



# COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

## Item 3 of the Provisional Agenda

### INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

#### Twelfth Session

Rome, 10–12 December 2024

### FINALIZATION OF *THE THIRD REPORT ON THE STATE OF THE WORLD'S PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE*

#### TABLE OF CONTENTS

	Paragraphs
I. Introduction .....	1–5
II. Background .....	6–8
III. Data collection and main sources of information .....	9–16
IV. Preliminary key findings of <i>The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture</i> .....	17
(1) The state of <i>in situ</i> conservation and management .....	18–25
(2) The state of <i>ex situ</i> conservation .....	26–36
(3) The state of sustainable use .....	37–49
(4) The state of human and institutional capacities .....	50–68
V. Budget .....	18
VI. Guidance sought .....	9

## I. INTRODUCTION

1. *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (Third Report) is one of the milestones of the 2023–2031 Strategic Plan for the Commission on Genetic Resources for Food and Agriculture.<sup>1</sup>
2. At its Nineteenth Regular Session, the Commission took note of the draft Third Report and recommended that information on gaps in data from national reports on the implementation of the *Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*<sup>2</sup> (Second GPA) be included in the Third Report. It further recommended that for the different topics discussed therein, the number of reporting countries be made explicit and general statements about changes be substantiated with quantitative data and references. It further recommended that a section on key findings be included in each chapter.<sup>3</sup>
3. As requested by the Commission, the draft Third Report was also made available to the Tenth Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty).<sup>4</sup> The Governing Body invited Contracting Parties to provide additional comments and inputs through the process of the Commission.<sup>5</sup>
4. As requested by the Commission, a revised – unedited – version of the Third Report, was made available in August 2024, for comments and inputs by Members and observers. A proofing version of the Third Report, revised in light of comments and inputs received, is provided as an information document, *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture – Proofing version*.<sup>6</sup>
5. This document considers historical background, and identifies key sources of information used for the Third Report and preliminary key findings. It further seeks the Working Group's guidance regarding the dissemination of the findings of the Third Report.

## II. BACKGROUND

6. The first report on *The State of the World's Plant Genetic Resources for Food and Agriculture* (First Report) was launched by FAO in 1996 during the Fourth International Technical Conference on Plant Genetic Resources.<sup>7</sup> *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (Second Report) was presented by FAO on the occasion of the Commission's Twelfth Regular Session in 2009.<sup>8</sup> The Second Report, an update to the First Report, presented the changes and developments that had occurred since 1996. It provided an assessment of the status and trends of PGRFA and identified the most significant gaps and needs.
7. Both reports attracted considerable attention and generated global policy responses. In response to the findings of the First Report, the rolling Global Plan of Action on the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (GPA) and the Leipzig Declaration on Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (Leipzig Declaration) were adopted by 150 countries attending the Fourth International Technical Conference on Plant Genetic Resources in 1996. The Leipzig Declaration provided added impetus for the revision of the International Undertaking on Plant Genetic Resources, which resulted in the adoption of the International Treaty in 2001. In response to the Second Report, the Commission

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<sup>1</sup> CGRFA-19/23/Report, *Appendix E*, Annex 1.

<sup>2</sup> FAO. 2011. *Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i2624e>

<sup>3</sup> CGRFA-19/23/Report, paragraph 45.

<sup>4</sup> IT/GB-10/23/16.1/Inf.2.

<sup>5</sup> IT/GB-10/23/Report, Resolution 10/2023.

<sup>6</sup> CGRFA/WG-PGR-12/24/3/Inf.1.

<sup>7</sup> FAO. 1998. *The State of the World's Plant Genetic Resources for Food and Agriculture*. Rome. <https://www.fao.org/3/w7324e/w7324e.pdf>

<sup>8</sup> FAO. 2010. *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i1500e>

revised the GPA and the FAO Council, on behalf of the FAO Conference, adopted the Second GPA in 2011.<sup>9</sup>

8. In 2013, the Commission endorsed a timeline for the preparation of the Third Report.<sup>10</sup> The timeline reflected the full integration of the preparatory process for the Third Report with the monitoring of the implementation of the Second GPA. It envisaged two rounds of periodic country reporting based on agreed indicators and a corresponding reporting format developed for the purpose of monitoring the status of implementation of the Second GPA. The integration of the two processes – the monitoring of the implementation of the Second GPA and country reporting for the Third Report – implied changes for the Third Report. The Third Report follows the structure of the Second GPA, and provides both a global assessment of the state of the world's PGRFA and an analysis of countries' efforts in the implementation of the Second GPA.

