CGIAR Genebank Platform

CROP TRUST

Genebank Platform Annual Plan of Work and Budget (POWB) for 2018

AfricaRice
Benin

Bioversity International
Belgium

International Center for Agricultural Research in the Dry Areas
Morocco and Lebanon

International Center for Tropical Agriculture
Colombia

International Crops Research Institute for the Semi-Arid Tropics
India

International Institute for Tropical Agriculture
Nigeria

International Livestock Research Institute
Kenya

International Maize and Wheat Improvement Center
Mexico

International Potato Center
Peru

International Rice Research Institute
Philippines

World Agroforestry Center
Kenya

2018 Genebank Platform POWB

2018 Genebank Platform POWB

Name of the Platform	Genebank
Name of the Lead Center	Crop Trust
List of participating Centers and other key partners	11 CGIAR genebanks: AfricaRice, Bioversity, CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IITA, ILRI, IRRI

1. Expected Key Results

1.1 Adjustments/Changes to Your Theories of Change

There are no adjustments to the proposed Theory of Change for the Genebank Platform.

1.2 Expected Platform Outputs

The most important output is the provision, in an effective and timely manner, of healthy, viable, documented germplasm from the 35 crop and tree collections, which are maintained effectively in long-term conservation in accordance with Article 15 of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Together, the 11 CGIAR genebanks are expected to distribute approximately 80,000 samples of germplasm in response to requests from up to 2000 external users and CGIAR scientists.

Additional planned outputs in 2018 include:

- **Continued implementation of Digital Object Identifiers (DOIs):** DOIs have been applied to 501,172 accessions (67%), exceeding the 50% target for 2017. In 2018, genebanks will support and encourage the adoption of DOIs through the AFS CRPs and Excellence in Breeding (EiB) Platform in the use of germplasm in breeding and research.
- **Four new genebank managers** will be recruited out of the 12 manager positions in 2017-2018. The Platform will have an important role in supporting the new recruits to familiarize themselves with the environment of international plant genetic resources conservation and use and to deal with the range of policy, strategic and management issues that regularly arise. In February 2018, the genebank managers were invited by NordGen to the 10-year anniversary event at the Svalbard Global Seed Vault and six retiring genebank managers were recognized by the Crop Trust for their contributions to genetic resources conservation.
- **Strategic curation and alignment of collections:** Wild species are the most difficult and expensive materials to conserve and manage *ex situ*. A Tropical and Sub-Tropical Forages (TSTF) Strategy developed in 2016 by the TSTF community, recommended the prioritization of species for conservation and promotion for use and the deprioritizing of species that have limited value as forages. At the same time, CIAT and ILRI agreed to bring the management of their two forages collections under unified management. In 2018, the implementation of the strategy recommendations will get under way and significant changes in the management and composition of both collections will become evident over the next 2-3 years. ICRAF is also undertaking a species conservation prioritization process in 2018 and will be implementing strategic changes to their seed and field collections.
- **Diversity analysis**: A simple method, pioneered by the Centre for Genetic Resources (CGN) in the Netherlands, to represent the diversity in a crop genepool and assess the representativeness of genebank collections is now being implemented across multiple CGIAR mandate crops. In 2018, the 'diversity trees' will be developed for 14 crops and the holdings of collections mapped for at least six crops. The result should provide an immediate visualization of what diversity is in the CGIAR collections and where gaps exist or species and

genotypes are under-represented. Two complementary methods of spatial and trait gap analysis are being developed and refined in 2018 by CIAT and ICARDA for multiple crops.

1.3 Plans by Platform Modules

Conservation Module

The Conservation Module supports the core genebank operations, the minimum activities that must be undertaken by the genebanks, without which the fundamental security of the collections and their use are at serious risk. Under the Platform, the status of the collections in terms of their availability, safety duplication and documentation is monitored and continually improved by removing backlogs in regeneration and health testing, and by making strategic curation decisions. In addition, a number of collective activities are underway as follows:

- **Quality management:** Individual genebank's Standard Operating Procedures (SOPs) for key operations are being systematically audited for their conformity to international standards and, where necessary, recommendations are made by policy, thematic and QM experts to improve specific procedures and their documentation.
- **Strategic curation:** All genebanks are under pressure to find efficiencies in their processes and to improve the quality of their services. In 2018, a Task Force will develop guidelines to enable more strategic management of collections and support processes of de-activating accessions within a sound legal and policy framework. Several Centers are taking active steps to 'spring clean' collections under their management. Bioversity International will be removing accessions that have been identified as not true-to-type with accessions from the cryopreserved collection. CIMMYT is in the process of de-activating 2,570 accessions that will be repatriated to Australia and a further 15,288 accessions of barley to be transferred to ICARDA or archived. ICRAF is planning to archive 829 accessions of non-priority species that have never been requested. CIAT and ILRI will commence a process to align both collection composition and processes to manage forages collections. This means de-activating accessions or transferring low priority species to alternative hosts who can make better use of them. ICARDA continues to reconstruct active and base collections in Lebanon and Morocco through large-scale planting of safety duplicates retrieved from the Svalbard Global Seed Vault.
- **Gap analysis and collecting:** Three methods of landrace gap analysis were developed and tested in 2017 and will be extended in 2018. Through consultation with taxonomic experts, four "Diversity Trees" (banana, rice, potato, barley) have been developed to illustrate the structure of individual crop genepools according to geography, traits and genetics based on expert opinion. A further ten crop genepools will be structured into trees in 2018. A number of CGIAR genebanks will also be adopting methods developed by CIAT and ICARDA in 2017 to map landraces and potentially interesting traits, and identify hotspots for collecting.
- **Germplasm Health**: The Germplasm Health Units (GHUs) of 11 CGIAR centers have initiated a process within the GHU Community of Practice to harmonize operational frameworks and quality management plans, and to share terminology, SOP templates and research protocols for common crops. Gaps in capacity are being assessed with a specific focus on the phytosanitary needs of each genebank. A plan will be developed to review the costs of individual GHU's operation and time taken for service delivery.
- **Seed longevity**: Increasing the longevity of seed in storage, and improving the accuracy with which we can predict their longevity, continues to be a key target to improve the efficiency and effectiveness of conservation, eliminating the need for excessively frequent germination testing and regeneration.
- **Automation**: automating key repetitive tasks is critical to reduce costs, increase throughput, and assure uniformly high quality. IRRI introduced partially automated seed phenotyping in 2016 and automated seed sorting in 2017. In 2018, IRRI and CIMMYT will introduce automated

seed germination testing. Recent published research finds a positive correlation between radical emergence 3-4 days after imbibition and viability. Normal tests require 7-10 days so the newly installed systems are expected to significantly reduce the time required for viability testing for rice, wheat and maize and improve accuracy and documentation.

Use Module

The Use Module drives increased use of crop diversity by providing access to more and better quality information on the accessions in the collections.

- **DOIs:** In 2018, all CGIAR genebanks will obtain DOIs for 100% of the accessions in their collections, and will develop and implement Center-specific rules for obtaining DOIs for individual components of accessions such as a regenerated seed lot. Engaging the Big Data and Excellence in Breeding Platforms and each Center's breeding programs, a strategy will be developed and implemented for the use of DOIs beyond the genebanks so that breeders and researchers both inside and outside the CGIAR are regularly assigning and referring to DOIs in data and research results. The "frontrunner" genebanks will provide guidance and assistance to all Centers that need it to achieve their 2018 targets.
- **Integration between genebanks and breeding programs:** Opportunities to facilitate interoperability between data systems will continue to be sought and acted upon through interactions between the genebanks, Big Data and EIB Platforms and the AFS CRPs both at an individual crop level and at the collective level. CIMMYT is leading the way in actively associating Seeds of Discovery data to genebank accessions and finding ways of visualizing and managing such genetic datasets for the benefit of genebank users.
- **Genesys**: Genesys, the accession data web portal, continues to work on improving the user experience by addressing recommendations provided in a user feedback study in 2017. In 2018, a major new effort is under way to incorporate accession characterization data and accession subsets with value-adding metadata into Genesys.
- **Subsetting**: Each genebank is responsible for developing new subsets every year to respond to users' needs. The new subsets are generally trait-based with Focused Identification of Germplasm Strategy (FIGS) or similar approaches using environmental data being adopted to reinforce evaluation data.
- **Impact of genebank use**: Use studies will be initiated in at least four genebanks to track distribution of germplasm to outcomes and impact as part of the Genebank Impacts Workplan. This will involve adapting a simple user survey based on a similar survey implemented by the USDA National Plant Germplasm System.

