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REPORT FROM THE GLOBAL CROP DIVERSITY TRUST

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CGRFA 17

I. INTRODUCTION

1. Established in 2004 under international law as an independent international organization, the Global Crop Diversity Trust (Crop Trust) operates from Bonn, Germany within the framework of the International Treaty on Plant Genetic Resources for Food and Agriculture (the Treaty) in accordance with the overall policy guidance provided by its Governing Body. The Crop Trust's objective as stated in its Constitution is "to ensure the long-term conservation and availability of plant genetic resources for food and agriculture with a view to achieving global food security and sustainable agriculture".
2. The Relationship Agreement between the Crop Trust and the Governing Body of the Treaty recognizes the Crop Trust "as an essential element of the Funding Strategy of the International Treaty in relation to *ex situ* conservation and availability of plant genetic resources for food and agriculture." It notes that the Crop Trust has established an endowment with the objective of "providing a permanent source of funds to support the long-term conservation of the *ex situ* germplasm collections on which the world depends for food security." The Agreement refers to the call in the First Global Plan of Action for Plant Genetic Resources for Food and Agriculture (GPA) for the "development and support of a rational, efficient and sustainable system of genetic resources collections around the world".
3. The Crop Trust addresses major portions of the Treaty and the First and Second Global Plans of Action. At its 6th Session in September 2015, the Governing Body approved Resolution 8/2015, Policy Guidance to the Global Crop Diversity Trust. The key areas that the Governing Body selected for policy guidance were: scientific and technical matters; the Global Information System; resource mobilization; communication and outreach. The Crop Trust submitted a report on both institutional and programmatic developments that occurred in the biennium 2016-2017 to the 7th Session of the Governing Body of the Treaty (some activities from 2015 were included for context), addressing the above key areas. The present report to the 17th Regular Session of the Commission on Genetic Resources for Food and Agriculture (Commission) is an updated version of that presented to the 9th Session of the Commission's Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture (Working Group).

II. SCIENTIFIC AND TECHNICAL MATTERS

A. GLOBAL CROP CONSERVATION STRATEGIES

4. In the first years of its existence, between 2004-2010, the Crop Trust gathered together groups of experts to develop a series of global crop conservation strategies, to help guide its support. Following the recommendation by GB6 to continue supporting this process, the Crop Trust facilitated the development of a number of new strategies during 2016-2017:
 - a. Surveys were done in collaboration with United States Department of Agriculture (USDA) on the status of apple genetic resources globally, and experts held a number of workshops to discuss the results and the way forward. The strategy is now being finalized.
 - b. A survey was also undertaken of, and consultations held with, experts on tropical and subtropical forages, with support from the Genebank Platform (see below). A work plan has been put in place for prioritizing forage and potential forage species for conservation and use on a global basis.
 - c. A strategy for coffee has been prepared in collaboration with World Coffee Research, involving a survey of collections and a number of field visits to genebanks in Africa and Latin America (including the Article 15 collection at the Centro Agronómico Tropical de Investigación y Enseñanza, CATIE). The document was finalized in mid-2017.
 - d. The process of developing a global conservation strategy for tea genetic resources has begun, with funding from Unilever.
5. The global strategy for coconut, first drafted in 2008, among other things reflected the crop community's concerns about the vulnerability of the crucial Article 15 South Pacific genebank in Papua New Guinea (PNG). This large and unique field collection continues to be threatened by the spread of Bogia Coconut Syndrome from surrounding areas. With financial and technical support from the Australian Centre for International Agricultural Research (ACIAR), the Crop Trust convened a

meeting at the site of the genebank in April 2015, during which 27 experts were able to assess the problem at first hand and develop a rescue plan. This plan, which involves moving the collection to a safe site in PNG, is now starting to be implemented by the Kokonas Industri Koporisin (KIK) of PNG in collaboration with the Pacific Community (SPC) and the International Coconut Genetic Resources Network (COGENT), with funding from the Government of PNG and the United Kingdom (UK) Darwin Initiative.

6. In addition, various activities under the new Genebank Platform build on, and update, the relevant global crop conservation strategies (e.g. gap analysis, see below). As the Governing Body recognized that the crop strategies are key guiding documents to rationalize *ex situ* conservation and to build collaboration, the Crop Trust is exploring with the Treaty Secretariat opportunities for joint fund-raising on this topic, as part of a comprehensive programme of collaboration agreed at a meeting in early 2018.

B. LONG-TERM CONSERVATION AND AVAILABILITY OF CROP DIVERSITY

7. At the core of the Crop Trust is the endowment fund (see below), created to provide financial security to globally important collections of crop diversity in perpetuity. To date, the Crop Trust has approved long-term grants from the endowment to nine of the CGIAR genebanks and the genebank of SPC. The funding is partially supporting the conservation and availability of 19 international collections of 16 major crops¹. In 2018, the Crop Trust entered into a long-term partnership agreement with IRRI in recognition that the IRRI genebank has sustained performance targets over several years and become eligible to receive full funding for essential operations. All of these collections serve an international role as crucial parts of a rational, efficient and effective global system, recognized under Article 15 of the Treaty. In addition, the Crop Trust funds the annual operating costs of the Svalbard Global Seed Vault (see below), another key component of the global system. Long-term grants now amount to more than USD 11,530,000 annually, for a total of USD 49,400,000 since 2006.

CGIAR-Crop Trust Partnership on Genebanks

8. In 2017, funding for the routine activities of all 11 CGIAR genebanks, complementing the long-term grants from the endowment, was secured through the continued partnership of CGIAR and the Crop Trust in the CGIAR Genebank Platform. The five-year Genebank Platform took over from the Genebanks CGIAR Research Program (CRP), which ran from 2012-2016. The Platform, managed by the Crop Trust together with the CGIAR Genebank Managers, continues to increase efficiencies and strengthen quality management, optimize conservation protocols, develop data management systems and actively promote use of the collections.

9. The genebank figures presented below are extracted from the Online Reporting Tool that is maintained by the Crop Trust to monitor the status of the collections in the genebanks and progress towards performance targets. They reflect the situation in early 2018. Updated figures will be available early 2019 when centres finish their yearly reporting.

