

## System Level Review of Genebank Costs and Operations September 2020

### Paper 2b: Genebank Platform

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*This paper is compiled by the Genebank Platform Management Team to argue that it is logical and efficient to include and maintain a platform for coordinating CGIAR Centers’ genebank-related activities within the One CGIAR architecture including a Policy Module and Germplasm Health Units. The first part of the paper highlights six common conditions shared by CGIAR genebanks which make it more efficient for the genebanks to work together than to work in separation from one another or mainstreamed into other research and development programs. The next part of the paper highlights how the current CGIAR Genebank Platform already functions in the spirit of One CGIAR and argues that One CGIAR should build upon the successes of the Genebank Platform, rather than replace it with something entirely new. The final two parts give more details on the Policy Module and group of Germplasm Health Units.*

#### Why it makes sense to include a genebank platform as part of One CGIAR

##### **A. Common conditions that require efficient, system-wide coordination**

It makes sense to govern and coordinate activities of the CGIAR genebanks through a single mechanism under the framework of One CGIAR because they share the following common, individuating characteristics and conditions. One, they provide common service functions within the CGIAR and for the international community. Two, they must address common technical challenges in their day-to-day work. Three, they share a common dependence on long term, sustainable funding in order to uphold basic conservation of these collections. Four, they are subject to common international governance mechanisms and legal obligations. Five, they are subject to common performance targets and monitoring mechanisms. Finally, six, they share the common ability to severely damage the reputation of the entire CGIAR if they make mistakes. We address each of these issues in more detail in the following paragraphs.

### *1. Common service functions*

In general, the CGIAR genebanks support the research and development activities of other users, both inside and outside the CGIAR, by providing healthy germplasm and related information. CGIAR genebanks distributed approximately 97,000 PGRFA samples in 2018 (60% of that was to users outside CGIAR). Recipients outside CGIAR included advanced research institutes and universities (32%), NARS (50%) and to farmers and the private sector (10%) in 87 countries. In 2017 the CGIAR genebanks distributed 109,339 samples. The role of CGIAR genebanks as conservers and providers of crop diversity has been steadily documented in the scientific literature<sup>1</sup> (e.g. Lawrence, 1975; Evenson and Gollin, 1997; Johnson et al. 2015; Galluzzi et al. 2016).

This service function, while critical in support of all five objectives of One CGIAR, cannot be monitored and measured in terms of regular CGIAR research outcomes and impacts. There is a danger that holding genebanks' services to a rolling demonstration of development impact will ultimately lead to a series of short-term decisions to decrease investments in the genebanks, which will ultimately undermine the viability of the genebank collections.

Furthermore, it is critically important to note that more than half of the genetic materials distributed by CGIAR genebanks is to recipients outside the CGIAR, primarily to public sector agriculture research and development organizations in developing countries and countries with economies in transition. And the demand for materials in the CGIAR genebanks from non-CGIAR Centers is growing. This service-providing to the international community is not a charitable act. It is an international legal obligation that is inextricably linked to the CGIAR's privileged position to be recognized as international organizations, as will be highlighted in subsection 4 below.

### *2. Common technical challenges*

CGIAR genebanks face a number of common technical challenges in their daily work that they can more efficiently address together, for examples: developing common information systems for sharing information about the materials in their collections; tracking information on use of their material, developing common methodologies for analysing the structure and completeness of their collections (gap analysis, etc); coordinating collecting missions for different crops in the same countries; implementing quality management systems for the genebanks and the germplasm health units; developing best practices for ensuring seed longevity; developing protocols for conservation, regeneration, viability testing; optimizing practices and capacities for long term conservation of clonal and recalcitrant seed crops; developing best practices for ensuring conserved and distributed germplasm is in good health, free from quarantine pests and diseases; and developing internationally acceptable standards and processes for rationalizing collections in ways that preserve their value, but lowering their maintenance costs.

### *3. Common dependence on long term, sustainable funding*

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<sup>1</sup> **Robert E. Evenson and Douglas Gollin.** 1997. Genetic Resources, International Organizations, and Improvement in Rice Varieties. *Economic Development and Cultural Change* 1997 45:3, 471-500  
**Lawrence, E.** Future in the past. *Nature* 258, 278–279 (1975) doi:10.1038/258278a0  
**N.L. Johnson, D. Pachico and O. Voysest.** 2005. The distribution of benefits from public international germplasm banks: the case of beans in Latin America. *Agricultural Economics*, 29 (3)  
**Galluzzi, G., Halewood, M., Noriega, I.L. et al.** 2016. Twenty-five years of international exchanges of plant genetic resources facilitated by the CGIAR genebanks: a case study on global interdependence. *Biodivers Conserv* 25, 1421–1446.

