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联合国粮食及农业组织 Food and Agriculture Organization of the United Nations Organisation des Nations Unies pour l'alimentation et l'agriculture Продовольственная и сельскохозяйственная организация Объединенных Наций Organización de las Naciones Unidas para la Alimentación y la Agricultura منظمة الأغذية والزراعة للأمم المتحدة

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 15 of the Provisional Agenda

Eighteenth Regular Session

27 September – 1 October 2021

REPORT FROM CGIAR

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Documents can be consulted at www.fao.org

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I. BACKGROUND

1. On July 7, 2021, many of the 15 CGIAR Centers received requests from UN FAO to provide reports on their policies, programmes and activities relevant to the prioritized themes of the 18th Regular Session of the UN FAO Commission on Genetic Resources for Food and Agriculture (Commission). In consultation with the Secretariat of the Commission, the CGIAR's Global Director of Genetic Innovation, Global Director for Partnerships and Advocacy, and the Director Generals of the CGIAR Centers, it was decided to submit a single report from CGIAR. The CGIAR Genebank Platform Policy Module coordinated development of this report with inputs from the CGIAR System Organization and the following CGIAR Centers: AfricaRice, CIP, IITA, IRRI, the Alliance of Bioversity International and CIAT, ILRI, ICARDA, ICRISAT, CIFOR-ICRAF, WorldFish and CIMMYT.

2. The structure of the report follows the headings suggested in the request letter from UN FAO, that is: cross-sectoral matters, animal, aquatic and microorganism and invertebrate genetic resources. Thereafter, the report includes information concerning the programmes and activities of CGIAR Centers and research programmes that are related to the plant genetic resources-related issues, and the forest genetic resources-related issues, that the Commission will be considering during its 18th session. Finally, the report includes a summary of the newly reformed One CGIAR, highlighting those programmes that deal most directly with genetic resources for food and agriculture.

II. CROSS-SECTORAL MATTERS

Follow up to the report on *The State of the World's Biodiversity for Food and Agriculture*

3. CGIAR participated in the meetings of the Group of National Focal Points for Biodiversity for Food and Agriculture in March and July 2021, focusing on the further development of the document "Biodiversity for Food and Agriculture – Revised Draft Needs and Possible Actions". CGIAR submissions at these meetings called for a more thorough integration of a food systems transformation approach into the prioritized actions, to better reflect the interrelationship between food systems, healthy diets, biological diversity and environmental sustainability.

4. CGIAR is making similar submissions in other international fora that are considering related subject matter as reported below under 'Concept note on Biodiversity for Food and Agriculture and Human Health'.

Review of work on access and benefit-sharing for genetic resources for food and agriculture

5. Given their role as conservers and users of genetic resources, CGIAR research programs are directly affected by access and benefit-sharing norms. CGIAR participates in a range of activities related to the development and implementation of access and benefit-sharing rules, including meetings of the Team of Technical and Legal Experts on Access and Benefit-Sharing. CGIAR also dedicates considerable resources to ensuring compliance of its research and development programs with access and benefit-sharing obligations arising from national and international laws and research ethics. CGIAR has developed decision making tools and guides, and most recently, an online training course entitled 'Genetic Resources Policies for CGIAR Scientists' to assist Centers in understanding and complying with those obligations. It also supports a 'CGIAR Genetic Resources Policy Helpdesk' which is available to CGIAR scientists who have questions about how to address genetic resources policy issues in their day-to-day work. CGIAR is making biennial reports to the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty) concerning its implementation of the CGIAR Principles for the Management of Intellectual Assets, including compliance with ABS-related obligations under the Treaty and national ABS laws.

6. CGIAR has made numerous written submissions, statements and coordinated side events related to ABS issues during international negotiating meetings to develop the Post-2020 Global

Biodiversity Framework under the aegis of the Convention on Biological Diversity.[1] In summary, those submissions have highlighted that the post-2020 framework's ABS-related sections should:

- contribute to more genetic resources (and traditional knowledge) being potentially available, exchanged and used for research and sustainable development;
- result in more benefits generated and equitably shared;
- promote implementation of the Treaty's multilateral system of access and benefit-sharing (and not only the Nagoya Protocol) given its importance to conservation and sustainable use of plant genetic resources, and agricultural research and development;
- redouble its focus on the generation and sharing of non-monetary benefit-sharing (in addition to monetary benefit-sharing).

7. While making these submissions, CGIAR has highlighted the relevance of the *ABS Elements* (endorsed by the Commission) as a useful tool to assist policy-makers promote the availability of genetic resources for food and agriculture while complying with the applicable international instruments.

8. As part of its effort to increase focus on non-monetary benefit-sharing, at the 10th Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture (ITWG-PGR), CGIAR proposed that the ITWG-PGRFA should request the Secretariats of the Commission, Treaty and CBD to work together, to consider mechanisms for monitoring/reporting on the generation and sharing of non-monetary benefits linked to ABS systems. CGIAR also recommended that an additional thematic study should be included in the Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture, focusing on how the use of PGRFA generates non-monetary benefits.

9. With respect to digital sequence information (DSI), CGIAR previously made submissions to the Governing Body of the Treaty and the Ad Hoc Open Ended Working Group to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing (WG-EFMLS) concerning the possibility of adopting a subscription system – as part of the multilateral system - whereby benefits associated with the use of both plant genetic resources and genomic information could be equitably shared without creating barriers to the availability and use of such information for agricultural research and developments. While the negotiations of the WG-EFMLS were suspended by the Governing Body in 2019, CGIAR is hopeful that some resolution to outstanding tensions concerning DSI can eventually be forged by taking advantage of the basic architecture of the Treaty's multilateral system, given that it was developed to reflect the needs (and opportunities for benefit- sharing) in the agricultural research and development sector.

Review of the work on biotechnologies for the conservation and sustainable use of genetic resources for food and agriculture

10. In November 2020, the CGIAR System Board approved *the CGIAR Research Ethics Code* as cross-CGIAR Policy.[2] The purpose of the Code is to ensure that clear, achievable and relevant standards of ethical conduct apply to all CGIAR Research. Section 4.3 of the code sets out mandatory ethical standards applicable to CGIAR research involving modern biotechnology, and includes considerations related to the management of intellectual property rights over biotechnologies and the evaluation of socio-economic impacts from the use of modern biotechnologies. As a complementary

[1] See for example, the policy brief authored by the eleven 'Article 15' CGIAR Centers, UNEP and the ABS Capacity Development Initiative entitled, "*Including access and benefit sharing in the post-2020 Global Biodiversity Framework"* , submitted to the Open-ended Working Group on the Post-2020 Global Biodiversity Framework on its second meeting, available at https://cgspace.cgiar.org/handle/10568/111273.

[2] The CGIAR Ethics Code is available at https://cgspace.cgiar.org/bitstream/handle/10568/113003/CGIAR-Research-Ethics-Code-Approved-3Nov2020.pdf?sequence=1&isAllowed=y.

resource, CGIAR has adopted two accompanying Q&A documents related to CGIAR Centers' and research programs' use of genetic engineering and genome editing technologies.[3]

Review of work on climate change and genetic resources for food and agriculture

11. The Commission Background Paper entitled 'The Role of Genetic Resources for Food and Agriculture in Climate Change Adaptation and Mitigation'[4] provides an excellent and exhaustive overview. It includes a considerable amount of information, including case studies, provided by scientists from a number of CGIAR Centers, research programs, and the Standing Panel on Impact Assessment. CGIAR appreciates the extent to which the Secretariat, and consultants conducting the study, reached out to CGIAR scientists for contributions. We look forward to promoting the paper once it is published.

