lines as necessary			

4.2 Is there any germplasm of other rice collections safety-duplicated at your facilities?

1 yes 1 no

4.2.1 If yes, please specify:

Name of holder of the original collection:	Number of accessions	Storage conditions (short, medium, long term)	Nature of the storage (e.g. black box, fully integrated in host collection, etc.)
Add lines as necessary			

4.3 To what extent do you consider the rice accessions in your collection to be unique and not duplicated extensively elsewhere (i.e. EXCLUDING safety-duplication)?

- 1 Fully unique
- 1 Mostly unique
- 1 Partially unique
- 1 Fully duplicated elsewhere

4.4 Are any constraints to duplicating the collection elsewhere outside your country?

- 1 yes 1 no

4.4.1. If yes, please specify.

5. Information management:

5.1 Do you use an electronic information system for managing the collection (data related to storage, germination, distribution, etc.)? 1 yes 1 partly 1 no

5.1.1. If yes, what software is used?

5.2 Please indicate the proportion (%) of the following types of data is: (1) documented and (2) the proportion that is available in electronic format:

1. Type of germplasm	Passport data		Characterization data		Evaluation data	
	Doc.	Electr.	Doc.	Electr.	Doc.	Electr.
Wild related species	%	%	%	%	%	%
Landraces	%	%	%	%	%	%
Obsolete improved varieties	%	%	%	%	%	%
Advanced improved varieties	%	%	%	%	%	%
Breeding/research materials	%	%	%	%	%	%
Inter-specific derivatives	%	%	%	%	%	%
Unknown	%	%	%	%	%	%
Other, specify:	%	%	%	%	%	%

5.3 In case the collection is not computerized, are there plans to do so in the future?

- 1 No plans
- 1 Computerization planned within 3 years
- 1 Other

5.4 Is information of the collection accessible through the Internet? 1 yes 1 partly 1 no

5.5 Are data of the collection included in other databases?

- National 1 yes 1 partly 1 no
- Regional 1 yes 1 partly 1 no
- International 1 yes 1 partly 1 no

5.5.1 If yes or partly, specify the databases:

6. Distribution and use of material:

6.1 What proportion (%) of the total collection is AVAILABLE for the following distributions?

Nationally: _____% Regionally: _____% Internationally: _____%

6.1.1 Please fill in the number of accessions DISTRIBUTED annually, and indicate the expected change over the next 3-5 years, where: + = increasing 0 = no change - = decrease

	Number of accessions distributed annually (average of last 3 years)	Expected change for the next 3-5 years
Nationally		
Regionally		
Internationally		

6.2 Do you set specific conditions for distribution? Please specify:

6.3 Is the germplasm sufficiently available in terms of QUANTITY for distribution?

- Seeds: 1 yes 1 partly 1 no
- *In vitro* material: 1 yes 1 partly 1 no
- Cryopreserved material: 1 yes 1 partly 1 no
- Other, please specify: 1 yes 1 partly 1 no

6.4 Is the germplasm sufficiently available in terms of HEALTH for distribution?

- Seeds: 1 yes 1 partly 1 no
- *In vitro* material: 1 yes 1 partly 1 no
- Cryopreserved material: 1 yes 1 partly 1 no
- Other, please specify: 1 yes 1 partly 1 no

6.5 Do you have adequate procedures in place for:

- Phytosanitary certification? 1 yes 1 no
- Packaging? 1 yes 1 no
- Shipping? 1 yes 1 no
- Other, please specify: 1 yes 1 no

6.6 Do you keep records of the distribution? 1 yes 1 No

6.7 Which of the following received germplasm from you in the past 3 years?

Type of users:	Proportion of total distribution %
----------------	------------------------------------

Farmers and Farmers' organizations	
Other genebank curators	
Academic Researchers and Students	
Domestic users	
Foreign users	
Plant breeders - public sector	
Plant breeders - private sector	
NGOs	
Others, please specify:	

6.8 How do you inform potential users about the availability of accessions and their respective data in your collection?

6.9 What are the most important factors limiting the use of the material maintained in your collection?

6.10 Please describe your policy regarding accessibility and distribution of rice germplasm:

Cost of accessions: 1 free 1 cost: _____

Cost of shipment: 1 free 1 cost: _____

Use of Material Transfer Agreement: 1 yes 1 no

2.6.2.1 6.10.1 Do you have any restrictions on who can receive materials? 1 yes 1 no If yes, please specify: _____

7. Networks of rice genetic resources:

7.1 Do you collaborate in (a) network(s) as a rice collection holder?
1 yes 1 no

7.1.1 If, yes please provide the following information for each of the networks: (A) name, (B) type (national, regional or worldwide), (C) main objectives and (D) a brief description of the main reasons to participate in the network.

A- Name of network	B - National/ Regional/ Worldwide	C - Objectives	D - Reasons for participation

8. Major constraints:

Please list the 5 major limitations you are facing in the management of the collection:

1. _____
2. _____
3. _____
4. _____
5. _____

9. Question concerning institutes NOT maintaining *ex situ* collections of rice:

If your institute does not maintain an *ex situ* collection of rice, please indicate to the best of your knowledge, the following:

Current conservation activities:	
Institute focal person to contact for further details:	
Plans for any <i>ex situ</i> conservation:	
Any other information:	

10. Please add any further comments you may have:

Please return the questionnaire to the International Rice Institute (r.hamilton@cgiar.org) as soon as possible.

DRAFT

Annex 3: Performance targets and indicators for genebanks (from the Genebank CRP)

		Indicator	Target and challenges
TARGETS	1	Availability: % collection which is clean (of seed-borne pathogens), viable, in sufficient seed number to be made immediately available for international distribution from medium term storage	90% accessions in the collection
	2	Security: % collection which is held in long term storage conditions in two locations and also in the Svalbard Global Seed Vault or for clonal crops % collection in two locations	90% accessions in the collection
	3	Data availability: % collection with minimum passport and/or characterization data available online	90% accessions in the collection
	4	Quality Management System (including user satisfaction)	Minimum elements of QMS (as defined by Crop Trust partnership) are in place.
CHALLENGES	5	Distribution of diversity: number of discrete accessions distributed in a single year or over a ten-year period	Ensure that the diversity of the collection is explored and used.
	6	Distribution: number of samples disseminated in a single year or over a ten-year period	Increase distribution to more countries and more users
	7	Relative efficiency: days between harvest and storage; duration between subcultures for clonal crops	Increase storage efficiency
	9	Cost per accession: per accession cost of routine operations	Maintain costs per accession within an appropriate range