### III. DATA COLLECTION AND MAIN SOURCES OF INFORMATION

9. Key sources of information for the Third Report include the data, reports and so-called summative narratives provided by countries through their National Focal Points (NFPs). In addition, the Third Report draws on reports by international agricultural research centres and regional genebanks, thematic background studies and other relevant information.

10. In 2015, the reporting format was made available to the Commission at its Fifteenth Regular Session.<sup>11</sup> Following a pilot phase, which served to finalize and finetune the online Reporting Tool, the official country reporting on the implementation of the Second GPA commenced in October 2015. NFPs were invited to report on the status of PGRFA and the implementation of activities carried out during the period of 1 January 2012 to 30 June 2014. Country reporting was based on an approach and timeline endorsed by the Commission at its Fourteenth Regular Session.<sup>12</sup>

11. The results of this first assessment of the implementation of the Second GPA were made available to the Commission at its Sixteenth Regular Session in 2017 in the form of a *Summary assessment of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture 2012-2014*<sup>13</sup> and a more detailed report, *Assessment of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture 2012-2014*.<sup>14</sup>

12. In 2017, at its Sixteenth Regular Session, the Commission requested FAO to consult Commission Members and observers on options for simplifying the reporting format. Given the relatively small number of countries that had provided information during the first monitoring cycle and other experience gained during that cycle, the Commission extended the deadline for reporting to 31 December 2017 and endorsed a revised timeline for the preparation of the Third Report. At its Seventeenth Regular Session in 2019, the Commission endorsed the revised reporting format to be used for the second country reporting cycle spanning the period of July 2014 to December 2019. It invited NFPs to provide a summative narrative of the progress made (between January 2012 and December 2019) and the remaining gaps and constraints. The initial deadline for reporting was 31 December 2020. The Commission, at its Eighteenth Regular Session, agreed to extend that deadline to the end of December 2021 to account for the delays in reporting caused by the challenges and constraints of the COVID-19 pandemic.

13. In order to facilitate the reporting process, FAO made available the online Reporting Tool through the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS) portal in 2015. The user manual,<sup>15</sup> as well as the guidelines for country

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<sup>9</sup> CL 143/REP, paragraph 43.

<sup>10</sup> CGRFA-14/13/Report, paragraph 101.

<sup>11</sup> CGRFA-15/15/Inf.9.

<sup>12</sup> CGRFA-14/13/Report, paragraph 23 and Appendix C.

<sup>13</sup> CGRFA-16/17/Inf.17.1.

<sup>14</sup> CGRFA-16/17/Inf.17.2.

<sup>15</sup> FAO. 2020. *WIEWS Reporting Tool on the Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture – User Manual*. Rome.  
[http://www.fao.org/fileadmin/user\\_upload/wiews/docs/UserManual\\_EN.pdf](http://www.fao.org/fileadmin/user_upload/wiews/docs/UserManual_EN.pdf)

reporting,<sup>16</sup> were made available in the six official languages of FAO. In addition, FAO held online training sessions in English, French and Spanish to assist NFPs and stakeholders in the preparation of country reports. The training sessions provided an overview of the process for the preparation of the Third Report as well as introductions to the guidelines for country reporting, the functionality of the WIEWS Reporting Tool and an overview of the expected outputs. Over 440 participants from more than 75 countries attended the training sessions and recordings were made available online. In addition, FAO provided bilateral technical assistance, including short training sessions, to address country-specific issues and queries.

14. The draft Third Report has been prepared with contributions from a total of 128 countries. 106 countries provided reports on the implementation of the Second GPA for the reporting period of January 2012 to December 2019 and 116 countries provided reports on the PGRFA component of Sustainable Development Goal (SDG) indicator 2.5.1a (Figure 1). *Ad hoc* reports on the implementation of the Second GPA were received from 12 international centres, and reports on SDG 2.5.1a received from 13 international and four regional genebanks.