12. Many CGIAR research activities have the objective to contribute to the resilience of agricultural production systems in response to climate changes. Details of these research activities' results and impacts are available on the CGIAR Results Dashboard (https://www.cgiar.org/food-security-impact/results-dashboard/). This dashboard provides an overview of results achieved by the CGIAR Research Programs and Platforms. It tracks key metrics across CGIAR to help paint a picture of CGIAR research for development achievements. Figures and maps are 'clickable' providing links to additional detailed reports. CGIAR invites the Commission members to use the dashboard to obtain information about CGIAR work's results not only in relation to climate change mitigation and adaptation, but also in relation to other global goals such as food security, poverty reduction and ecosystem protection.

13. The following paragraphs provide some illustrative examples – some of them selected from the CGIAR Dashboard – of CGIAR achievements in relation to the conservation and use of genetic resources for food and agriculture for climate change adaptation.

14. Over 5 million sub-Saharan African households benefit from improved drought tolerant maize varieties: CIMMYT's Drought Tolerant Maize for Africa project, followed by the Stress Tolerant Maize for Africa project, gave smallholder farmers in 13 countries access to improved drought and stress tolerant maize varieties. Over 200 distinct drought tolerant maize hybrids and open pollinated varieties were released throughout both projects' lifetime (12 years), of which 54,000 tons of certified DT maize seed was produced, benefiting an estimated 5.4 million households – or 43 million people – who planted them on 2.75M ha. With STMA closing in early 2020, a follow-up project will continue to deliver and track impacts.

15. Community-based seed systems increased access/availability of high-quality adapted seeds for 189,000 farmers in East Africa: The CGIAR Research Programme on Climate Change, Food and Agriculture (CCAFS) in East Africa and the Alliance of Bioversity International and CIAT partnered with national research institutions to establish community seed-banks for storage and multiplication of diverse resilient high-quality seeds adapted to local climatic conditions reaching 189,000 farmers in East Africa. About 107,000 farmers in Kenya and Uganda access seeds through seed-banks, another 82,000 potato farmers in Kenya are using web-based SMS platform for disseminating information on resilient seeds and ware. In Tanzania, CCAFS and the International Potato Center (CIP) are undertaking trials and multiplication of adapted potato varieties.

16. Large scale dissemination of stress tolerant rice varieties in Sub-Saharan Africa: From 2009 to 2019, over 1,000 stress tolerant rice breeding lines (including multiple stress tolerant lines) were evaluated by AfricaRice through an Africa-wide Rice Breeding Task Force in 19 project countries under two projects: STRASA (Stress Tolerant Rice for Africa and South Asia) and Green Super Rice (2009-2019). During the 11 years of the projects, over 200 rice varieties were released in 24 countries (including non-project countries). These varieties include 97 stress tolerant varieties (drought, salinity, submergence, cold and/or iron toxicity), which target rainfed lowlands, rainfed uplands, mangrove

[3] The two documents on questions and answers about genetic engineering and genome editing can be accessed at https://cgspace.cgiar.org/handle/10568/113825 and https://cgspace.cgiar.org/handle/10568/113824

[4] The paper is available at http://www.fao.org/fileadmin/user_upload/wiews/docs/CGRFA_WG-PGR-10_21_7_Inf1.pdf

swamps, irrigated lowlands, and highlands. Over 33,000 tons of breeder, foundation and certified seeds have been produced and disseminated through formal national channels in the project countries covering over 700,000 ha of rice growing area in Africa. Adoption of newly released varieties in the project countries were relatively high in some countries such as in Guinea Conakry and Mali where 16% and 20%, respectively, of the farmers surveyed had access to certified seeds. In Madagascar, 48% of the farmers surveyed were using improved varieties including the stress tolerant varieties. In addition, over 1,200 national scientists, technicians and farmers from SSA were trained in breeding, seed production, women leadership, enterprise management, impact assessment, crop information management and participatory varietal selection.

17. Delivering genetic gains in farmers' fields: In the past two years, in South Asia, IRRI in consultation with national agricultural research organizations, conducted over 5000 strategically placed multi-locational on-farm trials in the form of H2H, triadic, and market segmented trials for several potential products in different rice-growing environments of India and Bangladesh. These scientific trials included about 100 recently released germplasms and pipelines as nominated by national scientists along with farmer preferred local checks. Out of these, 20 products were found significantly superior for advancement and scaling in the seed chain. These trials are the first critical step towards delivering genetic gain in farmer fields and hence furthering the impact of breeding programmes. In addition, more than 10,000 hectares of area were demonstrated under positioning of many new and promising products in direct partnership with several agencies from public, private and community institutions. More than 50 varietal cafeterias and exhibitions were conducted engaging diverse seed chain stakeholders to create awareness, demand and visibility of new varieties and also potential linkage in supply chain to stabilize the multiplication and scaling of those in seed chain. "Seed without the border" agreement was leveraged widely to accelerate the promising germplasm reaching across the border.

18. In the last two years, the International Network for the Genetic Evaluation of Rice (INGER) continued to play a facilitating role in the evaluation of rice new lines. Only in 2021, requests for evaluation trials were received by 10 countries. Different types of trials were composed with materials for irrigated, rainfed, upland, abiotic stress tolerances such as drought flood, and cold biotic stress tolerances such as bacterial blight and stem borer tolerant lines. These were dispatched in the form of pre-designed trial kits consisting of 9,000 packets and dispatched to 145 locations.

Concept note on biodiversity for food and agriculture and human health

19. A wide range of scientists across CGIAR Centers contributed to the Thematic Studies supporting the initial development of the State of the World's Biodiversity for Food and Agriculture Report of 2019, including the Thematic Study *Contributions of biodiversity to the sustainable intensification of food production* that included authors from six Centers (ICRAF, Bioversity International, CIFOR, ICRISAT, ICARDA and WorldFish). This Thematic Study takes a cross-sectoral look at the evidence for the roles of biodiversity in food production and the means to enhance them.

20. CGIAR Centers and research programs are making technical contributions to a number of international fora to raise delegates' awareness concerning the interconnection of food systems, human health, climate change, environmental sustainability and the sustainable use and conservation of biodiversity. In addition to the meetings of the Group of National Focal Points for Biodiversity for Food and Agriculture noted above, CGIAR Centers are making thematically consistent contributions to the following international bodies and policy-making processes:

- Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and the Open-ended Working Group on the Post-2020 Global Biodiversity Framework, both concerning the development of the *Post-2020 Global Biodiversity Framework*[5];

[5] See for example, *Including food systems, biodiversity, nutrition and dietary health in the zero draft of the Post-2020 Global Biodiversity Framework*, co-developed by Alliance of Bioversity International and CIAT, and the United Nations Environment Programme (UNEP) with the endorsement of EAT; Food and Land Use Coalition (FOLU); and the Kenya Agricultural & Livestock Research Organisation (KALRO), available at

- United Nations Food Systems Summit *(including the pre-summit: July 2021[6]);*
- 2nd International Agrobiodiversity Congress, November 2021[7];
- UNFCCC[8];
- Leaders Pledge for Nature[9];
- African Community of Practice on Forgotten and Underutilized Foods;
- G20 Meeting of Agricultural Chief Scientists[10].