- The CGIAR genebanks manage 768,576 accessions, including 25,301 *in vitro* and 28,063 held in the field. Approximately 79 percent of these are immediately available for international distribution. This continues the steady increase in the availability of accessions since the Genebank CRP was launched in 2012 and is particularly significant when the ongoing distribution and acquisition of samples is taken into account.
- Of the seed accessions, 55 percent is secured in safety duplication at two levels, and 79 percent of accessions of clonal crop collections is safety duplicated in the form of *in vitro* or cryopreserved samples.
- Some 91,506 germplasm samples were provided by CGIAR genebanks to users in 2015, 111,117 in 2016 and 109,339 in 2017; in 2015, 32,850 distinct accessions were provided to users within CGIAR and 20,010 were distributed outside CGIAR directly to advanced research institutes and universities (43 percent), NARS (32 percent) and to farmers and the

¹ Crops supported by the Crop Trust through long-term grants are: banana/plantain, barley, bean, cassava, chickpea, edible aroids, faba bean, forages, grass pea, lentil, maize, pearl millet, rice, sorghum, sweet potato, wheat and yam.

private sector (25 percent) in 114 countries. In 2016, 50,058 accessions were provided to CGIAR programs and 27,265 distributed to advanced research institutes and universities (40 percent), farmers and private sector (24 percent) and NARS (22 percent) in 102 countries. In 2017, 47,963 accessions were provided to CGIAR programs and 61,376 distributed to NARS (50%), advanced research institutes and universities (32 percent), farmers and private sector (10 percent) in 95 countries. These germplasm flows represent the bulk of global distributions using the SMTA.

10. During 2017-2018, the Genebank Platform initiated a phase of audit of the Standard Operating Procedures (SOPs) of individual genebanks, which were developed through activities to strengthen quality management systems (QMS) as part of the CRP. Key SOPs for conservation, acquisition, distribution, regeneration and characterisation and safety duplication are being internally audited for their compliance with the FAO Genebank Standards, International Standards for Phytosanitary Measures, policy related to the Multilateral System for Access and Benefit Sharing and other relevant instruments. The internal audit will be followed up by a phase of external validation in 2019-2020.

11. As a result of a first phase (2012-2016) of technical review of the 11 CGIAR genebanks, 140 recommendations for improvements were made, of which 68% have already been addressed. Since 2017, the genebanks have been pursuing a further 250 improvements as part of their optimization plans.

12. The Genebank Platform is organized into three modules: Conservation, Use and Policy. Existing operations and activities on QMS, seed longevity research, cryopreservation, and strengthened data management through GRIN-Global and Genesys (see below) continue. The Platform conducts activities on: a) compliance and engagement in international plant genetic resources policy (through the Policy Module, for which governance is provided by the Article 15 Centres' Directors General and CGIAR System Management Board); and b) upgrading and strengthening quality management in Germplasm Health Units. The Platform contributes to developing an improved measure for the coverage of diversity in collections, and addressing gaps, in partnership with NARS, as the Governing Body requested *ex situ* conservation to be inclusive beyond CGIAR collections. This process will build on, and update, the relevant global crop conservation strategies.

13. The activities undertaken by the Platform include:

- i. The Policy Module represents CGIAR in meetings of the Treaty and of the Commission, and holds workshops and develops papers to facilitate and promote compliance with international plant genetic resources policy.
- ii. CGIAR Germplasm Health Units (GHU) receive support to upgrade facilities, strengthen QMS and develop diagnostics. Together, GHU leaders are mobilizing support internationally for a "greenpass" system to facilitate the movement of germplasm through CGIAR Centres.
- iii. An initiative on gap analysis is looking at ways of measuring and representing the diversity in collections and identifying gaps through expert knowledge, geographical analysis and trait assessments. Crop genebanks have been structured into "diversity trees" through expert consultation for 14 crops, which allows a quantitative analysis to be carried out in individual collections.
- iv. The Use Module is mobilizing all genebanks to develop characterisation datasets and germplasm sets to respond to users' needs. In 2018, 185 subsets were reported, of which 76 have been distributed to users during the course of the year. A major new effort is underway to incorporate characterization data and subsets, with key metadata, into Genesys.
- v. Digital Object Identifiers (DOIs) have been applied to virtually all accessions in the CGIAR genebanks. The Platform supports and encourages the adoption of DOIs in the use of germplasm by NARS and in breeding and research. An informational video on DOIs was released to enhance awareness and adoption of DOIs as a way to standardize identification of germplasm across genebanks².
- vi. In 2017-2018, the Crop Trust conducted five costing reviews, which assess and benchmark the costs of routine operations in each of the 11 CGIAR genebanks.

² <https://vimeo.com/258264024>

- vii. The Genebank Platform newsletters are released twice a year and highlight feature stories and interesting developments in the world of plant genetic resources and genebanks. An informational video highlighting the work of the Genebank Platform was produced to strengthen the communication and outreach efforts of the international genebanks³.
- viii. The Platform also supports a joint work plan on genebank impact assessment in collaboration with Dr Melinda Smale of Michigan State University. Seven early career professionals conducted research in 2018 as part of a six-month fellowship programme.
- ix. In collaboration with FAO, an expert consultation workshop with experts from national, regional and international genebanks was carried out in April 2018 to facilitate the adoption and application of the FAO Genebank Standards. This meeting responds to the call from the Treaty to collaborate on scientific and technical matters, including the development of concepts for quality management regarding the conservation of, and access to, collections of PGRFA.

Crop Trust's support to regional and national genebanks

14. In 2011, the Crop Trust launched a ten-year project to support countries to collect high-priority diversity of the wild species related to 29 Annex 1 crops, to secure that diversity for the long-term, and to use it to prepare materials useful to breeding programmes around the world in adapting these crops to climate change. The project, “Adapting Agriculture to Climate Change”, is funded by the Government of Norway and guided by an Advisory Group comprising subject-matter experts and representatives of CGIAR Centres, and of the Treaty Secretariat as an observer. It is being implemented in partnership with the Millennium Seed Bank (MSB) of the Royal Botanic Gardens, Kew, UK and with specialist institutes and national and international conservation and pre-breeding programmes around the world.