15. The Third Report relies on different types of information:

- i. data on the implementation of the Second GPA provided by a total of 106 countries over the two reporting cycles:
  - 90 countries for the period of January 2012 to June 2014 (reporting undertaken in 2015–2017); and
  - 94 countries for the period of July 2014 to December 2019 (reporting undertaken in 2020–2021);
- ii. summative narratives provided by 85 countries (reporting undertaken in 2021);
- iii. *ad hoc* reports on the implementation of the Second GPA by 12 international agricultural research centres;
- iv. data on SDG indicator 2.5.1a reported annually by countries, regional and international research centres for 2014 and 2016–2022;
- v. thematic background studies commissioned by FAO; and
- vi. other relevant information.

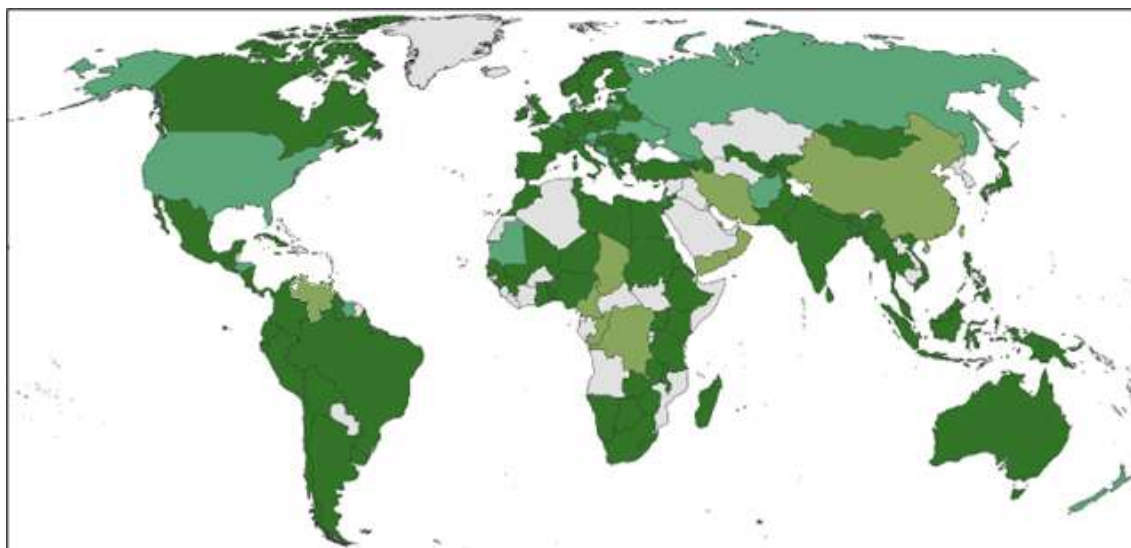


Figure 1. Countries that contributed to the preparation of the draft Third Report. Dark green denotes countries that reported on both the implementation of the Second GPA and SDG 2.5.1a. Light green denotes countries that reported on GPA implementation only. Turquoise denotes countries that reported on SDG 2.5.1a only.

16. At its Eighteenth Regular Session, the Commission supported the preparation of thematic background studies on climate change, nutrition, genotyping and phenotyping, novel biotechnologies

<sup>16</sup> CGRFA-18/21/12.4/Inf.1 Rev.1.

and germplasm exchange.<sup>17,18</sup> In response, FAO commissioned subject matter specialists to prepare the thematic background studies, which – at the time of writing – are being finalized for publication. Their findings have been reflected in the draft Third Report.

#### **IV. PRELIMINARY KEY FINDINGS OF THE THIRD REPORT ON THE STATE OF THE WORLD'S PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE**

17. The Third Report includes an introductory chapter and chapters covering the four key areas of the Second GPA, which identify related gaps and needs in each area:

- (1) The state of *in situ* conservation and management;
- (2) The state of *ex situ* conservation;
- (3) The state of sustainable use;
- (4) The state of human and institutional capacities.

##### **The state of *in situ* conservation and management**

18. *In situ* conservation and on-farm management of PGRFA is essential for supporting adaptation processes in their natural or usual habitats. As land use, climate and other factors increasingly threaten PGRFA diversity, the need for its conservation *in situ* and on-farm management has gained recognition. The second chapter of the Third Report addresses the current state of conservation and management of PGRFA *in situ* and on-farm based on reports from 97 countries. This chapter also discusses assistance provided to farmers in disaster situations and the impact of emergency assistance on PGRFA diversity. Additionally, it summarizes threats, challenges, gaps and needs related to *in situ* conservation and on-farm management.