21. In addition to making contributions to each of these processes, CGIAR is committed to promoting links between them, to overcome 'silo effects' between health, environment and agriculture sectors. For example, CGIAR scientists are actively promoting links between the outcomes of the United Nations Food Systems Summit with ongoing work under the framework of the United Nations Framework Convention on Climate Change, and the Post-2020 Global Biodiversity Framework.

22. CGIAR scientists have also been very closely involved with the development of a number of seminal reports on the subject, including, for example, *The Anthropocene: the EAT-Lancet Commission on healthy foods from sustainable food systems.*[11] IFPRI's (now former) Director General is a member of the EAT Commission; the Director General of the Alliance of Bioversity International and CIAT is on the EAT Board of Directors, and CGIAR scientists are among the co-authors of the report.

23. Furthermore, CGIAR Centers and Research programs are involved in a number of research and development projects and programs which explore the links between biodiversity and health. One such project, noted in background document CGRFA-17/19/6 (Review of Work on Genetic Resources for Food and Agriculture and Nutrition) is the GEF-funded project *Biodiversity for Food and Nutrition project (BFN)* wherein project partners from Turkey, Kenya, Brazil, Sri Lanka and the Alliance of Bioversity International and CIAT have investigated means to improve human health through consumption of a greater diversity of locally produced and sourced foods. Alliance Scientists also partnered with FAO to develop the 'Guidelines on assessing biodiverse foods in dietary intake surveys'.[12]

24. AfricaRice and its partners in Côte d'Ivoire are involved in a project entitled *Development of rice varieties responding to market needs and their cultivation practices*. The project will improve yield and market acceptability of local rice in Côte d'Ivoire with spillover effects to other countries near Côte d'Ivoire, and improve the nutrition (Fe, Zn and protein) of people in Côte d'Ivoire and nearby countries. Breeding lines with increased Fe, Zn and protein and other consumer-preferred qualities are being developed. Cultivation practices to derive agronomic capacity (in yield, resource

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https://alliancebioversityciat.org/publications-data/including-food-systems-biodiversity-nutrition-and-dietary-health-zero-draft-post.

[6] CGIAR scientists and leaders co-authored at least 14 papers and briefs, and participated in at least 16 panels and side events as part of the UN Food Systems Summit Pre-summit. CGIAR scientist are members and coordinator of the Action Tracks. Dr. Claudia Sadoff, Managing Director, Research Delivery and Impact of the CGIAR System Organization (CGIAR), stressed the importance of food system transformation, linking human health and environmental sustainability, as speaker on expert panel entitled, 'Science Serving End Hunger and Safe and Nutritious Food' July 26, 2021. A summary of CGIAR CCAFS engagement at the Pre-summit is available at: https://ccafs.cgiar.org/ccafs-un-food-systems-summit-unfss-2021

[7] This 4-day Congress will convene experts, practitioners, and policymakers to share and advance scientific research, nature-positive solutions, policies, and practices to transform food systems and deliver on the 2030 Agenda for Sustainable Development through the use and conservation of agrobiodiversity.

[8] See for example, a summary of presentations, papers and briefs from CGIAR scientists addressing food systems transformation as a strategy to address climate change under the framework of the UNFCCC, available at https://ccafs.cgiar.org/news/transforming-food-systems-under-changing-climate-building-consensus-action

[9] https://www.leaderspledgefornature.org/

[10] 10th Meeting of Agricultural Chief Scientists, 15-16 June 2021, Italy

[11] https://eatforum.org/eat-lancet-commission/eat-lancet-commission-summary-report/

[12] See Kennedy G., Lee W.T.K., Termote C., Charrondière R., Ji Yen and Tung A. (2017) Guidelines on assessing biodiverse foods in dietary intake surveys. FAO, Rome. http://www.fao.org/3/a-i6717e.pdf

use efficiency etc.) of varieties with high market values using an Ajinomoto byproduct as fertilizer, are also being developed and arrangements for further out-scaling of developed technologies will be prepared. A total of 1,336 rice genetic resources are being analyzed for Fe, Zn and phytate in Giessen University (Germany), and for amylose, protein and other grain quality traits at the AfricaRice M'be research station.

25. CIP, through the Andean Initiative has been investigating the linkages between nutrition security, agrobiodiversity and food sovereignty amid transforming global systems and climate change in the Andean region. A study in Peru suggests that increased agrobiodiversity in food-growing spaces can enhance nutrition security and food sovereignty, lessen vulnerability, and strengthen agroecological adaptive capacity and resilience[13]. CIP scientists also published a study highlighting the importance of strengthening the role of agrobiodiversity and informal food chains to address food insecurity in the context of the COVID-19 crisis in South America[14]; that study was also featured in a webinar exploring innovative uses of agrobiodiversity[15] in food systems.

26. CIFOR and ICRAF have provided evidence on how forests, agroforestry systems and other multi-functional landscapes provide a diversity of nutritious foods that support healthy diets, as well as supporting food security and nutrition indirectly through ecosystem services. CIFOR scientists showed that tree cover has been found to be positively associated with dietary diversity and consumption of fruits and vegetables in Africa.[16] ICRAF scientists devised an approach for making location- specific recommendations for cultivating a greater diversity of food trees to support year-round harvest and deliver key micronutrients in local diets.[17] Once developed, the customised portfolios are promoted to communities through agroforestry innovation hubs and school programmes, where agronomic and nutrition information is shared, and access to quality planting material is facilitated (McMullin *et al.* 2020).[18] To support the development of the portfolios, it is important to know more about the nutrient composition of tree foods, embracing not only well-known species but indigenous and underutilised ones that can be particularly nutrient-dense. We have addressed the current knowledge gap for indigenous and underutilised species by developing the Priority Food Tree and Crop Food Composition Database [19] [20]. The database currently holds nutritional profiles for 99 food tree and crop species and can inform prioritization of crops for mainstreaming in local (and global) food systems

[13] Zimmerer, K.S.; Haan, S.de.; Jones, A.D.; Creed-Kanashiro, H.; Tello, M.; Plascencia, F.; Carrasco, M.; Meza, K.; Tubbeh, R.; Nguyen, Kien Tri; Hultquist, C. (2020). Indigenous smallholder struggles in Peru: Nutrition security, agrobiodiversity, and food sovereignty amid transforming global systems and climate change. Journal of Latin American Geography. ISSN 1548-5811. 19(3). 38p. Available at https://cipotato.org/publications/indigenous-smallholder-struggles-in-peru-nutrition-security-agrobiodiversity-and-food-sovereignty-amid-transforming-global-systems-and-climate-change/

[14] Zimmerer, Karl S.; Haan, Stef de (2020). Informal food chains and agrobiodiversity need strengthening—not weakening—to address food security amidst the COVID-19 crisis in South America. Food Security. ISSN 1876-4525. Published online 10Jul2020.