15. The crop wild relative (CWR) species in a total of 92 genera, including the project’s target crops, have been catalogued and the database is searchable on the project’s web portal as “The Harlan and de Wet Crop Wild Relative Inventory”⁴. An ecogeographic dataset has been assembled from numerous sources, representing the largest and most comprehensive resource on the spatial occurrence of the wild relatives of the world’s major crops. This dataset has been analysed to identify high priority species and regions for collecting⁵. Following the prioritization exercise, collecting and conservation of CWRs by national programmes have been supported in 24 countries: Armenia, Azerbaijan, Brazil, Chile, Costa Rica, Cyprus, Ecuador, Ethiopia, Georgia, Ghana, Guatemala, Italy, Kenya, Lebanon, Malaysia, Nepal, Nigeria, Pakistan, Peru, Portugal, Spain, Sudan, Uganda and Viet Nam. All CWR collecting activities were concluded in 2018 except for two partners that will multiply accessions with low seed numbers to increase seed quantities. Collecting partnerships include technical backstopping in the form of equipment kits, collecting guides and training workshops on seed conservation techniques. Country-specific field guides will be updated using information from the collecting projects and will represent a long-term resource to inform national conservation efforts while also contributing for capacity building.

16. As of December 2018, more than 4000 collections have been made in the 24 countries. About 80% of these collections have been received by MSB for safety duplication. The material at MSB is processed for long term storage and distribution to pre-breeding programs and other users. About 30% of the samples received at MSB have already been distributed, with the largest shipment being to ICARDA for multiplication.

17. Data from the collecting work is now available on a dedicated Genesys page⁶. The Genesys page will be updated with new data from projects that closed in December 2018. The gap analysis, i.e. the GIS-based methodology that was used to identify the global conservation priorities, is currently being rerun to investigate the extent to which the collecting missions have reduced the diversity gaps.

³ <https://vimeo.com/259296364>

⁴ <http://www.cwrdiversity.org/checklist/>

⁵ <http://www.cwrdiversity.org/conservation-gaps/>

⁶ <https://www.genesys-pgr.org/project/CWR>

18. In preparation for the pre-breeding phase of the project, crop-specific consultations were held with a wide range of breeders and other researchers. Pre-breeding projects are now underway, or have been concluded, on 19 crops, with all materials developed being made available under the Treaty. They involve a total of some 53 national and international partners in 32 countries, and all include a strong emphasis on capacity building:

Table 1. Overview of the 19 pre-breeding projects. Completed projects are highlighted.

Crop	Partners involved	Focus traits	Duration
Alfalfa	Australia, Chile, China, Kazakhstan	Drought tolerance	2015 - 2018
Banana	Belgium (KU Leuven, Meise), Bioversity, IITA (Nigeria), Papua New Guinea	Drought tolerance	2016 - 2020
Barley	ICARDA, Germany, Morocco	Drought, heat and salinity tolerance, enhanced nutritional value, disease and pest resistance	2016 - 2019
Bean	Colombia, CIAT, Honduras	Heat, drought, waterlogging and root rot resistance	2016 - 2019
Carrot	Bangladesh, Pakistan, USA	Heat, salt and drought tolerance	2014 - 2018
Chickpea	ICARDA, Turkey, USA	Drought tolerance	2014 - 2019
Cowpea	IITA, Burkina Faso, Niger, Nigeria	Drought, heat	2016 - 2018
Eggplant	Cote d'Ivoire, Spain, Sri Lanka	Drought resistance, waterlogging, cold and heat tolerance, root system development	2013 - 2016
Finger millet	ICRISAT (Kenya), Kenya	Drought tolerance, resistance to blast and <i>Striga</i> , agronomic traits	2015 - 2018
Grass pea	ICARDA, Morocco, India	Heat tolerance, low toxicity, broomrape (<i>Orobanche</i>), powdery mildew and aphid resistance	2016 - 2019
Lentil	Bangladesh, Canada, ICARDA (Morocco), Nepal, Spain, Turkey	Drought tolerance, <i>Orobanche</i> and <i>Stemphyllium</i> -blight resistance	2013 - 2017
Pearl millet	ICRISAT (India), India, ICRSIAT (Niger)	Heat and terminal drought tolerance	2015 - 2018
Pigeonpea	ICRISAT (India), India	Salinity tolerance, <i>Phytophthora</i> blight and pod borer resistance, yield-related traits	2015 - 2019
Potato	Brazil, CIP (Peru), Peru, Uruguay	Heat and drought tolerance, late blight and bacterial wilt resistance	2013 - 2017
Rice	IRRI (The Philippines), USA	Yield-related traits under drought	2011 - 2016
Sorghum	Australia, Ethiopia	Heat tolerance, cool soil conditions tolerance, water-use efficiency, rust, anthracnose, grain mold and downy mildew resistance	2015 - 2018
Sunflower	Canada, Uganda	Drought tolerance, early flowering, yield-related traits	2011 - 2016
Sweet potato	CIP (Peru), USA, Mozambique	Heat tolerance	2014 - 2019
Wheat (durum)	India, CIMMYT (Mexico), ICARDA (Morocco), UK	Yield potential, heat tolerance, drought tolerance, disease resistance	2014 - 2019

19. Negotiations with the Government of the Kingdom of Norway have recently been positively concluded with the signature of a new funding agreement for Phase 3 (2017-2020) of the project. With the collecting activities under Phase 2 completed, Phase 3 will focus on expanding pre-breeding work and evaluating germplasm derived from CWRs. Promising pre-breeding materials incorporating desired traits are already being made available proactively to national and international breeding programs. Data from pre-breeding projects will be made available through “Germinate 3” databases⁷, developed by our partners at the James Hutton Institute, UK. Germinate 3 offers a customizable common interface, containing information on lines, phenotypic traits and genetic markers, through a wide range of integrated visualization and analysis tools. From 2017 to 2020, the project is focusing on expanding the pre-breeding work and evaluating materials derived from CWRs. Evaluation projects are supported for 13 crops and will contain a significant participatory evaluation component involving smallholder farmers.

Table 2: Overview of pre-breeding evaluation projects. Projects with a strong component on farmer participatory engagement in breeding are indicated by an asterisk. Lead partners are indicated in bold.