Genebanks require long term, stable funding. Fluctuations in levels of support from year to year will result in the loss of materials which can never be replaced. It is therefore untenable to require CGIAR genebanks to enter into competition for zero-sum reallocations of funds with CGIAR research and development programs.

It was for precisely this reason that the international community, in the form of the Governing Body of the Plant Treaty, endorsed the creation of the Global Crop Diversity Trust and made it an essential element of the Treaty's Funding Strategy. It is also the reason that the CGIAR SC agreed to 'ring fence' additional funds from W1 and W2 to ensure the CGIAR genebanks had requisite, stable support under the framework of the Genebank Platform.

The Trust's endowment fund is now at approximately 300 million USD, generating up to 10 million USD/year, much of which could be dedicated to support the CGIAR genebanks. While significant, the endowment is below predicted levels, with the result that additional 'ring fenced' funds are still required from windows 1 and 2.

#### *4. Common international governance mechanisms and legal obligations*

Each of the eleven Centers hosting genebanks have signed identical international agreements with FAO (1994) and the Governing Body of the Plant Treaty (2006) which cumulatively create legal obligations on those Centers to

- maintain the ex situ collections in their genebanks "in trust for the benefit of the international community, in particular the developing countries"
- "manage and administer these ex situ collections in accordance with internationally accepted standards"
- provide facilitated access to natural and legal persons around the world to those collections on terms and conditions established by the Plant Treaty and its Governing Body
- accept policy guidance for the management of those collections from both the Governing Body of the Plant Treaty and the Commission on Genetic Resources for Food and Agriculture
- be subject to (very public) dispute resolution procedures in the event that anyone alleges the centers have not fulfilled their legal obligations with respect to the management of the in trust collections or center improved materials derived from those materials

The CGIAR Centers manage their relationships with the Governing Body in a collective manner. They develop and submit single harmonized reports in the name of CGIAR to the Governing Body of the Plant Treaty concerning the execution of their responsibilities under their international agreements. When the Governing Body has concerns, it has requested responses and inputs from CGIAR as a whole (as well as from individual Centers in some cases). This has happened in the past with respect to materials being distributed by Centers' genebanks without the proper standard material transfer agreement or with respect to Centers' restrictive licenses and intellectual property applications for improved germplasm derived from in trust materials.

In addition, to be subject to international laws directly governing their management and distribution of genebank and breeders' materials, the Centers are also subject to national and international laws concerning the materials they may want collect to include in their genebanks. Compliance with those laws can be complicated and resource consuming. CGIAR genebanks can pool (and are pooling) their

resources to address legal compliance issues for collecting missions in multiple countries for multiple crops.

5. *Common performance targets and monitoring mechanisms*

Over the course of the Genebank CRP (2012-2016) and the Genebank Platform (2017 - present) the Centers, in cooperation with the Crop Trust, have developed increasingly detailed and useful performance targets and performance monitoring systems for the CGIAR genebanks. These targets and monitoring systems are harmonized across the genebanks. Of course, it will take some Centers longer to reach those targets depending on the types of crops they work with. Performance information can and should be collectively pooled to facilitate cross-center, cross-crop comparisons, to assess the collective performance of CGIAR as a whole, and to be able to demonstrate that CGIAR Centers are fulfilling their obligations under their international agreements referred to under subsection 4 above. To move forward into One CGIAR by developing separate performance targets and monitoring systems for each Center's genebank would be to undo decades of collective work to promote efficiencies and transparency for the international community.