[15] https://cipotato.org/events-andean-initiative/webinar-from-andean-farm-to-table/

[16] Ickowitz, A., Powell, B., Salim, M. A., and Sunderland, T. C. H. (2014). Dietary quality and tree cover in Africa. *Glob. Environ. Change* 24, 287–294. doi: 10.1016/j.gloenvcha.2013.12.001; Ickowitz, A., Rowland, D., Powell, B., Salim, M.A., Sunderland, T., (2016). Forests, trees, and micronutrient-rich food consumption in Indonesia. PLoS One 11, e0154139.

[17] McMullin S, Njogu K, Wekesa B, Gachuiri A, Ngethe E, Stadlmayr B, Jamnadass R and Kehlenbeck K. 2019. Developing fruit tree portfolios that link agriculture more effectively with nutrition and health: A new approach for providing year round micronutrients to smallholder farmers. Food Security 11, 1355–1372 (2019). https://doi.org/10.1007/s12571-019-00970-7

[18] McMullin S, Stadlmayr B, Ngethe E, Wekesa B, Njogu K, Gachuiri A, Mbaya B, Katiwa A and Jamnadass R. (2020). Trees nurture nutrition: An insight on how to integrate locally available tree food and crop species in school gardens.Chapter 6. In Agrobiodiversity, school gardens and healthy diets: Promoting biodiversity, food, and sustainable nutrition. Hunter D, Monville-Oro E, Burgos B, Roel CN, Calub BM, Gonsalves J and Lauridsen N. eds. ISBN 9780367148867. Published March 17 2020 by Routledge, 344 p. https:// www.routledge.com/Agrobiodiversity-School-Gardens-and-Healthy-Diets-Promoting-Biodiversity/Hunter-Monville-Oro-Burgos-Roel-Calub-Gonsalves-Lauridsen/p/book/9780367148867

[19] http://apps.worldagroforestry.org/products/nutrition/

[20] Stadlmayr, B., McMullin, S., Innocent, J., Kindt, R, and R. Jamnadass (2019): Priority Food Tree and Crop Food Composition Database: Online database. Version 1. World Agroforestry, Nairobi Kenya. http://apps.worldagroforestry.org/products/nutrition/index.php/home/reference/

based on their nutritional value. Many of these indigenous and underutilised species are considered "orphan crops", ICRAF have also looked at evidence to support the mainstreaming of these species into food systems. [21] The portfolios have been digitized and placed online in an interactive decision support tool for selecting a diversity ecologically suitable food tree species to meet seasonal and micronutrient needs.

27. The African Orphan Crops Consortium (AOCC) based at CIFOR-ICRAF in Nairobi is working towards developing and using genomics knowledge for promoting biodiversity-based approaches to improve locally important orphan and underutilized but nutritious African crops and trees. By ensuring retention of productive genomic diversity, these nutrient dense crops can be selected using the new approaches for resilient crop breeding practices based on directional genomics assisted breeding. Usual fallout of traditional crop improvement processes is improvement in the production of calorie rich crop products often leading to reduction in the quality of nutrients, but with these modern genomics-based approaches this can be particularly avoided. To date, the AOCC has sequenced 10 species (6 trees; *Vitellaria paradoxa*, *Sclerocarya birrea*, *Moringa oleifera*, *Faidherbia albida*, *Artocrpus altilis*, *Artocarpus heterophyllus* and 4 annual crops; *Dioscorea alata*, *Vigna subterranea*, *Lablab purpureus*, *Solanum aethiopicum*). Apart from their use for improvement, genetic/genomic diversity-driven decisions have been taken for conservation and pre-breeding selection for tree crops like *Dacryodes edulis*, *Irvingia* spp., *Adansonia digitata*, and *Moringa oelifera*.

28. ICRISAT, in partnership with FARA, organized a webinar entitled "Development of an African Manifesto and Plan of Action on Forgotten Foods" as part of a continental consultation process to lead the preparation of Africa's manifesto on forgotten foods. This event proposed the creation and operationalization of the African Community of Practice on forgotten foods to represent the continent in the crafting of the global manifesto on forgotten foods and in the preparation of a plan of action.

III. ANIMAL GENETIC RESOURCES

Review of implementation of the global plan of action for Animal Genetic Resources

29. Through its small ruminant-related research, ICARDA contributes to three of the four Strategic Priority Areas (SPA) of the Global Plan of Action on Animal Genetic Resources viz: SPA 1: Characterization, inventory and monitoring; SPA 2: Sustainable Use and Development and SPA 4: Policies, Institutions and Capacity-building. Related to SPA1 Characterization, inventory and monitoring, ICARDA, jointly with NARS partners in Ethiopia, Tunisia and Sudan, characterized the genetic diversity and structure, and the genetic basis of traits of adaptation significance in sheep and goat populations using SNP genotyping platforms and whole genome sequencing. In Ethiopia, the work included the characterization and mapping of the genetic basis of adaptation traits, e.g. tail fat deposition, adaptation to diverse environments, and prolificacy in sheep. The work also included characterization of the genetic diversity of goats and the structure and genetic basis of local adaptation. In Sudan, the research activity included the determination of the structure and diversity in the Sudan Thin-tailed Desert sheep. In Tunisia, the research focused on the determination of the genetic basis for endo-parasite resistance. Together with national and advanced research institutes, ICARDA also undertook research spanning global populations of sheep to understand their demographic dynamics, domestication trajectories and introgression of agronomic traits into the domestic genotypes from their wild ancestors.

30. To contribute to sustainable use and development of local and indigenous AnGR (SPA 2), ICARDA, in collaboration with NARS in Ethiopia, Tanzania and Sudan, continued to support and further develop sheep and goat community-based breeding programs (CBBP). CBBPs started in 2010

[21] Termote, C., McMullin, S., Hendre, P. (2021). From discovery to food system diversification with African Neglected and Underutilized Species In Eds Padulosi *et al*. Orphan crops for sustainable food and nutrition security: Promoting neglected and underutilized species. Routledge. ISBN 9780367902827; McMullin, S., Stadlmayr, B., Mausch, K., Revoredo-Giha, C., Burnett, F., Guarino, L., Brouwer, I.D., Jamnadass, R., Graudal, L., Powell, W., Dawson, I.K.,. (2021). Determining appropriate interventions to mainstream nutritious orphan crops into African food systems. Global Food Security. 28, https://doi.org/10.1016/j.gfs.2020.100465

in Ethiopia with 4 sheep breeds and 8 communities. CBBPs consider the needs, views, decisions and active participation of farmers from inception through to implementation in low input production system. CBBPs have emerged as an alternative to often unsustainable centralized nucleus schemes and crossbreeding based on exotic sires. CBBPs resulted in measurable genetic progress for selection traits considered, economic benefit and livelihood improvement.[22] Nowadays CBBPs have expanded to more than 14 sheep and goat breeds in more than 60 communities in Ethiopia and in many other African and Asian countries. ICARDA and Ethiopia's NARS, partnered with AbacusBio, an agribusiness technology firm, and established a cloud-based genetic database platform called Dtreo to provide timely and more accurate feedback to the community. Data collectors in Ethiopia and Tanzania were equipped with tablets and trained to use the software to support the sheep and goat breeders. ICARDA also established 7 low infrastructure mobile reproductive laboratories in different areas to support dissemination of improved genetics.