Crop	Partners	Title/Focus traits	Duration
Sunflower	University of British Columbia , Canada; National Semi-Arid Resources Research Institute (NaSARRI), Uganda; Indian Institute of Oilseeds Research (IIOR), India; Instituto Nacional de Tecnología Agropecuaria (INTA), Argentina; MIGAL - Galilee Research Institute, Israel; North Central Regional Plant Introduction Station (NCRPIS), USA; (SOLTIS, Euralis Semences, France	<i>Evaluation of Sunflower Pre-Bred Lines for Stress Resistance and Associated Trade-Offs with Yield</i> Drought and heat tolerance, yield-related traits, biotic stresses	04/2017 – 08/2019
Eggplant	World Vegetable Center , Taiwan; Université Félix Houphouët-Boigny, Cote d'Ivoire; Universitat Politècnica de València, COMAV, Spain; Dept. of Crop Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka; breeding companies (<i>in kind</i>): East-West Seed, Philippines; Meridien Seeds, Spain; Callivoire, Cote d'Ivoire; Hayleys Agriculture Holdings Limited, Sri Lanka; Novagenetic, France	<i>Development and Preparation of Eggplant Pre-Bred Materials for Adaptation to Climate Change</i> Drought resistance, biotic stresses	07/2017 – 06/2019
Sorghum (Kenya)*	Rongo University , Kenya; Ugenya Banana farmer group; Aminyasa Youth group; Eva Weltzien	<i>Sorghum Breeding with Wild Relatives: Evaluating Pre-Breeding Material with Farmers in Kenya</i> Key adaptive and agronomic traits	03/2018 – 09/2020
Sorghum (Mali)*	Institut D'Economie Rurale ('IER-SRA Cinzana) , Mali; Union des Agriculteurs du cercle de Tominian (UACT; ICRISAT; Eva Weltzien	<i>Sorghum Breeding with Wild Relatives: Evaluating Pre-Breeding Material with Farmers in Mali</i> Key adaptive and agronomic traits	03/2018 – 09/2020
Rice (Vietnam)*	Can Tho University, Vietnam ; Mekong Delta Development Research Institute (MDI) of CTU; College of Agriculture and Applied Ecology; 2 Seed Centers; 1 Seed Cooperative; 1 Seed Station; 9 Seed Clubs	<i>Adapting Agriculture to Climate Change: Participatory evaluation of Crop Wild Relative Introgressed Genetic Resources in Rice in the Mekong Delta, Vietnam</i>	05/2018 – 06/2020

⁷ <https://ics.hutton.ac.uk/cwr/eggplant>

Crop	Partners	Title/Focus traits	Duration
		Key adaptive and agronomic traits	
Potato*	International Potato Center (CIP) , Peru; CIP, Kenya; Yanapai NGO, Peru; Collaborators: EMBRAPA, Brazil; KEPHIS, Kenya; KALRO-Tigoni, Kenya	<i>Crop Wild Relatives (CWR) Derived Potatoes for Climate Change Resilience of Farming Communities in Kenya and Peru</i> Combining late blight resistance and drought tolerance from CWR with advanced heat-tolerant breeding lines	05/2018 – 09/2020
Durum wheat*, barley*, lentil*	International Center for the Agricultural Research in the Dry Areas (ICARDA) ; INRA-MAR, Morocco; Institut Sénégalais de Recherches Agricoles (ISRA), Senegal; Ethiopian Institute of Agricultural Research (EIAR), Ethiopia; Lebanese Agricultural Research Institute (LARI), Lebanon	<i>DIIVA-PR Dissemination of Interspecific ICARDA Varieties and Elites through Participatory Research</i> Key adaptive and agronomic traits	06/2018 – 10/2020
Pigeonpea*	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) , India; PJTSAU-RARS Warangal, India; ANGRAU-RARS, Tirupati, India; UAS-ARS, Gulbarga, India; Department of Agricultural Research (DAR), Yezin, Myanmar	<i>Utilization of Introgression Lines Derived from Wild Cajanus Species for Pigeonpea (Cajanus cajan) Improvement</i> Key adaptive and agronomic farmer-preferred traits	07/2018 – 09/2020
Finger millet*	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) , Kenya; Maseno University, Kenya; KALRO-Kisii, Kenya	<i>Improving Finger Millet Productivity Through Exploitation of Wild Germplasm (Eleusine spp)</i> Key adaptive and agronomic farmer-preferred traits	09/2018 – 11/2020
Carrot*	USDA ARS , USA; University of Sargodha, Pakistan; Bangladesh Agricultural University, Bangladesh; Bangladesh Agricultural Research Institute, BARI, Bangladesh; Bangladesh Institute of Nuclear Agriculture, BINA, Bangladesh; World Vegetable Center, Taiwan	<i>Carrot Germplasm Development and Farmer Training for Production in Stressful Environments</i> Key adaptive and agronomic farmer-preferred traits	10/2018 – 09/2020
Alfalfa*	South Australian Research and Development Institute (SARDI) , Australia; Instituto de Investigaciones Agropecuarias (INIA), Chile; Kazakhstan Research Institute for Agriculture and Plant Growing (KSRIAPG), Kazakhstan; Grasslands Research Institute of the Chinese Academy of Agricultural Sciences (GRI), China; University of California Davis, USA; University of Wisconsin, USA	<i>The Use of Crop Wild Relatives to Develop Drought Tolerant Alfalfa and its Extension to Subsistence Farmers in Kazakhstan, China and Chile</i> Key adaptive and agronomic farmer-preferred traits	01/2019 – 11/2020
Common bean	International Center for Tropical Agriculture (CIAT) , Columbia; Instituto de Investigação Agrária de Moçambique (IIAM), Mozambique; Escuela Agrícola	<i>Using Bean Populations Derived from P. acutifolius to Advance Toward Generation of New Bean Varieties and Discerning the</i>	01/2019 – 10/2020

Crop	Partners	Title/Focus traits	Duration
	Panamerica Zamorano, Honduras; AgroSavia, Columbia	<i>Traits and Genetic Base Associated to Heat Tolerance</i> Key adaptive and agronomic farmer-preferred traits	

20. By the end of its final phase, the project aims to have made available under the Treaty a range of new and exciting adaptive options for agriculture that might otherwise have been lost, whilst helping protect biodiversity from irrevocable loss. The project will also have helped build capacity in developing countries and will have produced valuable information to assist complementary on-farm and *in situ* efforts.