Policy Module

The Policy Module supports CGIAR Centers' compliance with international genetic resources policies and laws. It also coordinates CGIAR participation in international fora where genetic resources policies are being developed. To these ends, the Policy Module engages in the following:

- **Responding to the Resolution 4/2017 of the ITPGRFA Governing Body:** At its last meeting, the Governing Body requested the CGIAR Centers to provide information about Intellectual Property policies, licensing strategies and compliance with Intellectual Assets Principles. For this purpose, in 2018 and 2019, the Policy Module, will seek confirmation from DGs and SMB on best ways to respond to Resolution 4/2017 and support the CGIAR System Office and Article 15 Centers to develop relevant submissions to the Secretariat and the Governing Body.
- **Negotiations to revise the ITPGRFA's MLS and SMTA:** The Working Group to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing (WG-EFMLS), established by the Governing Body to develop new mechanisms to increase monetary benefit-sharing under the MLS, will meet again in October 2018. The Policy Module will coordinate CGIAR's submission to and participation in this meeting.

- **'Dematerialization':** There are increasing demands for the Convention on Biological Diversity (CBD), Nagoya Protocol, ITPGRFA and the FAO Commission on Genetic Resources for Food and Agriculture to develop norms requiring benefit-sharing from commercial use of genomic information. Meanwhile, CGIAR is under increasing scrutiny concerning how Centers manage their data. The Policy Module will coordinate discussion within/across CGIAR about this issue including with CGIAR Genetic Resources Policy Working Group, DGs, and SMB. It will also monitor developments and make contributions in relevant international fora.
- **Capacity building for GR Policy Compliance:** The Policy Module is organizing capacity building sessions and workshops for CGIAR genebanks' staff and other CGIAR scientists. The Module will submit the Guidelines for CGIAR Research Centers to operate in compliance with the Nagoya Protocol for approval by the Article 15 DGs and SMB, and will promote their use across CGIAR through workshops, complementary Q&As, fact sheets, and an introductory video to be developed in 2018. The Policy Module will also develop guidelines for the transfer of plant genetic resources under development (PuD) and new PGRFA products.
- **Implementation of the ITPGRFA and the Nagoya Protocol in a mutually supportive manner:** The Policy Module will collaborate with the Secretariats of the ITPGRFA and the CBD/Nagoya Protocol to organize an awareness-raising and capacity building workshop at CIP in Peru, in September, for national ITPGRFA and Nagoya Protocol focal points in Latin America for the implementation of both international instruments.

1.4. Cross Cutting Dimensions

1.4.1 Capacity Development

Numerous collective activities undertaken in the Genebank Platform engender collaboration and capacity building across Centers. Capacity building activities in 2018 include:

- Quality management system audits and training, including at least one Genebank Operations and Advanced Learning (GOAL) workshop in 2018 and meeting of CGIAR germplasm health units;
- Development of phytosanitary diagnostic tools for clonal and seed crops;
- Seed longevity research and improvement of seed management protocols;
- Collection diversity analysis and gap identification;
- Development and implementation of GRIN-Global software for accession data management;
- Development and improvement of data in Genesys (accession data online portal);
- Implementation and promotion of digital object identifiers (DOIs);
- Critical assessment of costs and efficiency-building;
- Development of guidelines for the strategic management of collections;
- Strengthening compliance of Centres with international policy on genetic resources;
- Convening of the CGIAR Genetic Resources Policy Working Group;
- Use tracking and impact assessment, including a 'bootcamp' for impact fellows and specialists.

On an annual basis, genebanks and GHUs carry out services on behalf of CRPs and national partners to host, distribute, test, clean and select germplasm. In many cases, they also provide data, advice and instruction for the rehabilitation, development and documentation of collections outside the CGIAR and for research on genetic resources in general.

1.4.2 Open Data and Intellectual Assets

The Platform's management of genetic resources complies with the CGIAR Principles on the Management of Intellectual Assets. Genesys (https://www.genesys-pgr.org), the global web portal on genebank accessions, publishes germplasm data supplied by CGIAR and external data providers in accordance with agreements between the Crop Trust and those providers. The principles and goals of

the portal are to make the data open and universally accessible and available to everyone, and the protocols for data exchange and use are primarily determined by Center implementation of CGIAR Open Access policy.