31. With respect to SPA4, through its research on CBBPs, ICARDA made inputs into Ethiopia's small ruminant breeding strategy (2019-2030): CBBP based selection is considered as the main approach for most of the sheep and goat breeds; [23] this represents a shift from centralized nucleus and indiscriminate crossbreeding. In July 2021, ICARDA consulted with 20 Federal State Universities of Ethiopia to integrate CBBP into their programs, all of which included the CBBP approach in their curriculum and set up a model CBBP villages for small ruminants. Four Universities launched CBBPs in 2020. To enhance the capacity of national partners to manage their animal genetic resources, ICARDA conducted several training sessions for NARS partners on basic concepts and implementation of CBBPs, data management and analysis and reproductive technologies. ICARDA also included several MSc and PhD students into its research programs and supports a special MSc program to increase the number of livestock breeders in Ethiopia funded by BMGF in Ethiopia.

32. For more than four and a half decades, the work of the International Livestock Research Institute (ILRI), and its predecessors, the International Livestock Centre for Africa (ILCA) and the International Laboratory for Research on Animal Diseases (ILRAD) has contributed to the conservation of animal genetic resources. This work has been done in an integrated approach with animal health and disease control, feeds and forage development, livestock-related land management, public policy, and economics. This effort has contributed to improving the understanding of livestock genetic diversity across developing countries, hence leading to better informed conservation and genetic improvement decisions. The following recent publications provide highlights of this contribution:

- *The story of cattle in Africa: Why diversity matters.*[24] This book showcases a few of the continent's indigenous cattle breeds. The book highlights the social, cultural, economic roles that these breeds play and describes some of the unique genetic attributes of these breeds, hence their overall present and future importance.
- *The mosaic genome of indigenous African cattle as a unique genetic resource for African pastoralism*.[25] ILRI's findings presented in this reference paper indicate that a combination of past-aurine and recent indicine admixture-derived genetic resources is at the root of the present success of African pastoralism. This information can be leveraged to develop

[22] For more information, see Haile, A., Getachew, T., Mirkena, T., Duguma, G., Gizaw, S., Wurzinger, M., Soelkner, J., Mwai, O., Dessie, T., Abebe, A., Abate, Z., Jembere, T., Rekik, M., Lobo, R.N.B., Mwacharo, J.M., Terfa, Z.G., Kassie, G.T., Mueller, J.P., Rischkowsky, B., 2020. Community-based sheep breeding programs generated substantial genetic gains and socioeconomic benefits. Animal 1–9; and Haile, A., Gizaw, S., Getachew, T., Mueller, J.P., Amer, P., Rekik, M., Rischkowsky, B., 2019. Community-based breeding programmes are a viable solution for Ethiopian small ruminant genetic improvement but require public and private investments. J. Anim. Breed. Genet. 136, 319–328.

[23] For more information, see Ministry of Agriculture. 2019. National Small Ruminant Breeding Strategy (2019 to 2030), Addis Ababa, Ethiopia.

[24] Dessie, T. and Mwai, O. (eds). 2019. The story of cattle in Africa: why diversity matters. Nairobi, Kenya : ILRI, Republic of Korea : Rural Development Administration, and Nairobi, Kenya: AU-IBAR.

[25] Kim, K., Kwon, T., Dessie, T. *et al*. 2020. The mosaic genome of indigenous African cattle as a unique genetic reserves for African pastoralism. *Nature Genetics*, 52.

stabilized productive and resilient breed mixes along the lines pursued by the ILRI-led African Dairy Genetics Gain Project.

- *Ethiopian indigenous goats offer insights into past and recent demographic dynamics and local adaptation in sub-Saharan African goats.*[26] ILRI and ICARDA Scientists provide insights into mechanisms leading to genome variation and differentiation in sub-Saharan Africa indigenous goats. This information would therefore best inform breed conservation priorities.
- *Community-based sheep breeding programs generated substantial genetic gains and socioeconomic benefits*.[27] This work demonstrated that CBBPs for small ruminants are alternatives to centralized, government-controlled breed improvement and conservation schemes which have been implemented in many developing countries. The study showed that CBBPs are technically feasible, result in measurable genetic gains in performance traits and impacts the livelihoods of farmers and results in sustainable conservation.
- *Breeding objectives and practices in three local cattle breed production systems in Burkina Faso with implication* for the *design of breeding programs*.[28] This study highlighted herd characteristics, production objectives and traits preferred in three local cattle production systems in West Africa, with the goal to improve farmers' livelihoods and to contribute to the suitable conservation of animals' genetic resources.
- *Values and Beliefs That Shape Cattle Breeding in Southwestern Burkina Faso.*[29] This work brings to the fore the critical roles people and their culture plays in designing and implementing successful conservation and improvement programs.

33. For a decade now, the International Livestock Research Institute (ILRI) is running a biorepository at its main campus in Nairobi to ensure the safe, secure, and efficient collection and storage of biological material and related data.[30] ILRI is also working with partners to preserve elite ecotypes of African chicken genetic resources applying the latest advancement in Primordial Germ Cell (PGCs) cryopreservation and surrogate host technology, to allow the contribution of indigenous gene pools in future response to new breeding requirements.[31] The ILRI livestock gene bank also collaborates with National research institutions, for example, the Kenya Agricultural and Livestock Research organization (KALRO), for staff training and biobanking of Kenyan chicken genetic resources. The Precision Breeding and Reproductive Technology laboratory at CTLGH-ILRI works on other projects to explore use of surrogate sires to improve small ruminant breeds.[32]

34. ILRI's Livestock genetic programme has also been most instrumental in supporting technically and scientifically the African Union's – Inter African Bureau for animal Resources (AU-IBAR), deploying some of their livestock development projects, as well as playing a key role in developing the Livestock Master Plans for many African countries.

35. All these activities involving collection of biological material are implemented in full compliance of the Access and Benefit-Sharing (ABS) framework of the Nagoya protocol, while building the capacities of our respective partners on the subject.

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[26] Tareken, G., Khayatzadeh, N. *et al*. 2020. Ethiopian indigenous goats offer insights into past and recent demographic dynamics and local adaptation in sub-Saharan African goats. *Evolutionary Applications*, 14 (7).
[27] Haile, A. *et al*. 2020. Community-based sheep breeding programs generated substantial genetic gains and socioeconomic benefits. *Animal,* 14 (7).
[28] Ouédraogo, D. *et al*. 2020. Breeding objectives and practices in three local cattle breed production systems in Burkina Faso with implication for the design of breeding programs. *Livestock Science*, 232.
[29] Zoma-Traoré, B. *et al*. 2021. Values and Beliefs That Shape Cattle Breeding in Southwestern Burkina Faso. *Human Ecology*.
[30] More information at: https://www.ilri.org/research/projects/ilri-biorepository and https://cgspace.cgiar.org/handle/10568/33911
[31] More information at: https://cgspace.cgiar.org/handle/10568/109787
[32] More information at: https://www.ilri.org/news/scientists-africa-explore-use-%E2%80%98surrogate-sires%E2%80%99-improve-small-ruminant-breeds

36. ILRI's animal genetic resources work is aligned to the FAO agenda on biotechnologies for the conservation and sustainable use of genetic resources for food and agriculture. To advance this agenda, ILRI proposes collaboration on the following aspects:

- Build on the indicators of success of the African Dairy Genetic Gains (ADGG) and African Chicken Genetic Gains (ACGG) projects to ensure that African smallholder farmers are continuously accessing more productive genetics, breeding and farmer education services and other related input services enabling their farming enterprises to be profitable and competitive businesses.
- Harness the Stem cells (Primordial germ cells (PGCs) and Induced pluripotent stem cells (iPSCs)) technologies for biodiversity conservation and testing preferential alleles for adaptation and disease resistance of tropical livestock and poultry.
- Harness the surrogate sire technology to develop locally-adapted surrogate sires for use in breeding and elite germplasm dissemination programs in Africa. This will be of greatest importance to improve livestock production in the ASALS of Sub-Saharan Africa through widespread distribution of high potential genetic semen through locally-adapted surrogate sires incorporated into the community system breeding programs.
- Strengthen the capacities of national and local ABS systems for improved implementation of the Nagoya Protocol and stewardship for animal biotechnology adoption and uptake in sub-Sahara Africa.

37. ILRI maintains alliances and partnerships with a range of partners for its work on animal genetic resources, including the following:

- Center for Tropical Livestock Genetics and Health (CTLGH) - is a strategic alliance of The Roslin Institute and Royal (Dick) School of Veterinary Studies at the University of Edinburgh, Scotland's Rural College, and the International Livestock Research Institute (ILRI).
- African Union – Inter African Bureau for Animal Resources (AU-IBAR).
- African Regional Economic Communities (RECs), National Agricultural Research Systems (NARS) like the Kenya Agricultural and Livestock Research Organisation (KALRO) and the Ethiopian Institute of Agricultural Research (EIAR).
- International Service for the Acquisition of Agri-biotech Applications (ISAAA).
- ABS Capacity building initiative – GIZ.

IV. AQUATIC GENETIC RESOURCES

Consideration of the draft global plan of action for aquatic genetic resources for food and agriculture

38. WorldFish made a number of submissions to 34th Session of the FAO Committee of Fisheries (COFI) that are relevant to 18th Session of the Commission concerning aquatic genetic resources. Those submissions are reproduced in the following paragraphs:

> *"In relation to the draft global plan of action for aquatic genetic resources for food and agriculture*
>
> *WorldFish:*

- welcomes the finalization of the report on The State of the World's Aquatic Genetic Resources for Food and Agriculture;
- supports the recommendations that Members develop national management plans on aquatic genetic resources (AqGR);
- supports full preparation and implementation of the Global Plan of Action;

- supports the development of a global registry of farmed types and an associated information system; accelerating the development of AqGR for aquaculture with emphasis on selective breeding; the conservation of threatened species, with emphasis on gene banking; and the development of relevant guidelines;
- supports putting in place practical Access and Benefit-Sharing (ABS) measures and material transfer agreements, if requested by Members, and further encourages Members and regional organizations to work with FAO on the development of concrete globally applicable models;
- recognizes the need for investment in capacity building, including training in genetics and breeding;
- supports the setting up a new coherent aquaculture program "Global Integrated Sustainable Aquaculture Program" drawing on complementary skills of FAO and R&D partners to achieve global outcomes.

39. In relation to the implementation of the FAO Strategy on Biodiversity Mainstreaming across fisheries and aquaculture:

40. WorldFish strongly agrees in saying that the irreparable loss of biodiversity can increase the vulnerability of poor people to climate and non-climate shocks, and reduce their abilities to meet their food and nutritional security needs and aspirations. We also believe ill-planned conservation measures can equally exacerbate poverty – for example, if poor peoples' access to essential natural resources is curtailed by setting up protected areas from which they are then excluded. Therefore, we recommend a people-centred and equitable approach to the conservation and sustainable use of aquatic biodiversity.

41. WorldFish also recognizes that Aquatic Genetic Resources (AqGR) provide the basic material for the production of food from both capture fisheries and aquaculture. However, we would like to express our concern that AqGR are inextricably linked with marine scientific research and bioprospecting, which at present remains the privilege of developed countries with enough financial resources and technological capacity to explore these resources. This raises a serious intra- and inter-generational equity issue. Therefore, WorldFish strongly supports the key action under Outcome 1, which states: "Assist Members, at their request, in improving capacity for developing, adapting and implementing access and benefit-sharing (ABS) measures to take into account the importance of genetic resources for food and agriculture, their special role for food security and their distinctive features." We recommend that the work on AqGR should be informed by the CBD Convention and the Nagoya Protocol, which enshrine the fair and equitable sharing of genetic resources within and beyond national jurisdiction, in particular Article 10 of the Nagoya Protocol. This should be done in such a way that the mechanism safeguards the interests of men and women who depend on these resources to survive, and facilitate a global multilateral benefit-sharing mechanism in transboundary situations."

V. MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES

Review of work on micro-organism and invertebrate genetic resources

42. ICRISAT maintains at least 1,500 accessions of beneficial bacteria, fungi and actinomycetes isolated from rhizosphere soil samples of sorghum, rice, chickpea and pigeonpea. Some of these strains (particularly *Streptomyces* spp.) are well characterized and have demonstrated plant growth-promoting traits including root and shoot weight, nodule number and weight, grain and stover yield in rice, sorghum, chickpea and pigeonpea. These *Streptomyces* strains have also demonstrated to have antagonistic traits against important pathogens such as *Fusarium* wilt, *Botrytis* gray mold and charcoal rot diseases and entomopathogenic traits against insect pests such as *Helicoverpa armigera*, *Spodoptera litura* and *Chilo partellus* on chickpea and sorghum. These beneficial microorganisms are shared with researchers on request.

43. ICRISAT is part of FAO working group for the ASEAN Action Plan on Fall Armyworm (FAW) Control. This initiative works towards integrated pest management of FAW.

44. CIP historically accumulated substantial collections of crop-associated invertebrates, bacteria, nematodes fungi and viruses, including both pathogens, plant growth promoting as well as biological control agents. However due to lack of dedicated funding and loss of associated expertise over the last 15 years, these collections have been largely donated to local universities and/or research organizations, or in some cases lost due to lack of maintenance.

VI. PLANT GENETIC RESOURCES

General overview about CGIAR genebanks and their most relevant activities

45. CGIAR genebanks have been impacted to varying degrees by COVID pandemic related travel and work restrictions. To date, the genebanks in Latin America have experienced the longest and strictest lockdown conditions. Despite this, by the end of the year, a total of 43,530 plant germplasm samples (36,661 accessions) were distributed by CGIAR genebanks to users, which represents around half the amount of germplasm distributed in a normal year. The total number of requests from external users (i.e. users outside CGIAR) was reduced by more than a quarter.

46. By the end of 2020, CGIAR genebanks were managing a total collection of 736,210 crop, forage and tree accessions, including 26,224 in vitro accessions and 32,930 accessions held as trees or plants in the screenhouse or field. Approximately 82% of the total collection is acceptably viable, free of quarantinable disease, with adequate stock and legally available for international distribution. Of the seed accessions, 60% is secured in safety duplication at two levels and 78% is duplicated at the Svalbard Global Seed Vault (SGSV). 65% of clonal crop collections is safety duplicated in the form of cryopreserved or in vitro cultures.