6. *Common reputational risk*

The eleven Article 15 Centers have made identical international-level commitments to maintaining the *in trust* collections at international standards, and to subject themselves to the policy guidance of the Plant Treaty's Governing Body. All CGIAR Centers' reputations – when it comes to germplasm health -- are inextricably intertwined. If one Center distributes diseased germplasm – all of the Centers will suffer reputational damage. If one CGIAR Center breaks the access and benefit sharing rules under the Treaty or appears to break those rules – all of the Centers will suffer reputational damage. Indeed, this has already occurred, when a complaint against two Centers in 2013 (when genetic resources policy compliance was not part of the Genebank CRP) catalyzed a series of uncomfortable reputation damaging investigations by the Governing Body and the Treaty Secretariat of all Centers' germplasm management practices. In the eyes of the international community, the eleven Centers with international agreements under the Plant Treaty are one entity. In fact, we are increasingly communicating that message about ourselves. If the genebanks are separated, mainstreamed into other CGIAR research programs, lose track of one another, and fail to take advantage of pooled resources to address common challenges, the risk of genebanks not living up to international standards will increase.

**B. Relevant experiences and lessons learned under the CGIAR Genebank Platform, 2017-2019 inclusive**

The CGIAR Genebank Platform has been operating since 2017. The vast majority of its resources are dedicated to conservation of the genebank collections, subject to the performance targets and monitoring mechanisms mentioned above. So far, one Center, IRRI has met the performance targets, and thereby qualified to receive a "long term partnership agreement" with the GCDT for an 'in perpetuity' contribution from the endowment of a substantial portion of the total running costs of the genebank. It is anticipated that some other Centers will be similarly qualified for such agreements over the course of the next two years.

In response to recommendations of the external review of the Genebank CRP (2012-2016), the Genebank Platform also supports coordinated system-wide capacity building for the Centers' germplasm health units, and a Policy Module. This represents the first time in CGIAR history that there has been support for CGIAR system-wide coordination among the Centers' germplasm health units. The germplasm health units have been historically subject to unstable levels of support, as the genebanks were prior to the Genebank CRP and Platform. It makes sense to include coordination and capacity building and networking between GHUs as part of a genebank platform under the framework of One CGIAR.

The Genebank Platform's Policy Module is dedicated to building Centers' compliance with genetic resources policies and laws, and to coordinating CGIAR participation in international policy making meetings of the Plant Treaty, Convention on Biological Diversity and the FAO Commission on Genetic Resources for Food and Agriculture. The Policy Module reports regularly to the Article 15 Centers' DGs and the System Management Board, to provide relevant updates on the state of Centers' compliance with policies and laws, and to receive guidance on policy positions to advance in the name of CGIAR at international policy meetings. The concept of embedding system wide genetic resources policy work in the genebank platform has been successfully proven. The Policy Module's efforts have been widely appreciated, both within and outside the CGIAR.

The Genebank Platform has a third module, dedicated to enhancing the use of materials in the CGIAR genebanks by CGIAR breeding programs and other external users. Over the last 3 years, the module has supported creation of GLIS-DOIs for germplasm (DOIs under the Global Information System on Plant Genetic Resources established by the International Treaty on Plant Genetic Resources), , incorporation of said GLIS-DOIs into distribution documentation, compiling evaluation data into open access databases to provide users additional information to choose accessions, empowering genebank clients with intuitive, user-driven query tools (Genesys and GRIN Global), create subsets to promote utilization of specific germplasm, conduct multi-crop, multi-Center genotyping initiatives, etc.. The boundary between genebanks' conservation and breeders' (and others') use of conserved materials has always been indistinct. It is possible, under the One CGIAR framework, that current Use Module-related work under the Genebank Platform could be further advanced under other One CGIAR research and development programs, depending on the strength of linkages between the genebanks and those programs (recalling, again, our international commitments to making those materials available to users worldwide).

The Genebank Platform already operates in the spirit of One CGIAR and has been operating this way for the last 10 years. The genebanks are united and harmonized due to germplasm health, policy, conservation, and several communities of practice include clonal, seed quality management, QMS, data, and gap analysis. One CGIAR should build upon the successes of the Genebank Platform, rather than replace it with something entirely new.

## Genebank Platform Policy Module

### **C. International genetic resources policy-related negotiations with high potential impact on CGIAR**

In this section we highlight issues that will be addressed over the next 2-5 years at international levels that could have profound effects (positive or negative) on the CGIAR Centers.