Genesys provides data on plant genetic resources to facilitate their use in breeding and crop improvement. In 2018, plans to enrich data content, build search and visualization tools, and establish data links with other Platforms and/or AFS CRPs will provide major incentives for new partners and users to participate in Genesys and promote further use of crop diversity in breeding and crop improvement. Software and web tools resulting from the work will be made available under open access licenses.

Research papers, policy briefs, conservation protocols, training materials, written submissions to international policy fora, will be made publicly available through the Platform's website or open access journals and in conformance with the CGIAR Open Access and Data Management Policy.

2. Planning for Platform Effectiveness and Efficiency

2.1 Platform Staffing in 2018

The main issue concerning staff in 2018 is succession planning at a senior level. Four new genebank managers are being hired in 2018 to replace long-serving staff (in CIP, IRRI, ICRISAT, and ILRI). Additional highly experienced staff are also being replaced because of retirement (e.g., in IRRI, CIMMYT, CIAT). Of particular note, is the establishment of AfricaRice in Cote D'Ivoire, which has required an almost complete replacement of staff except for the manager and three key positions. QMS is allowing the genebanks and GHUs to prepare for staff changes by ensuring that processes are adequately documented and staff are trained. The Platform will provide capacity building opportunities in 2018 to support new staff through exchange visits, expert visits and virtual meetings. The Policy Module will provide capacity building support on the use of the Standard Material Transfer Agreement, targeting new staff and specifically new managers. The new managers may not have the wealth of knowledge of the collections or of conservation practice and legal obligations, but they bring skills in modern technologies. This will, no doubt, have a generational impact on the Platform and usher in a degree of change and new thinking.

2.2 Financial Plan for 2018, including use of W1/2

Funding follows the Genebank Platform proposal. See Tables D and E.

2.3 Collaboration and Integration

2.3.1 New Key External Partnerships

The Genebank Platform is planning to enter into new partnerships with the following collaborators:

- **Aarhus University:** Collective activities to systematically improve seed longevity across all Centers is proposed to be managed in a partnership with Aarhus University in Denmark, who will provide the scientific expertise. Contract details are currently under discussion.
- **EMBRAPA:** In November, the annual meeting of Genebank Platform staff and partners will take place in Fortaleza in Brazil in conjunction with the Fifth Brazilian Conference on Genetic Resources. Plans are being developed to ensure the active participation of CGIAR in the Brazilian Conference and vice versa.
- **Secretariat of CBD/Nagoya Protocol:** Through the Policy Module, CGIAR will develop awareness raising and guidance materials for compliance with the Nagoya Protocol in collaboration with the CBD. A joint training workshop for ITPGRFA and Nagoya Protocol national focal points from 11 countries will be hosted at CIP, September 2018.

- **International Plant Protection Convention (IPPC)**: Meetings in 2018 with the IPPC Secretariat in the FAO will initiate a closer collaboration with the CGIAR and discussions towards facilitating the CGIAR's role in the distribution of germplasm internationally.

Table 1 describes specific examples of partnerships between individual CGIAR genebanks and external partners planned for 2018.

Table 1. New partnerships between individual CGIAR genebanks and external partners planned for 2018

Center	External	Details
Bioversity	Millennium Seed Bank, UK	Collaboration on physiological trait studies including seed germination.
	Botanical Garden of Meise, Belgium & KULeuven	Joint collecting and population genetics studies.
CIAT	University of Minnesota	Discussions with the University of Minnesota to develop a project proposal that uses genomics tools to integrate and mobilize information along genetic-value chains connecting genebanks, breeding programs, seeds systems and farmers.
CIP	INIA, Potato Park	At least three Andean communities where potato has been repatriated will be visited to better understand the interest and impact of repatriation. Collaborations with partners involved in the conservation of ARTCs for developing *in vitro* methods for conserving arracacha and achira, and improving oca *in vitro* conservation.
	Santa Maria Catholic University, Arequipa-Peru	Collaboration with Santa Maria Catholic University, Arequipa- Peru as a part of the Project "Isolation and structural elucidation of the predominant glucosinolates in Peruvian accessions of Mashua (*Tropaeolum tuberosum*) and determination of antifungal activity *in-vitro*".
CIMMYT	INIFAP, Mexico	Maize landrace rescue project in Jala, Nayarit.
ICARDA	IPK-Germany, China	Collaboration with partners for genotyping barley accessions.
ICRAF	Various national partners	Optimization of pathogen testing protocols.
ICRISAT	Niger, Zimbabwe, Various national partners	Development of a sustainability strategy for regional collections in Africa, including capacity building and database integration.
IITA	Tanzania, Kenya and Rwanda	Collection, DNA fingerprinting, and cleaning of unique cassava germplasm in collaboration with national partners.
	University of California, Riverside	Genotyping of cowpea core collection using the iSelect platform.
ILRI & CIAT	Various national partners	Development of tools (SoFT) for the identification of forages genetic resources for breeding and selection.