47. In 2020, the Genebank Platform, working with the genebank managers, in close collaboration with the Secretariats of the Treaty and the Commission developed a 'Guidance note for CGIAR Genebanks on improving accession management'. It was reviewed by the Director Generals of the 'Article 15 Centers' in January 2020 and thereafter submitted to the CGIAR Executive Management Committee for consideration.

48. Since the unfortunate events in Syria leading to the loss of the collection maintained by ICARDA in Aleppo, ICARDA has been proactive in ensuring that collection becomes available as soon as possible for the international community through genebanks managed by ICARDA in Morocco and Lebanon. Over the past 5 years, ICARDA has been engaged in intensively regenerating safety duplications of the original collection that is being stored in the Svalbard Global Seed Vault and Ankara Genebank (a total of 134,809 accessions). In addition, since 2012, ICARDA's genebank has acquired 15,759 new accessions and further enriched its collection through new collecting missions across many countries conducted by ICARDA with partners from NARS and advanced research institutes.

49. In December 2020, IITA, AfricaRice, ICRISAT, ICRAF, the World Vegetable Center and CORAF (Le Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles), co-organized a regional consultation meeting in Dakar, Senegal, with the objective to come up with a strategy and action points for an improved conservation, exchange and use of plant genetic resources in West and Central Africa, as well as to develop collaboration terms and conditions for a stronger and more efficient PGR network in the region. The meeting involved CGIAR genebank managers, country focal points for plant genetic resources, national genebank managers, and phytosanitary, data and policy experts. It was funded by ICRISAT and The Global Crop Diversity Trust.

Draft Practical Guides for the Application of the Genebank Standards for Plant Genetic Resources for Food and Agriculture

50. CGIAR has followed the development of the Draft Practical Guides for the Application of the Genebank Standards for Plant Genetic Resources for Food and Agriculture.

51. For all national and international genebanks, and certainly for CGIAR genebanks, the practical guides will play an extremely important role in implementing operations, monitoring, audit, review, training and funding. CGIAR genebank managers are currently (as of submission of this report)

reviewing the draft guides and sending their comments to FAO, in collaboration and coordination with the Global Crop Diversity Trust.

Status of preparation of The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture (3rd SoW PGRFA)

52. CGIAR Centers were requested in January 2021 to contribute to the preparation of the Third Report by completing an ad hoc survey that focused on Priority Areas 5-11, 14-17 of the Global Plan of Action. All the CGIAR Centers hosting Article 15 collections made extensive responses to the survey.

53. One background study to be included in the 3rd SOW PGRFA focusses on *Germplasm exchange.* Since approximately 90% of all PGRFA exchanges under the Treaty's multilateral system of access and benefit-sharing are from CGIAR Centers, CGIAR should be consulted/included in the development of this paper to provide contextual information to complement the raw data on exchanges that are available through the VIEWS reporting tools and the SMTA reporting data store.

54. As noted above in the section dealing with ABS issues, CGIAR suggests including an additional background study in the 3rd SoW PGRFA on non-monetary benefit-sharing.

VII. FOREST GENETIC RESOURCES

55. The Alliance of Bioversity International and CIAT are currently working with FAO to provide support with the preparation of The Second Report on the State of the World's Forest Genetic Resources (SoW-FGR-2). As part of this collaboration the Alliance is summarizing the results of, and lessons learnt from Bioversity International's global research programme on forest genetic resources, with some illustrative case studies.

56. The Alliance continues to provide technical support to FAO in capacity development for tree and forest restoration practitioners. As part of this work, regional workshops have been organized in Asia-Pacific, Mediterranean and Sahel regions.

57. As part of its work on the use of tree genetic diversity for restoration purposes, the Alliance has developed and is further expanding a user-friendly online tool, Diversity for Restoration (D4R; www.diversityforrestoration.org) intended to assist decision makers and restoration practitioners with the selection of tree species and seed source to restore tropical forest landscapes. The tool was originally developed for the tropical dry forests of Colombia, but it has been widely expanded to cover tropical dry forests of northwestern Peru - southern Ecuador, Burkina Faso, Cameroon, and further expansion is underway. The species catalogue contains hundreds of species, each profiled through information derived from scientific literature and traditional knowledge. More specifically the tool integrates habitat suitability maps under current and future climatic conditions, functional trait data, local ecological knowledge, threat status, optimization functions based on functional trait diversity or phylogenetic diversity to foster complementarity effects in species selection and seed zone maps that guided the identification of seed sources.

58. The Alliance also provides technical support and assistance with fund raising to three regional networks: APFORGEN (Asia Pacific Forest Genetic Resources Programme), SAPFORGEN (South Asia and Pacific Forest Genetic Resource Programme) and LAFORGEN (Latin America Forest Genetic Resource Programme). These networks play an important role in convening key experts and practitioners with an interest in the conservation and sustainable use of forest genetic resources. The Asia Pacific Forest Genetic Resources Programme (APFORGEN, www.apforgen.org), which involves 15 Asian countries, has developed a regional strategy to support the implementation of the Global Plan of Action on Forest Genetic Resources. The Strategy includes objectives for (i) mobilising political and financial support for implementing the Global Plan of Action; (ii) making available information about forest genetic resources; (iii) developing conservation and sustainable use strategies for regionally important and threatened tree species and (iv) strengthening tree seed systems to support forest and landscape restoration and livelihood improvement. APFORGEN also collaborates with FAO to support the region's countries in national reporting for The Second State of the World's Forest

Genetic Resources Report. As part of this support, the programme co-organised a regional capacity strengthening workshop on reporting requirements, in October 2019.

59. Availability of quality tree genetic resources is crucial to ensure successful landscape restoration programs in Africa and all over the world. In the last four years (2017-2021), the PATSPO project, led by ICRAF and funded by Norwegian International Climate and Forest Initiative, has worked to ensure access to high-quality planting material of the most important tree species used for forest landscape restoration and all other tree-planting activities in Ethiopia. Key achievements of the project have been: 1) a national Tree Seed Network established in collaboration with the Environment, Forest and Climate Change Commission (EFCCC) to enhance collaboration and coordination among all stakeholders in the tree seed sector, including the private sector; 2) support to EFCCC in the preparation of a tree seed proclamation and a tree seed policy as a legal foundation to support procurement of high quality tree seed in Ethiopia; 3) tree species distribution and production of a climate atlas for Ethiopia covering 150 species (to be finalized in 2021); 4) an application on 'What trees to plant where' (to be finalized in 2021); 5) assessment of possible use of genomic studies (DNA) in tree breeding in Ethiopia; 6) 100+ existing tree seed sources described and registered in collaboration with the five Regional Tree Seed Centers (RTSCs); 7) 30 Breeding Seedling Orchards (BSOs) of 14 priority tree species (mostly indigenous) established at 10 sites; 8) 25 training courses (some of them in collaboration with Ethiopian universities) on technical, management and information aspects of tree seed procurement; 9) tree improvement conducted for over 400 participants; 10) over 500 farmers involved in tree seed collection trained on aspects of tree seed procurement; 11) over 80 publications – training/extension materials (posters, technical notes, etc.), technical reports, technical guidelines and leaflets – produced and disseminated. More information can be found on PATSPO homepage.[33]