1. *Negotiations to enhance the Plant Treaty's multilateral system of access and benefit sharing*

These negotiations were launched in 2013 and were suspended without achieving any agreement in November 2019. The Centers signed agreements with the Plant Treaty's governing body to manage their collections under the Plant Treaty's framework, including the multilateral system. Since 99% of the PGRFA distributed by CGIAR genebanks and breeders are through the multilateral system (under the standard material agreement - SMTA), as well as most of the PGRFA they acquire, revisions to that system will impact on Centers' operations. Contracting parties are currently meeting informally to discuss options for formally relaunching the renegotiating process at the next meeting of the Governing Body in late 2021. If relaunched, it is likely the negotiations will at least another two additional years. [During the negotiations up to 2019, CGIAR made many interventions promoting policy positions and textual changes to enhance policy support for international agricultural research and development and the improved functioning of the multilateral system overall. Most of these were well received and broadly adopted. It is essential that the Centers engage in future negotiations to protect gains already made, and to ensure that new proposals actually help, and do not undermine, the work of CGIAR.]

2. *Negotiations concerning benefit-sharing from the commercial use of digital genomic sequence information*

Perhaps the most significant point of disagreement leading to the suspension of negotiations to enhance the Plant Treaty's multilateral system concerned whether there should be mandatory sharing of monetary benefits derived from the commercial use of digital genomic sequence information (DSI). The same issue is being addressed by the Conference of the Parties to the Convention on Biological Diversity and its Nagoya Protocol., and also the FAO CGRFA over the course of the next 3 years, probably longer. All of these processes are interlinked. The progress and outcomes of CBD/COP and subsequent CBD negotiations will influence how DSI gets addressed in the re-launched negotiations to enhance the multilateral system and by the FAO CGRFA. Meanwhile, CGIAR Centers' practices generating, sharing, using DSI – particularly DSI derived from the genebank collections – is already subject to considerable scrutiny, with some countries representatives saying Centers should not publicly share DSI associated with the international collections public (because it facilitated biopiracy) and others insisting that we should always do so (in the name of global public goods, open source science). [For CGIAR, it is essential that norms developed to promote benefit sharing should not interrupt the ability of R&D organizations to generate, share and use DSI derived from PGRFA. To this end, it would be most effective to build upon the architecture of the multilateral system, so that monetary benefits derived from use of DSI can be shared through multilateral mechanisms already established under the Plant Treaty framework.]

3. *The Plant Treaty's Governing Body scrutiny of CGIAR Centers' intellectual property applications and restrictive licenses for improved PGRFA*

At the Plant Treaty's Seventh Session of the Governing Body in 2017, a number of contracting parties and observers expressed concern about some CGIAR Centers' seeking intellectual property rights and subjecting their PGRFA-related research outputs to restrictive licenses. This culminated in Governing

Body Resolution 4/2017, which requested CGIAR to provide reports concerning Centers' compliance with the CGIAR Principles for the Management of Intellectual Assets, particularly with respect to intellectual assets derived from PGRFA accessed from the multilateral system of access and benefit sharing. Since 2017 the Genebank Platform Policy Module has worked with individual Centers and the SMO to generate and share information of relevance to the Governing Body, and to develop a submission to the 2019 Governing Body meeting to respond to Resolution 4/2017. The outcome of the 2019 meeting was largely positive, but the Governing Body called on CGIAR to continue providing relevant information. It will be critically important for maintaining the reputation of CGIAR for Centers to continue generating, and sharing, information online, through the annual CGIAR reports on the Management of Intellectual Assets, and future reports submitted directly to the Governing Body. While the licenses and IP application concern Centers improved germplasm, they usually incorporate materials received from the genebanks, which is the source of the obligation to respect Treaty rules and the Governing Body's scrutiny/guidance. So, this is an issue that cuts across the management of the germplasm by both the genebanks and the breeders.

#### *4. Additional issues addressed in international fora*

Additional genetic resources policy issues and related processes of high potential relevance to the CGIAR Centers over the next few years include development of the: Plant Treaty's Global Information System on PGRFA (which includes information from the CGIAR genebanks); the CBD's Post 2020 Global Biodiversity Framework (which will include goals and targets related to conservation and sustainable use of PGRFA and access and benefit sharing).