2.3.2 New Contributions to and from CRPs:

Genebanks foster strong linkages and supply data and germplasm to respective crop research communities both inside and outside the CGIAR (see Table 2). GHUs, likewise, provide key phytosanitary services to both genebanks and AFS CRPs. The following new areas of work in 2018 are helping to enhance interactions and collaborations with CRPs:

- **DOIs**: The use of DOIs facilitates the sharing of data generated in the evaluation of accessions between research and genebank communities. Hence, the support of AFS CRPs is key to ensuring the widespread adoption of DOIs beyond the genebanks. Bioversity, CIMMYT, CIP

and IRRI are playing roles as "frontrunners" in engaging breeders and research programs to adopt DOIs and share data with genebanks.

- **Gap analysis:** Efforts are under way to consult with a small number of pre-breeders in several crops (tentatively beans, barley in 2018) to ascertain where demanded traits or germplasm are missing from existing genebank collections. Proposed traits that are likely to have a strong relationship with environmental or climactic factors are chosen for analysis and a geographical map is developed to help postulate where materials possessing such traits may potentially be found *in situ*. The "trait maps" help to identify existing accessions for evaluation or suggest locations for collecting.
- **Germplasm Health Units:** GHUs are improving phytosanitary and indexing protocols for seed and clonal crops, aiming to establish a globally accepted health certification procedure (Greenpass) for rapid distribution of germplasm. Non-invasive diagnostics are being pursued for seed health testing of grain crops (wheat, maize, rice, and legumes) to reduce the operational time and cost of testing. Technology transfer to NARS is a key component realized through workshops planned in Ghana, Nigeria, and Nairobi. The indexing and phytosanitary protocols improved by the work of the Genebank Platform will also feed directly into disease surveillance and seed system work by AFS-CRPs.
- **Policy Module:** The Plant Genetic Resources Helpdesk (PGR Helpdesk) will be promoted in 2018, and exchanges facilitated with the aim of providing support to all relevant CGIAR staff members in their day-to-day encounters with genetic resources policy (e.g. using the SMTA, making curation decisions on the collections, etc.).

Table 2. Some of the genebank and CRP collaborations planned in 2018

CRP	Details
FTA	Collaboration on the generation of accessions' characterization/evaluation data and use of subsets to promote the use of the collection. (ICRAF)
GLDC	Development of Focused Identification of Germplasm Strategy (FIGS) and FIGS subsets for evaluation. Collaboration on pre-breeding activities through interspecific crosses in wheat, barley, grass pea, chickpea and lentil. (ICARDA)
	Collaboration with cowpea and soybean breeders to evaluate drought and heat tolerance. (IITA)
	Identification of germplasm from the global and regional collections with superior and/or novel traits through FIGS and evaluation of mini core subsets. (ICRISAT)
Wheat	Collaboration on shared priorities with the wheat genebank: (CIMMYT) • Baking & nutritional data for bank accessions available in GRIN-Global; • Bank / Wide Crosses / Pre-breeding / Breeding meeting; • Imputation of DArTseq to breeder prioritized genes; • Connectivity of DArTseq platforms with GRIN Global; DArTseq genotyping; • Data visualization; Enhancing access to molecular data of conserved acccessions; • IWIN evaluation data for conserved accessions; • Linking databases with GRIN-Global via BrAPI; Phenotyping for priority traits; • SNP profile & query builder; • Subset identification; • Targeted access to germplasm. • Predictive, virtual phenotyping (2NS); Alignment/Blast of DArTseq tags to alternative sequences.
Livestock	Creation of focal subsets, encouraging users to focus in-depth phenotyping and genotyping on common subsets of accessions. Napier grass (enhanced WUE) subset will be under development in 2018 and core collections for *Chloris gayana* and *Cenchrus ciliaris* will be genotyped using GBS. (ILRI)
Maize	Screening of landrace derived pool of germplasm. (IITA)
Rice	Distribution and evaluation of mini-cores and development of data management tools to integrate searches of phenotypic and molecular data responding to breeders' expressed needs. (AfricaRice)