60. CIFOR and ICRAF have recently combined various resources, including databases, maps, apps, guidelines and software packages that were designed to help practitioners in the field and scientists to "select the right tree for the right place for the right purpose" into its Global Tree Knowledge Portal, available from https://worldagroforestry.org/tree-knowledge (see also https://www.cgiar.org/innovations/a-global-tree-knowledge-platform/). The resources available from the portal include the three following: *Africa Tree Finder:* This smartphone app provides information on the distribution of indigenous tree species in different natural vegetation types in Kenya and Uganda. It also gives information about the products and services that these trees can provide and information on how to manage the trees. *Useful Tree Species for Africa*: This tool provides a vegetation map for the whole of Africa and indicates which tree species are found in which vegetation zone, along with the potential uses of each species. *vegetationmap4Africa*: This interactive, high-resolution map features the vegetation types of eight countries in eastern Africa (Burundi, Ethiopia, Kenya, Malawi, Uganda, Rwanda, Tanzania and Zambia). The online map, which is complemented by a species' selection tool, helps tree planters and land managers decide which species to grow where in the region.

61. ICRAF is leading a consortium of the World's largest international NGO's - World Vision, OXFAM, CARE International, Catholic Relief Services and Sahel-Eco on the Regreening Africa Project to implement a tree-based land restoration initiative across eight countries covering the Sahel and East African agro ecologies. Natural regenerative practices are being promoted based on ICRAF's technical support and evidence based approaches that involve access to diverse tree seed material, propagation knowledge and best practices on managing tree nurseries. Access to seeds for over 40 tree species have been supported through ICRAF's global tree gene bank/GRU unit with at least 456 tree nurseries benefiting so far across the eight countries. Production of locally suited planting materials is helping mitigate problems of invasive species in countries with weak or non-existent national tree seed supply institutions and widespread forest degradation.

VIII. INTRODUCING ONE CGIAR

62. CGIAR is currently in the latter stages of a system-wide reform designed to increase our efficiency and effectiveness in response to evolving global challenges. The *CGIAR 2030 Research and*

[33] https://worldagroforestry.org/project/provision-adequate-tree-seed-portfolio-ethiopia

Innovation Strategy: Transforming food, land, and water systems in a climate crisis[34] provides an outline of the research and development priorities of CGIAR. CGIAR research will be organized under three research areas: System Transformation, Resilient Agrifood Systems, and Genetic Innovation. Work within those research areas is carried out through the Research Initiatives in Figure 1. More details about the Initiatives can be found on the CGIAR website.[35]

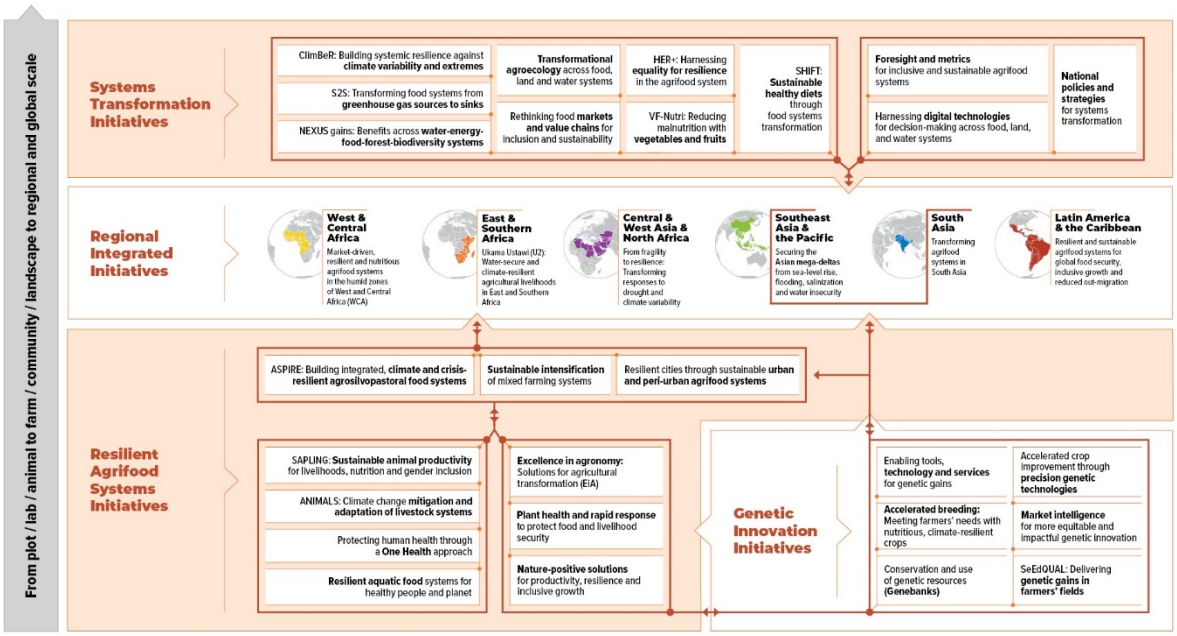

Figure 1: One CGIAR Research Initiatives

63. Most research and development activities working directly with genetic resources for food and agriculture will take place under Genetic Innovation, which includes the CGIAR genebanks, plant breeding, and seed systems. Of course, there is also genetic resources-related work taking place in other initiatives, for example, Nature Positive Solutions (which includes work on conservation and sustainable use of agricultural biological diversity), Transformational Agroecology, and Sustainable Healthy Diets, but the bulk of that work will take place under Genomic Innovation.

64. The One CGIAR reform process has involved considerable realignment and integration of the governance and operational structure of the CGIAR System overall. However, it is important to note that the CGIAR Centers will maintain their legal status as independent legal entities in their own right, and that their Article 15 agreements with the Governing Body of the Treaty will remain in place. CGIAR considers the 'in trust' plant genetic resources maintained by the CGIAR genebanks to be of inestimable value for the international community. CGIAR remains committed to supporting the continued management of collections hosted by IARCs, included within One CGIAR under the framework of the Treaty. One of the advantages of the One CGIAR reform process is that it will facilitate faster, more regular, harmonized reporting to the Governing Body of the Treaty, and, by strengthening a single point of engagement with the Treaty, as preferred by the Governing Body, will enable more proactive efficient CGIAR-wide engagement in activities under the Treaty framework.

65. Although CIFOR-ICRAF and ICRISAT have declined at this point in time to join the One CGIAR unified governance, their Article 15 agreements with the Treaty's Governing Body remain in force. ICRISAT and ICRAF will continue to ensure their genebanks are operated and maintained as per international standards. Furthermore, ICRISAT and ICRAF will continue to conserve materials for the international community, under the auspices of the UN FAO and the Treaty, as per the agreements signed in 1994 and 2006, and will continue to deliver their missions to international agriculture, food systems and landscape stewardship. CGIAR representatives will be present at the Commission

[34] Available at https://cgspace.cgiar.org/bitstream/handle/10568/110918/OneCGIAR-Strategy.pdf
[35] https://www.cgiar.org/news-events/news/cgiar-announces-new-portfolio-to-transform-food-land-and-water-systems-in-a-climate-crisis/

meeting in September. They will be able to provide Parties and Observers with additional information on the issues addressed in this report.