##### *A. Ensuring Centers' compliance with international, national and CGIAR policies*

National implementing mechanisms related to the CBD, Plant Treaty and Nagoya Protocol are still woefully under-developed, creating uncertainties and 'grey areas' for CGIAR scientists in their daily work accessing genetic materials from ex situ conditions, or for new collecting missions. Centers have to be able to demonstrate they are compliant with all laws and policies that exist, and to be operating in the spirit of the CBD, Nagoya Protocol and Plant Treaty where they do not, being careful to developing a 'paper trail' to be able to demonstrate good faith and due diligence when acquiring, using, and distributing PGRFA and related information. Uncertainties are growing as countries have just started to develop measures related to DSI. As the section on Resolution 4/2017 above underscores. There is a critically important interplay between CGIAR policies (for example, the Principles on the Management of Intellectual Assets) and national and international laws. There is an ongoing, rolling need for awareness raising, and capacity building for CGIAR genebank staff, breeders and research managers to ensure they are in compliance with the letter and spirit of international and national laws and CGIAR policies. [Under the Genebank Platform, the Policy Module has developed a number of mechanisms for reaching out to, and engaging CGIAR staff from genebanks, breeding programs, legal and IP management departments. These mechanisms include the CGIAR GR Policy Helpdesk, regionally based training workshops for Centers' scientists (and NARS partners), guidelines, and policy statements. It has also established regular reporting to the SMB and Article 15 DGs. These mechanisms need to be continued from 2021 onwards. Under the COVID crises the Module has started developing distance learning modules which should be very useful post 2021.]

As efforts to increase the efficiency and effectiveness of CGIAR genebank operations in the context of the FAO Global PGRFA System continue, Centers will need to start making more regular, systematic

choices about what accessions to continue to invest in conserving, and which to archive, and eventually delete from the collections. Policies and practices adopted by the CGIAR genebanks in this regard must be informed by, and compliant with, the Centers' obligations under their 1994 FAO-CGIAR In Trust Agreements and their 2006 'Article 15 agreements with the Plant Treaty's Governing Body, wherein, among other things, they agree to accept the policy guidance provided by the CGRFA and the Plant Treaty's Governing Body. The Genebank Platform has developed a draft policy guidance note addressing these issues which will be presented for adoption by the CGIAR General Assembly and SMB (and possibly One CGIAR). Centers will likely need technical assistance to ensure they comply with the guidance note on a case by case basis. Of course, if there are mergers of Centers and genebanks in pursuit of further efficiencies, it will be essential that they be undertaken in compliance with these international agreements (and other applicable laws).

#### B. Promoting development of supportive policies in partner countries

Given the importance of supportive policies, it is logical that CGIAR Centers should continue to support national partners in the development of national policy frameworks. One particularly important focus of such work is to provide capacity building for national implementation of the Plant Treaty. Over the last 6 years, this work has been coordinated with the Plant Treaty Secretariat and FAO as part of a Joint Capacity Strengthening Programme that has been endorsed by the Governing Body of the Plant Treaty.

In the context of national policies, it is important to note that two countries that host CGIAR genebanks are currently imposing policy/procedural requirements that are interfering with those Centers' ability to execute their responsibilities under the Article 15 Agreements with the Plant Treaty's governing body. This is a particularly pressing example of where it is essential for the Centers to influence national policies. There is a risk that this situation could arise in other countries if countries turn against the Plant Treaty as result of prolonged disagreements about the process to enhance the multilateral system and dealing with DSI.

## The Genebank Platform's Germplasm Health Component

It is well-known that plants and seeds can harbor various pests (pathogens, insects, nematodes, and all other harmful biotic agents) that can spread along with germplasm into new territories. The importance of this threat at worldwide level drove the implementation of the International Plant Protection Convention (IPPC) (the Convention) since 1953. It is a multilateral treaty of 183 countries, overseen by the FAO, that aims to secure coordinated, effective action to prevent and to control the introduction and spread of pests of plants and plant products. Countries have quarantine/biosecurity legislation, enforced by the National Plant Protection Organization (NPPO or quarantine agency) to regulate pest spread with international transfers of germplasm into their territories.

Inadvertent pests spread with germplasm distributions are also a concern for the CGIAR centers, that to a major extent supply to developing countries and biodiversity hotspots, lacking sufficient NPPO capacity to prevent pest entry or respond to pest outbreaks. Recognizing the hazards of pest risks, the Centers' have set up Germplasm Health Units (GHUs), as per the IPPC recommendations (Montreal, August 1993) with the objectives to (i) avert the spread of quarantine pests with the CGIAR germplasm transfers, (ii) prevent pest outbreaks and (iii) safeguard biodiversity. The safe and efficient transfer of germplasm is crucial for the Center international programs and public goods delivery under the IPPC treaty and national laws. The GHUs role, developments as part of the Genebank Platform and future perspectives are presented in the GCOR Working Paper 3, and the gist of is presented here.