CRP	Details
	Closer collaboration between the genebank and others in the RICE CRP through the new theme -- "Harnessing Genetic Diversity to Accelerate Impact". The goal is to create and deliver the knowledge, the material and the tools required to help rice breeders overcome the constraints that are preventing them from making effective use of the genetic diversity of rice. (IRRI)
RTB	Joint efforts for the dissemination of RTB-developed decision support tools to prevent the spread of emerging viruses such as BBTV. These will be implemented through capacity development initiatives targeting national plant protection organizations (NPPOs) in selected countries. (GHUs)
	Identify, curate and connect historical evaluation data to genebank accessions and databases, working also with pedigrees to establish linkages. (CIAT)
	Seed germination studies and seed cryopreservation protocol development. (Bioversity)
	Combining *in situ* and *ex situ* approaches to characterisation of yam germplasm in Benin. (IITA)

2.3.3 New Cross-Platform Interactions

The Genebank Platform supports flow of information, tools and skills between genebanks and genebank users. Coordinated approaches to genotyping and phenotyping, and standardization of methods and tools, through the Excellence in Breeding (EiB) and Big Data Platforms, is empowering the Use Module to help increase the chances that big data generated by the AFS CRPs and other Platforms will be directly linkable to genebank databases.

A priority area of collaboration with the EiB Platform in 2018 is the adoption and implementation of DOIs as a common standard to uniquely and permanently identify germplasm and facilitate interoperability. The use of DOIs will increase the ability of genebanks and germplasm users to track where accessions have proved useful in breeding and research and help inform future users. In 2018, interactions in the EiB Platform Module Expert Advisory Groups will be intensified particularly in genotyping and sequencing to ensure that outputs geared towards improving breeding programs in the CGIAR also benefit genebanks and enhance the use of germplasm.

Other opportunities for interaction will be explored, for example on the possible integration of blockchain technology with DOIs through a joint initiative with Big Data and EiB Platforms and the International Business Machines Corporation (IBM). Numerous areas of mutual interest between EiB and the Genebank Platform (listed in Table G) are the focus of discussion and planning in the EiB Advisory Groups in which genebank representatives participate. In particular, it is increasingly recognized that strong links between the Use Module and pre-breeding activities supported by EiB are essential to effectively use genetic diversity within CGIAR breeding programs.

The newly formed, 12-member, CGIAR Genetic Resources Policy Working Group, which is convened by the Policy Module, includes representatives from Big Data and EiB. The Working Group will meet in person for the first time in March 2018. It will also meet virtually later in the year. Meanwhile, individual members, including representatives from EiB and Big Data will be engaged in the development of Policy Module outputs as endorsed by the Working Group.

2.3.4 Expected Efforts on Country Coordination

The genebanks and GHUs have a particularly strong relationship with national genebanks and phytosanitary agencies in their host countries, as well as other institutes within their regions. This would be the obvious basis by which genebanks and GHUs would contribute to country coordination.

2.4 Monitoring, Evaluation, and Learning

A. CGIAR IEA evaluation

An Independent Evaluation Arrangement (IEA) commissioned study on the "Evaluation of the CGIAR research support program for Managing and Sustaining Crop Collections: Genebanks CRP" was published in April 2017. The report listed several recommendations with implications to the activities of the Genebank Platform. Table 3 lists relevant action points for 2018 resulting from the recommendations.