21. A high priority has also been given during the past biennium to strengthening the documentation systems of national and regional genebanks around the world. Progress in this area is described in a separate section below, but, in summary, detailed expert assessments of documentation systems and IT infrastructure have been carried out in 29 genebanks, and funds for upgrading provided to 20 of these.

22. In addition, through the Genebanks CRP/Platform's QMS initiative, the Crop Trust organized six Genebank Operations and Advance Learning (GOAL) workshops in 2015-2016, at:

- i. CIAT, Colombia (2015)
- ii. NBPGR, India with support from the Crawford Fund (2015)
- iii. IITA (2016)
- iv. NBPGR, India with support from the Crawford Fund (2016)
- v. ICRAF, Kenya (2016)
- vi. MARDI, Malaysia (2017)

23. The first GOAL workshop for Latin American genebanks (Costa Rica) and the follow-up workshop for the Asia/Pacific region were carried out in 2018. In addition to staff from CGIAR genebanks, a total of 50 staff from national genebanks and research institutes attended the GOAL workshops and benefitted from the learning opportunities afforded. The GOAL workshops organized thus far offer an excellent medium for raising and aligning standards not just across the CGIAR genebanks, but also beyond, to national partners.

24. Finally, the Crop Trust is also implementing a number of emergency grants to national/regional genebanks, with:

- i. the national genebank of Nepal for the collection, conservation, and restoration of native crop seeds in earthquake-affected areas (signed February 2016).
- ii. the Kenya Agricultural and Livestock Research Organization (KALRO) for the refurbishment and upgrading of the conservation facilities at the Genetic Resources Research Institute (GeRRI), with support from Irish Aid (signed July 2016)
- iii. SPC for post-cyclone recovery of the genebank, with support from AusAID, Australia (signed March 2017).

25. The Treaty Secretariat and the Crop Trust are exploring the possibility of the creation of an Emergency Fund, to be funded through voluntary contributions, to support (non-CGIAR) Article 15 collections in situations of crisis. The Fund would complement, and not duplicate, existing mechanisms and focus primarily on the preliminary assessment of the conditions of these collections and undertaking initial steps to mobilize necessary technical and financial support.

The Svalbard Global Seed Vault

26. The Treaty cites the need "to take appropriate steps to minimize or, if possible, eliminate threats to PGRFA" (Article 5.2) and the Second Global Plan of Action has as an objective "to provide for the planned replication and safe storage of materials not currently safety duplicated". Safety

duplication is recognized by the *Genebank Standards for Plant Genetic Resources for Food and Agriculture* as an essential element of good genebank management practice aimed at minimizing risk to *ex situ* collections. The Crop Trust supports the duplication under black-box conditions of the world's most important crop collections at the Svalbard Global Seed Vault, in Norway, as an ultimate safety net.

27. Since the signature of the new 10-year agreement in July 2017, 104,574 accessions have been added to the Vault by 30 depositors in 5 openings. This brings the total number of accessions in the Vault to 983,524, deposited by 76 institutions. This includes 591,860 accessions from the international collections managed by CGIAR centres. 61% of the total number of accessions have been deposited with support from the Crop Trust. In 2018, the Crop Trust provided funds for the preparation and shipment of 2,995 accessions from CATIE, the N.I. Vavilov All-Russian Scientific Research Institute of Plant Industry (VIR) and the SADC Plant Genetic Resources Centre. As part of the 10th Anniversary celebrations of the Seed Vault in February 2018, 23 genebanks made deposits, including three for the first time (Estonian Crop Research Institute, Estonia; Portuguese Bank of Plant Germplasm, Portugal; Unidad de Recursos Genéticos, INIA La Platina, Chile; Australian Pastures Genebank, Australia), depositing about 50,000 accessions in the Vault. This brought the total number of accessions sent to Svalbard for safety duplication under black box conditions to over one million. The new International Advisory Panel that provides advice on the operations and activities of the Seed Vault also used this opportunity to hold its first meeting.

28. In an effort to re-establish their active collection units in Morocco and Lebanon after the move from Aleppo, Syria, ICARDA has retrieved a total of 92,430 accessions from the Vault, i.e. 38,076 accessions in 2015 and 54,354 accession in 2017. These withdrawals explain the discrepancy between the over 1 million total accessions sent to Svalbard and the 983,524 currently conserved. All accessions retrieved from the Vault have been regrown in Lebanon and Morocco. Over 40,000 samples were successfully multiplied, and sub-samples returned to the Vault in 2017 and 2018.

29. Work is currently underway to upgrade the Vault in an attempt to address a water intrusion problem caused by melting permafrost. This includes the reconstruction of a new concrete water resistant access tunnel, construction of a service building that will house all technical installations, electrical and other refrigerating equipment that are likely to emit heat. Temperatures within the storage chambers are being monitored daily. The construction work will be completed by mid 2019. NordGen will continue to receive seed deposits. However, the Vault will remain inaccessible to the general public, visitors and depositors until the rehabilitation works are completed.

C. STRENGTHENING INFORMATION SYSTEMS FOR GENE BANKS

30. Article 17.1 of the Treaty requires that Contracting Parties “cooperate to develop and strengthen a global information system to facilitate the exchange of information, based on existing information systems, on scientific, technical and environmental matters related to plant genetic resources for food and agriculture, with the expectation that such exchange of information will contribute to the sharing of benefits by making information on plant genetic resources for food and agriculture available to all Contracting Parties.” Articles 13.2(a) and 12.3(c) address requirements to make information available. Priority Activity 15 of the Second Global Plan of Action calls for “Constructing and strengthening comprehensive information system for plant genetic resources for food and agriculture.”

31. CGIAR and Crop Trust are continuing to support the implementation of two initiatives to enhance the management and availability of information about PGRFA: GRIN-Global⁸ and Genesys⁹. Close collaboration with the Treaty's Global Information System (GLIS) in the biennium has focussed on automated data exchange between Genesys and GLIS databases. DOIs have been established as a priority area for GLIS on the advice of the Scientific Advisory Committee (the Crop Trust has participated in all Committee meetings), the Crop Trust has facilitated the adoption of DOIs by the CGIAR and national genebanks. Genesys started supporting DOIs by the end of 2017 and today

⁸ <https://www.grin-global.org/>

⁹ <https://www.genesys-pgr.org/>

maintains data on 771,340 accessions with DOIs. Along the same lines, the GRIN-Global community is also planning to include DOI support to the software.