### *GHUs serves as the Centers' gateway for germplasm exchange*

The GHUs ensure compliance with the IPPC procedures enforced by the NPPOs. The International Standards for Phytosanitary Measures (ISPMs) of the Convention provide guidance, frameworks, protocols, dispute resolution, and other elements used by NPPOs, to prevent and to control the introduction and spread of plant pests along with plants or plant products into their territories. As the Centers liaison, GHUs engage with NPPO of the host and recipient countries to organize import permits and phytosanitary certificates (export permits), conduct inspections of regeneration fields and prepare germplasm for exportation or importation as per the ISPMs and other recommended actions.

Because of good record of adherence to NPPO procedures, GHUs have been authorized to directly export or import germplasm under the NPPO monitoring system. This arrangement averted inordinate delays/loss of germplasm due to holdup at NPPO stations, which often prioritize clearing commercial consignments over research materials, thereby preventing the loss of germplasm in transit and missed cropping season due delays in accessing germplasm on-time for planting.

The GHUs operations are demand-driven as per the genebanks and breeding program germplasm activities. For instance, in 2018 and 2019, GHUs facilitated 1,300 and 2,600 events of international germplasm transfers from genebanks and breeding programs, respectively, reaching over 100 countries each year. In the same period, GHUs have tested 335,928 genebanks samples and eliminated 7% pest affected samples. Similarly, 118,044 samples were tested and eliminated 3% of contaminated samples from breeding programs. During this process, GHUs have employed 2.47 million diagnostic reactions, which at an average cost of US\$10 amounts to US\$ 24.7 million or about US\$12 million per annum investment on the generation of clean germplasm and preventive diagnostic testing to control the transboundary spread of pests by the CGIAR programs. The impact assessment of such a massive transdisciplinary effort cutting across GHUs, genebanks, and breeding programs of the CGIAR system is overdue. Nonetheless, these efforts have allowed germplasm transfers that would have been impossible without proper testing, and avoided the inadvertent spread of quarantine pests through global germplasm transfers from CGIAR countries of operation pervasive with some of the most

dreaded pests (e.g., cassava brown streak virus, maize lethal necrosis, Karnal bunt, wheat blast, rice blight, several seed-transmitted legume viruses, zebra chip of potato, banana Fusarium wilt Tropical Race 4, to name a few). It is worth mentioning that technical resources and skill set maintained in GHUs supports the Centers' initiatives on combating emerging pests, the supply of reference material for diagnosis and phenotyping, and national program development capacity.

Administratively, GHUs are independent of genebanks and breeding programs except for AfricaRice, Bioversity, CIAT, ICRAF, and ILRI, where GHUs are administered as part of the genebank. Regardless of the administrative positioning, GHU in each Center operates as an autonomous program with a separate budget and program management structure making go/no-go decisions on germplasm transfers based on phytosanitary status and maintenance of multidisciplinary capacities required to test and clean germplasm.

### *GHUs as a system under the Genebank Platform*

In 2017, GHUs were aligned to the Conservation Module of the Genebank Platform to improve the GHUs capacity to alleviate phytosanitary bottlenecks to genebank targets. Before this alignment, the GHUs were isolated with minimal interaction with other centers. This alignment provided a unique opportunity for collaboration among 11 GHUs and develop an uplifting plan to meet genebank targets and improve GHU operations. This collaboration has triggered strong synergies and led to the “One GHU” program evolution. It has catalyzed harmonization of strategy, procedures, and cross-center research initiatives to address common phytosanitary challenges. The funding from the Platform contributed to GHU strengthening in many ways, including:

- the renovation of old infrastructure, equipment upgrade, train staff in new skills, and hire staff for critical positions that could not be filled due to institutional budget limitations,
- development of new protocols (including non-invasive imaging methods and use of high-throughput sequencing) to accelerate pest diagnosis and clean-up of germplasm collections,
- unification of approaches for phytosanitation and detection of viruses infecting clonal crops,
- establishment of the GHU Quality Management System,
- development of digital tools for data collection and data management, with scope for interoperability with GRIN Global and other databases,
- strengthening of partnership with NPPOs and IPPC and joint workshops to build NPPO capacity,
- efforts to establish the “GreenPass” protocol for rapid distribution of health tested germplasm by minimizing redundant phytosanitary checks,
- organization of annual GHU working group meetings for review, learning and improve operations, including brainstorming on service delivery and phytosanitary challenges,
- Organization trainings for other GHUs to speed up acquisition of knowledge and know-how
- formation of GHU Community of Practice (CoP) to raise awareness and advocacy on GHU matters, and position GHUs as a global resource on invasive pest diagnosis and surveillance.

The contributions from the Genebank Platform have made visible improvements to throughput and service delivery in all the centers. Advocacy for GHU work by the Platform Management Team inspired new opportunities and boosted visibility to GHU work through its reports to ITPGRFA and CGIAR SMO. Coming together as one community inspired GHUs to improve performance, and the centers such as AfricaRice, ICRAF, and ILRI to establish dedicated GHUs. It also helped leverage a strategic presence in all continents and partnerships with NPPOs to position GHUs as a global network on germplasm phytosanitation, invasive pest diagnosis, and contributor to the global pest surveillance system.

GHU operations receive support from multiple funding streams, including a fixed annual contribution from the Genebank Platform for strategic improvements, ad hoc allocations from the CRP W1&W2, partial service cost recovery from projects seeking GHU services, and W3/bilateral funded projects. However, these funding streams are unreliable, and with shortages that constrain GHU operations, staffing, and essential upgrades to meet evolving needs.

### *GHUs future priorities*

Presently, CGIAR makes the majority of germplasm transfers under the multilateral system. Germplasm distribution is set to expand with the growing demand for new germplasm to enhance yields, nutrition, and climate-resilient traits. At the same time concern over the risk of transboundary pests spread is mounting as a result of increasing globalization, especially in the wake of Covid19 pandemic and recent outbreaks of fall armyworm, desert locust, and several newly introduced pests (e.g., cassava mosaic in east Asia, maize lethal necrosis in East Africa, TR4 wilt & zebra chip in Latin America, wheat blast in South Asia, bunchy top in West Africa and pests of trees). The evolving external changes and internal priorities demand quick adaptation and strengthening of ongoing efforts, some of which are listed below:

- augment of scientific knowledge on pests, particularly of underutilized species, forages, pastures, and trees species conserved in the genebanks,
- perform pest risk analysis and identify the threats by regions and crops, and establish pragmatic measures, including modeling for risk prediction
- improve pest screening and phytosanitary protocols, including seed treatments and modern diagnostics, which are eco-friendly, time and cost-efficient
- clean-up backlog of infected clonal crop collections in genebanks,
- formulate guidelines for germplasm transfers for “black-box conservation” in the third-party organizations and at the Svalbard Global Seed Vault,
- augment facilities and staff skills to stay-in-tune with new advancements
- implement GHU QMS, develop guidelines for germplasm health quality management and update safe exchange procedures (which also benefits surveillance, diagnostics and capacity development of NARES and NPPO),
- create an integrated database for all biological material related knowledge such as phytosanitary requirements and documentation, process flows, protocols for sampling, treatment, and testing,
- continue dialogue with regulators to secure the IPPC approval for the CGIAR GreenPass protocol to address the current limitations of ISPMs in meeting the needs of the international genebanks,
- strengthen GHU CoP to raise awareness and capacity development, and
- conduct a GHUs costing study to estimate budget requirements for core operations at each center and develop an appropriate funding mechanism to sustain operations.

At the same time, GHUs will prepare for the One CGIAR transition. Restructuring of R4D programs operating under current CRP and Platform models are expected to influence future GHU operation model. While it is too early to predict future scenarios, the One CGIAR inclination towards “institutional integration and shared services” strikes a chord with the cross-center GHU collaboration initiated as part of the GHU program of the Genebank Platform. It served as a good model for the inter-center collaboration and coordination to tackle complex phytosanitary requirements of the CGIAR system, besides addressing emerging challenges from the invasive transboundary pests. Ideally,

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the ongoing program should be elevated as a CGIAR Germplasm Health Program (GHP) linked to the Genebank Platform or a similar new alternative or implemented as an independent program.