Table 3. 2018 plans to address CGIAR IEA recommendations

CGIAR IEA recommendations	Comments
Recommendation 3. Given the shortcomings in the original Costing Study, and despite difficulties encountered earlier, the Genebank Platform management should give high priority to revisiting the Parity Study to establish realistic and transparent budget for each Center genebank.	Updated costing study started with IRRI in 2017 and will continue in 2018 with 7 Centers.
Recommendation 6. The Crop Trust should incentivize and empower the Genebank Platform management to promote the Platform independently from the Crop Trust's own communications, in order to ensure that a comprehensive communications strategy is developed to promote the visibility and accountability of the Platform and the CGIAR genebanks.	New website was launched in 2017 (https://www.genebanks.org). With a new Science Communications Specialist, our communication strategy is being implemented to enhance visibility of the CGIAR Genebank Platform.
Recommendation 7. Given that the Quality Management System (QMS) has become a key mechanism for enhancing Genebank operations, the Genebank Platform should build on this success by: • Compiling lessons learned from QMS to operationalize the FAO Genebank Standards into easily implementable approaches and procedures, and report regularly to the FAO Commission on their use which would help genebanks worldwide to enhance their performance; • Determining, at the earliest opportunity, if external validation of QMS is needed and if so, what form it should take, and to whom such a validation role might be assigned.	QMS audits will continue in 2018 to validate genebank documentation on 3 core operations: • regeneration and characterization • conservation • acquisition
Recommendation 8. Use of germplasm for research and crop improvement requires access to germplasm that has been adequately characterized and evaluated for resistance to and tolerance of biotic and abiotic stresses. In its future data development efforts, the Genebank Platform management should: • Enhance linkages between genebank characterization and breeders' evaluation and pedigree data; and • Expand the utility of GRIN-Global more specifically for in vitro collections.	The Genebank Platform through the "Use Module" promotes more effective access and use of germplasm through the following activities in 2018. • Minting of DOIs • Integration with EiB and AFS CRPs • Further development of Genesys • Enriching data on collections through focal subsets

B. Costing review

A new costing review started in late 2017 with a visit to IRRI to collate data on routine costs for genebank operation. In 2018, site visits by economics/finance consultants to seven genebanks are planned to gather new data on operational costs. The results of the analysis will feed into a technical and financial review of the budgets to support the efficient operation of the 11 CGIAR genebanks in the long term.

C. Genebank Impacts Workplan

The Genebank Impacts Workplan will document and increase awareness of the value of genebanks' work. Five early career young professionals will be recruited in 2018 to help deliver a set of impact

products and to strengthen user feedback surveys within a six-month fellowship program. Work will be undertaken in partnership with the CGIAR genebanks.

D. Quality Management Systems

QMS strengthening continues within individual genebanks, GHUs and the Platform as a whole with support from a QMS specialist through intensive training, template sharing, audits and workshops. The Crop Trust is supporting the FAO in the development of guidelines to implement international genebank standards, involving a number of CGIAR genebank staff and NARS partners.

3. Platform Management

3.1 Management of Risks to Your Platform

A major discussion in the genetic resources community concerns the sharing of benefits arising from the use of sequence data associated with genebank accessions. The Policy Module submitted a detailed paper, which has been widely referenced, on the benefits of genetic sequencing to the conservation and use of genetic resources to the Secretariat of the Convention on Biological Diversity in 2017. The debate risks undermining positive developments in the implementation of the ITPGRFA, as well as any public-funded initiative to sequence genebank collections and make data available. The topic will be an agenda item at the SMB's April meeting and discussions will continue to be monitored by the Policy Module.

3.2 Platform Management and Governance

No important changes in management or governance of the Genebank Platform are expected in 2018.

TABLES

Table A: Planned Milestones

Module	Outcomes	Planned 2018 milestones	W1/2	W3/ bilateral	Risk	Means of verification
Module 1: Conservation	Outcome 1.1 Disease-free, viable, documented germplasm made available	1. 80% accessions available 2. 60% seed accessions safety duplicated 3. 75% clonal accessions safety duplicated 4. 80% relevant requests met	10.18m	9.06m	L	Annual report to the Genebank Online Reporting Tool (ORT)
	Outcome 1.2 Crop diversity conserved in a rational and effective global system	5. 40 SOPs in place and 20 audited 6. 500 accessions successfully introduced into cryobanks 7. Diversity trees developed representing 14 crop genepools 8. 20 NARS staff involved in capacity building events	8.06m	0	L	Annual report to the Genebank ORT; QMS audits; meeting & workshop reports
Module 2: Use	Outcome 2: More effective access and use of germplasm enabled	9. 100% accessions with DOIs 10. One new subset for defined users developed in each genebank	1.31m	0	L	Annual report to the Genebank ORT; Genesys integration
Module 3: Policy	Outcome 3: Supportive policy environment developed	11. CGIAR guidance document on transferring PGRFA under Development and ITPGRFA products 12. CGIAR contributions to four intergovernmental meetings under the rubric of the CBD/Nagoya Protocol and the ITPGRFA.	0.81m	0	L	Meeting reports, white papers