GRIN-GLOBAL

32. The Crop Trust partnered with the US Department of Agriculture (USDA) and Bioversity International to develop and deploy an advanced genebank data management software package, GRIN-Global. Version 1.0 was released at the end of 2011, and an improved version 1.9 replaced the original USDA's own GRIN system in November 2015. In 2016, the USDA GRIN-Global team won the Secretary of Agriculture's Award for personal and professional excellence for this accomplishment.

33. GRIN-Global has been adopted or is being evaluated by 26 genebanks, in CGIAR centres (CIMMYT, CIP, CIAT, Bioversity, IITA, Africa Rice, ICRAF, ICRISAT) and national programmes. A GRIN-Global Frontrunner position has been established at CIMMYT to provide a helpdesk service to national and international genebanks staff who wish to explore the possibility of adopting GRIN-Global. Five GRIN-Global training workshops have been organized in the same period:

- i. CIAT, May 2015: ten participants from CIAT and CORPOICA (Colombia).
- ii. INIAF (Bolivia), September 2015: 22 participants from INIAF.
- iii. Czech Republic, February 2016: seven CGIAR genebanks and six national genebanks: Azerbaijan, Costa Rica, Jordan, Lebanon, Portugal and Tunisia.
- iv. CIAT, April 2016: seven national and regional genebanks in Latin America: Bolivia, Chile, Colombia, Costa Rica, Ecuador, Mexico and Uruguay.
- v. INIAV (Portugal), June 2018: CGIAR genebank data managers and representatives from Netherlands, Canada, USA, Australia, Colombia, Czech Republic, Portugal, Tunisia, Sweden.

Genesys

34. In furtherance of Article 17.1 of the Treaty and Priority Activity 15 of the Second Global Plan of Action, CGIAR and the Crop Trust are continuing to support through the Genebank Platform and bilateral projects with donors the development of Genesys as a fundamental component of an effective global conservation system. Genesys has been managed by the Crop Trust since 2014, with the Treaty Secretariat participating in the advisory committee since the beginning of the initiative. Genesys now allows searching passport data across some 3.9 million active accessions held in 473 institutes. The Crop Trust works continuously with existing data providers to help them share up-to-date information about their collections and actively promotes and encourages data publication (automated when feasible) from new genebanks. In 2018, about 50% of the 4.2 million historic and active accession records were updated (i.e. confirmed by data providers) in Genesys. Genesys provides online services¹⁰ for data validation that allow genebanks to test their data for potential errors in spelling of species names and invalid geo-reference data. Genesys measures and presents a Passport Data Completeness Index as part of its summary views. Since the introduction of the index, we have seen an increase in data updates and the amount of detail genebanks are publishing on Genesys. Data from Genesys is used to report on GPA implementation.

35. As of 2018, agreements to publish passport data on Genesys have been signed with the CGIAR Centres and 11 national or regional genebanks. NACGRAB (Nigeria) is the latest data provider to Genesys.

36. The Genesys Catalogue for Phenotypic Datasets, a project funded by the Federal Republic of Germany through the Federal Office for Agriculture and Food (BLE), started in September 2016. The project provided support to four national genebanks and two international genebanks in the preparation of phenotypic (characterization and evaluation) data for publication, and in the production of SOPs for data publication. Likewise, the project extended the Genesys database for publication of phenotypic data and its accompanying metadata, associated to passport data already visible through Genesys. The partners in this project were: National Genebank of Tunisia (Tunisia), CATIE, Genetic Resources Research Institute (Kenya), Malaysian Agriculture Research and Development (Malaysia),

¹⁰ <https://validator.genesys-pgr.org/>

National Plant Genetic Resources Laboratory (Philippines) and WorldVeg. A project meeting involving all partners was held in Bonn in February 2018¹¹. The project finished in September 2018 and Genesys currently publishes over 2,000 individual characterization and evaluation datasets from CGIAR genebanks and project partners.

Information technology assessment and upgrading

37. The Crop Trust, through the CWR project (see above), has assisted genebanks with the analysis of their documentation needs, and, if they so wish, with the adoption of GRIN-Global and with making information on their collections available through Genesys. To that end, genebank documentation experts visited 29 national and regional genebanks between 2014 and 2017: Azerbaijan, Bolivia, CATIE, Chile, Colombia, Cuba, Cyprus, Ecuador, Egypt, Guatemala, Jordan, Kenya, Lebanon, Mexico, Morocco, Nigeria, Peru, Philippines, Russian Federation, Rwanda, SPGRC, Sudan, SPC, Tunisia, Turkey (x2), Uganda, Viet Nam and Zambia. Based on the results of these assessments, support to strengthen capacity for data management was provided to the national and regional genebanks in the following countries: Azerbaijan, Bolivia, CATIE, Chile, Colombia, Guatemala, Kenya, Lebanon, Morocco, Nigeria, Peru, the Philippines, SPC, SPGRC, Tunisia and Viet Nam.

38. In the current biennium 7 national genebanks were visited: Ecuador, Nepal, Oman, Rwanda (revisited), Sri Lanka, Uganda (revisited) and Uruguay. Support for improving documentation and information technology capacity was provided to Cuba, Ecuador, Rwanda, Sudan, Uganda and Uruguay.

39. A 3-year partnership with EMBRAPA (Brazil), supported by the CWR project, for consolidation of accession information from 130 active genebanks (AGBs) into EMBRAPA's Alelo database and then publication on Genesys started in 2017. The EMBRAPA team developed integration mechanisms between the two systems in early 2018 using established Genesys APIs. EMBRAPA published passport data on more than 192,000 accessions on Genesys in May 2018.