##### *Surveying and inventorying PGRFA*

19. Over the reporting period, important progress has been made in the number of surveys and inventories of PGRFA undertaken *in situ* and on-farm. A total of 80 countries reported over 6 200 taxa surveyed, of which approximately 43 percent were food plants from nine use groups: fruit plants, vegetables, roots and tubers, herbs and spices, pulses, cereals, oil plants, pseudo cereals and nuts. Approximately 42 percent of surveyed taxa were reported to be threatened at either the species or varietal levels in at least one survey; including approximately 35 percent of 1 049 taxa of crop wild relatives (CWR) and 38 percent of 405 taxa of wild food plants surveyed. Surveys of farmers' varieties/landraces (FV/LR) found an average of 6 percent of their diversity was threatened globally, although results from nine of 18 subregions were more alarming, with 18 percent or more of FV/LR diversity reported as threatened.

##### *In situ conservation of crop wild relatives and wild food plants*

20. During the reporting period, the area of protected *in situ* conservation sites increased by 16 percent to almost 13 million km<sup>2</sup> in 59 out of 69 reporting countries, compared to the area increasing by 11 percent to 22.4 million km<sup>2</sup> globally.<sup>19</sup> CWR and wild food plants were mainly conserved passively, as only 6 percent of *in situ* conservation sites in the reporting countries had management plans specifically addressing the conservation of these important plant groups. Almost all countries reported that activities relating to the conservation of wild PGRFA were primarily supported by national institutions either as the sole source of support (51 percent) or in collaboration with others (30 percent).

21. *In situ* conservation involved a variety of activities, including the implementation of management practices to maintain high levels of genetic diversity, involvement of local communities,

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<sup>17</sup> CGRFA-18/21/12.4.

<sup>18</sup> CGRFA-18/21/Report, paragraph 108.

<sup>19</sup> <https://www.protectedplanet.net/>

arrangements for *ex situ* conservation of threatened and endangered populations, and/or plans for encouraging public participation.

*On-farm management and improvement of PGRFA*

22. During the reporting period, farmers continued to maintain and improve significant genetic diversity of locally adapted traditional varieties and landraces on-farm. Approximately 37 million hectares in 51 countries – equivalent to 45 percent of the total crop area of reported sites within areas of high diversity – were cultivated with FV/LR. This includes over 160 crops and 60 mixed crop groups in over 400 localities globally.

23. During the reporting period, the number of programmes, projects and activities for on-farm conservation and management of FV/LR increased, totaling over 1 100 initiatives in 81 countries. These initiatives included efforts to characterize FV/LR, assess the utilization and management of local varieties and farmers' knowledge for on-farm PGRFA management, and implement participatory plant breeding. In addition, a number of countries adopted community-based approaches for managing local crop diversity, such as community seed banks. The country reports indicate that farmers are increasingly involved, at least in some countries, in research and training activities. Complementing these efforts, capacity development and marketing initiatives that target farmers and other stakeholders and aim to strengthen on-farm management of PGRFA appear to be on the rise in an increasing number of countries.

*Restoration of crop systems after disasters*

24. The frequency and severity of erratic extreme weather events, as well as the increasing incidence of pests and diseases and the effects of civil unrest and war, appear to have driven a considerable rise in the demand for seed aid to restart crop production after crises. During the reporting period, almost 400 interventions in 48 countries distributed quality seeds and planting materials to farmers and communities as part of emergency aid. Most countries that reported such interventions following disasters are in Africa, while the highest number of interventions was reported by countries in Asia. A major difficulty in such situations is securing quality seeds and planting materials of adapted varieties from local or nearby sources. Climatic events were the cause for about two-thirds of all interventions, with drought as the main cause, followed by floods.

*Gaps and needs*

25. In some countries, a lack of coordination among ministries of agriculture, forestry and environment is a major constraint hindering effective conservation activities. Strengthening linkages with genebanks is essential for enhancing complementarity among *in situ* conservation, on-farm management and *ex situ* conservation approaches. To enhance the adoption of well-adapted quality seeds and planting materials, participatory variety selection and plant breeding with farmers should be strengthened through close cooperation among breeders, genebanks, farmers and community seed banks. Human capacity is also a limiting factor that needs to be urgently addressed to ensure an adequate availability of specialized staff, including taxonomists. While impacts on the agricultural sector after emergencies are often estimated in terms of monetary and nutrition costs, many countries reported a gap in assessing the impacts of disasters on crop diversity. An additional challenge is the identification of reliable sources of materials; the germplasm distributed to farmers after disaster situations may not always be fully adapted to the local conditions or the cultural environment.