Table D: Platform Staffing

Center	Total staff		IRS		Female	
	FTE	Number	FTE	Number	FTE	Number
AfricaRice	22.0	22	1.0	1	8.0	8
Bioversity	12.1	20	0.5	1	4.5	8
CIAT	87.4	89	4.1	6	32.0	33
CIMMYT	21.4	24	1.5	2	3.6	5
CIP	78.0	83	6.5	8	36.7	40
ICARDA	27.0	28	5.0	5	6.5	7
ICRAF	15.7	39	2.6	13	6.0	13
ICRISAT	49.0	49	1.0	1	8.0	8
IITA	49.0	49	4.0	4	15.0	15
ILRI	30.8	32	1.3	2	12.0	12
IRRI	39.2	40	1.4	2	25.0	25
Policy Module	1.7	3	1.2	2	1.0	2
Crop Trust	6.4	10	5.6	8	4.5	6
Total	**439.5**	**488**	**35.6**	**55**	**162.9**	**182**
% of Total	**-**	**-**	**8%**	**11%**	**37%**	**37%**

Notes: Based on 2017 staffing. IRS=Internationally recruited staff. FTE=Full Time Equivalents.

Table E: Platform Planned Budget

Expenditure Area	Planned budget 2018 (in $ million)			Comments on major changes
	W1/2	W3/ bilateral	Total	
Module 1	18.24	9.06	27.30	No changes
Module 2	1.32	0	1.32	
Module 3	0.81	0	0.81	
Platform Management and Support Cost	0.69	0	0.69	
Platform Total	**21.06**	**9.06**	**30.12**	

Table F: Main Areas of W1/2 Expenditure

Expenditure area	Estimated percentage of total W1/2 funding in 2018	Comments
Core conservation costs (operations, optimization, equipment, cryobanking, etc)	**87%**	
Promoting use of diversity (data integration, subsetting)	**6%**	
Capacity development	**11%**	
Monitoring, learning and self-evaluation	**3%**	
TOTAL FUNDING (in $ million)	**21.06**	

Table G: New Internal (CGIAR) Collaborations between the Platform and Programs and among Platforms

Name of CRP or Platform	Brief description of collaboration and value added	Relevant Module
AFS CRPs & EiB	Adoption of Digital Object Identifiers (DOIs) to harmonize the identification of plant genetic resources in research and breeding	Use & EiB Module 5
Big Data and EiB	Blockchain technology and implementation of DOIs to improve tracking germplasm use	Use
EiB	Discussions focus on the following areas for closer collaboration: • Facilitated access to genotyping services, particularly DArT • Closer links between activities of the Use Module and pre-breeding within EiB (e.g. joint workshop). • Learning on digitisation, e-data recording, barcoding and data management. • Automation of phenotyping, including NIRS, HarvestMaster and XRF analysis and sample preparation for evaluation and characterisation. • Mechanisation of farm practices (e.g. land prep, weeding and harvesting). • Remote sensing, drone-based phenotyping (measurements including LAI, crop stand, flowering date, crop growth curve, estimated yield).	Use
CGIAR wide	CGIAR Genetic Resources Policy Working Group to ensure compliance and engagement in shaping international genetic resources agreements.	Policy

Table H: Planned Monitoring, Evaluation, and Learning Exercises

Planned studies/learning exercises in 2018	Comments
Costing review	Updated costing study started with IRRI in 2017 and will continue in 2018 with 7 Centers.
QMS audits	QMS audits will continue in 2018 to validate SOPs and ensure their conformity to international standards.
Genebank Impacts Workplan	5-6 Fellows will be recruited in 2018 to work on individual genebank impact tracking and enhancing the documentation of genebank value.