III. RESOURCE MOBILIZATION

General

40. The Crop Trust mission is “a cost-effective, rational, and global system for *ex situ* conservation of crop diversity supported by long-term, sustainable funding”. Hence, the Crop Trust's fundraising priority continues to be the development of the endowment fund, to provide predictable and reliable long-term funding to key, globally important, national and international genebanks. As a result of costing studies initiated by the Crop Trust, our objective is to provide USD 34,000,000 a year to fund national and international genebanks, as well as the running costs of the Svalbard Global Seed Vault. Availability of USD 34,000,000 annually requires an endowment fund of USD 850,000,000 (calculation based on 4 percent rate of return plus inflation).

41. Since its inception in 2004 up to the 31st of December 2018, the Crop Trust received USD 273,800,000 in donor contributions paid into the endowment, which includes a EUR 50,000,000 (or USD 58,000,000) concessional loan from KfW (German Development Bank) in 2017. In addition, since inception the Crop Trust received a total of USD 216,000,000 in project funding and USD 21,000,000 for operational expenses.

42. Governance and oversight for the endowment fund is exercised at four separate levels, as follows:

- a. Crop Trust management oversees the activities of the two asset managers on an ongoing basis, including regular discussions about portfolio performance and capital market developments.
- b. On a quarterly basis, the Finance and Investment Committee (FIC) of the Crop Trust reviews the management results of the endowment fund, including direct interaction with the

¹¹ <https://www.croptrust.org/science-blog/helping-data-leave-home/>

two asset managers. FIC also reviews the annual budgets, revised budgets and audited financial statements for recommendation to the Executive Board for approval. This Committee is chaired by the Director and Chief Investment Officer of the Pension and Endowments department of the World Bank Treasury. A physical meeting of the FIC takes place annually in October in Bonn, in advance of the Fall Executive Board meeting, in order for the Committee to meet with the investment managers to discuss performance, review the investment strategy and policy, meet with the external auditors and to consider the investment risk limits. The FIC Chairman presents the outcome of this meeting to the Executive Board at its autumn meeting. The FIC oversaw the successful conversion to, and implementation of, full International Financial Reporting Standards for the financial statements for the year ended 31 December 2017 and the clean audit opinion issued by the external auditors, PWC.

c. The Donors' Council of the Crop Trust, which brings together all countries and private partners providing a significant contribution to the Crop Trust, reviews the financial performance of the endowment fund every 6 months and the annual budgets of the Crop Trust. The outcome of the deliberations at the Donors' Council is transmitted to the Executive Board of the Crop Trust by the Chair of the Donors' Council (currently held by the Netherlands).

d. The Executive Board of the Crop Trust meets twice per year to review the overall financial and operational performance and the strategic direction of the Crop Trust. This includes a report by the Finance and Investment Committee on the investment performance and management of the endowment fund.

43. The Crop Trust's fundraising efforts are overseen by both the Executive Board and the Donors' Council. The Donors' Council is comprised of governments and private sector donors who contribute at least USD 25,000 or USD 250,000, respectively. The Donors' Council meets biannually and provides financial oversight and advice to the Executive Board as outlined above.

A more diversified fundraising strategy

44. In order for the endowment fund to reach its goal of USD 850,000,000, the Crop Trust will need to develop a more diversified fundraising strategy. The Crop Trust Donor Council, at its meeting in Bonn in June 2018, established an Innovative Finance Working Group (IFWG), chaired by Mr Stefan Schmitz of BMZ, Germany, to identify innovative finance mechanisms that the Crop Trust could explore further to reach its fundraising target. This group will report back to the Donor Council at its Spring 2019 meeting.

45. As done in the past, the Crop Trust will continue to seek grant funding from governments for the endowment. This is still our preferred method of funding. We will increasingly hold annual bilateral discussions with major current donors to review their budgetary priorities, so as to identify early opportunities for additional support. Efforts to recruit new governments as donors will continue.

46. In addition to endowment fund giving, the Crop Trust will continue to pursue time-bound funding from specific donors to cover the annual operating expenditures of individual genebanks, or for specific projects for the upgrading of individual crop collections – prioritizing collections and crops that are included under Article 15 and Annex 1 of the Treaty, as well as genebanks identified under the National Collections Strategy of the Crop Trust.

47. As the Crop Trust builds the endowment fund it is crucial to limit avoidable withdrawals. To this end, the Crop Trust will seek support for the operational expenditures of genebanks, the Crop Trust Secretariat and the Svalbard Global Seed Vault. In 2018, the Secretariat secured operational support from the European Commission (EC), the Government of Switzerland and the Government of Finland for funding the CGIAR Genebank Platform and will continue to source funding for this program in 2019 in order to limit withdrawals from the endowment fund.

48. Engaging the private sector is crucial to achieving our fundraising targets. As discussed in the report to the 7th Session of the Governing Body, the Crop Trust is pursuing crop-based fundraising to foster greater engagement and investment from private sector actors. The aim of crop-based fundraising is to tie conservationists, researchers, producers, consumers and/or other users in the commodity chain of food crops into the development and implementation of a global crop-based

conservation strategy. This community “owns” the strategy, and thereby would hopefully be prepared to contribute to its funding. The Crop Trust is testing this approach with the Coffee Conservation Strategy, produced jointly with World Coffee Research. The aim is to raise USD 20,000,000 of endowment funding which would allow to invest USD 1,000,000 annually to safeguard key coffee collections in perpetuity. The same process is currently underway for tea, with funding for the strategy development process provided by Unilever.

49. In 2019, the Crop Trust will develop and pilot its first crowdfunding campaign, to be implemented in 2020. The goal of crowdfunding is to raise funds via a large number of small donations. In 2018, Friends of Global Crop Diversity (the Crop Trust’s 501C3 organization in the US) granted the Crop Trust USD 38,000 for the development of a concept note for a Crop Trust Crowdfunding Campaign.

50. The Investment Sharing Facility mentioned in Crop Trust’s previous report to the Governing Body is proceeding. DWS (formerly Deutsche Asset Wealth Management) has exchanged the underlying investment fund to a Global Equity Income oriented fund with sustainability features (ESG). The Crop Trust has established its German front-end charitable vehicle, the Crop Trust Foundation gGmbH, as a qualified and recognized entity to issue tax deduction certificates, subject to continuing approval by the respective local tax authorities. DWS and the Crop Trust continue their collaboration on the operational set-up. The prospectus language of the underlying investment fund, and the donation share class, was approved by the Luxembourg Regulator and the prospectus language was effective as of 1 January 2018. The Crop Trust is currently working with German tax authorities to ensure that donations received from investors will receive tax deductibility status and we expect a decision shortly.

IV. COMMUNICATION AND OUTREACH

51. The Crop Trust’s communication and outreach efforts focus on two overarching goals:

- i. raising awareness of the important of crop diversity for a more resilient and sustainable food system now and in the future
- ii. highlighting the work of our partners to make sure that crop diversity is safely conserved and readily available

52. The Crop Trust is pleased to report that Phase Two of the #CropsInColor campaign – a photographic storytelling effort aimed at raising awareness of crop diversity around the world – was approved during 2018 and work is underway. This phase expands the range of crops and countries covered. The Genebank Platform, Genesys and the CWR project continue to produce regular newsletters and have an active web and social media presence.

53. Construction work at the Svalbard Global Seed Vault – primarily to install a new, watertight entrance tunnel – is well underway and is expected to be completed in 2019. While seed deposits continue, access to the Seed Vault by journalists, depositors and others has been 100% restricted. As a result, outreach opportunities have been more limited than in recent years, with a major event planned for February 2020 to mark completion of the upgrade.

54. The three parties that jointly operate the Svalbard Global Seed Vault (Government of the Kingdom of Norway, NordGen and Crop Trust) established the Svalbard Global Seed Vault Communications Working Group, which met for the first time in September 2018. The Group aims to develop consistent messaging around the Seed Vault, a common media plan, agreed rules on information sharing and visitor access, and to jointly develop plans for a February 2020 event in Svalbard. A draft communications strategy will be delivered by the end of March 2019.

55. The Crop Trust communications team coordinated, with the support of an external public relations agency, media outreach around the organization’s historic decision to fully fund the essential operations of the genebank of the International Rice Research Institute (IRRI). The news story was covered in a number of media outlets, in multiple languages, including BBC, Reuters, Nature magazine, Science magazine, and a number of regional titles.

56. The Crop Trust collaboration with makers of the popular board game Catan saw a conservation-themed version of the game launched in German and English in September 2018. More

languages are expected in 2019. The Crop Trust “add-on” pack, which encourages Catan players to conserve crops and includes an accompanying booklet compiled by the Crop Trust, should help raise awareness of the importance of crop diversity and conservation with a broader audience. Catan has agreed that all profits from the sale of the game will go to the Crop Trust endowment fund.

57. Work to produce a Crop Trust magazine began in late 2018; the magazine will go to print in January/February 2019. This aims to fill a gap in the organization’s range of corporate products: less technical and more engaging and with a longer shelf life than the annual report, and more thorough than our promotional brochures. It will be freely distributed, and will be useful for donors, partners, media and others.

Food Forever

58. The Food Forever Initiative (FFI) continues to gain momentum, with 30 “champions” coming on board since its launch in June 2017. This global endeavour advocates for concrete actions and ideas in support of implementation of the United Nations Sustainable Development Goal Target 2.5. Specifically, it aims to:

- i. raise awareness of the importance of crop and livestock diversity for our food
- ii. highlight the work that our partners are doing to make sure that crop and livestock diversity is conserved and available

59. The Crop Trust strengthened its communications efforts around FFI with a series of opinion articles developed and posted in 2018, with the series continuing into 2019. Specific attention was also paid to raising Food Forever’s profile on social media.

60. The Food Forever website was completely redesigned to help engage a broader audience in the aims of the initiative and promote a better understanding of the importance of SDG Target 2.5. The new site went live in July 2018.

61. In September 2018, Food Forever held the inaugural session of its Board of Overseers at FAO Headquarters. The Board of Overseers is composed by permanent representatives of the donor (Germany, Netherlands, Norway and Switzerland) and other relevant (Brazil, China, Peru) countries to the Rome-based UN agencies. During this inaugural meeting, FAO, through its Department of Climate, Biodiversity, Land and Water, agreed to join with the Crop Trust and the Government of the Kingdom of the Netherlands, on the Secretariat of the initiative. This was formalized through an official letter sent by the Food Forever Chair in late September 2018.

62. Mercedes Aráoz, Vice President of Peru, became the new Chair of Food Forever in mid 2018. A tireless advocate for the importance of biodiversity, she contributed an op-ed to coincide with the UN’s International Day of Biological Diversity, and also spoke of the importance of biodiversity conservation and Food Forever at the World Food Prize in Des Moines, Iowa, in October 2018 as part of the Borlaug Dialogues.

63. Food Forever hosted its annual meeting in Delaware, USA, in September 2018, bringing together many Champions and Partner Organizations. This resulted in a series of pledges in support of SDG Target 2.5 that Champions and Partner Organizations will seek to implement prior to the 2020 deadline. These pledges contributed to the development of the Food Forever workplan for 2019.

64. The inaugural Food Forever Experience took place in New York in September 2018, hosted by Google and supported by partners including the Lexicon of Sustainability and restaurant chain Tender Greens. The event, which coincided with the United Nations Global Day of Action on the SDGs, challenged ten innovative chefs to give guests a glimpse of the future of food by cooking up dishes using ingredients currently on the margins of the US culinary mainstream. Guests included politicians, foodies, journalists, and many others. The aim was to celebrate food diversity and raise awareness of efforts going on around the world to support the 2020 target. The event was well-received, drawing very positive feedback from Google and others, and opened up opportunities for new partnerships. It was covered in detail by US TV news channel CBS. As a result, the Food Forever Experience is now considered the signature event series for the initiative, with plans underway for further events in several cities around the world in 2019.

65. While in New York for the Food Forever Experience, the initiative was represented at the UN Media Zone on two occasions: to promote the Food Forever Experience, and as part of a panel on biodiversity and climate change.

66. The Food Forever initiative also co-organized and participated in side events and panels in other international meetings relevant for the food and agriculture community. These include side events at the 24th Session of the Committee on Agriculture and the 45th Session of the Committee on World Food Security (both in FAO), as well as the 14th Conference of the Parties of the United Nations Convention on Biological Diversity (CBD), which took place in Sharm-el-Sheikh, Egypt in November 2018.