**The state of *ex situ* conservation**

26. *Ex situ* conservation safeguards PGRFA in a controlled environment and facilitates access by stakeholders. *Ex situ* conservation also provides a complementary backup for material conserved and managed *in situ* and on-farm. The third chapter of the Third Report addresses *ex situ* conservation efforts worldwide and focuses predominantly on materials maintained in genebanks.

*Overview of *ex situ* collections*

27. Germplasm collections totaling over 5.9 million accessions are conserved under medium- and long-term storage conditions in base collections of over 850 national genebanks in 116 countries, as well as four regional and 13 international genebanks. This represents a 6 percent increase compared to

collections reported in 2009. The biological status of the conserved germplasm is documented for 72 percent of the accessions reported. These include approximately 1 532 000 accessions of FV/LR and 727 000 accessions of wild materials, of which approximately 548 000 are CWR and 47 000 are wild food plants. The remaining accessions are improved varieties and breeding materials. The country of origin is known for approximately 70 percent of the accessions. The crop groups with the largest numbers of accessions conserved are the major food crops, including cereals, pulses, roots and tubers, and vegetables. The majority (79 percent) of accessions are conserved as seed, followed by conservation in field collections and *in vitro*.

#### *Safety duplication of stored material*

28. At the end of 2022, approximately 41 percent of all *ex situ* holdings were safety duplicated, a significant increase from 15 percent in 2014. Overall, 69 percent of all safety duplicated accessions are conserved as seed at their origin, 2.3 percent in field collections and less than 1 percent *in vitro*. Over 1 million accessions (43 percent of the safety duplicated holdings) were deposited at the Svalbard Global Seed Vault (SGSV), demonstrating that countries are taking increasing advantage of the SGSV as a long-term black-box storage facility. However, there is still a need to provide sustainable, long-term cryo-storage backup for species that are vegetatively propagated or produce recalcitrant seeds.

#### *Redundancy within and between collections and the uniqueness of germplasm accessions*

29. The degree of uniqueness is estimated to be approximately 37 percent of total *ex situ* holdings. Regarding unwanted duplications, continued rationalization efforts have resulted in some progress made at both the country level and within international genebanks. However, redundancies within and among collections have remained poorly documented overall and require continued attention. A number of species (e.g. *Uapaca kirkiana*, *Persea schiedeana*, *Dioscorea rotundata*, *Ensete ventricosum*, *Citrullus amarus*, *Piper aduncum*, *Vigna minima*, etc.) are conserved in only one or very few genebanks, which poses a risk that failure to conserve the material in these genebanks could mean a complete loss of the species.

#### *Acquisition of germplasm*

30. Between 2012 and 2019, almost 250 000 samples were collected by 366 institutes in 87 reporting countries. Of these, approximately 13 000 samples were CWR and just over 5 000 were wild food plants. A number of countries report to have strategies for targeted collecting, including to address missing genetic diversity, eco-geographic coverage, coverage of targeted taxa (including CWR), and trait-specific gaps (such as resistance to pests and diseases). Although acquisition of germplasm through collecting has improved, many genebanks could still benefit from more targeted collecting based on gap analyses. Despite renewed interest in the acquisition of CWR, collecting wild species often fails due to the unavailability of staff specialized in relevant disciplines, such as taxonomy and phenology.

#### *Germplasm health*

31. Germplasm health issues seem to receive increasing attention in the conservation, distribution and use of PGRFA. The increased movement of germplasm within and between countries and continents enhances the potential spread of pests and diseases. Overall, awareness and management of germplasm health issues appear to have improved during the reporting period. However, a number of national genebanks still lack adequate human and financial resources to effectively monitor germplasm health, which greatly affects germplasm exchange.



### *Regeneration*

32. Regeneration remains a key challenge for many countries and genebanks. Approximately one-third of the accessions reported by countries were regenerated between 2012 and 2019, while 24 percent are in need of regeneration. In particular, the regeneration of CWR and out-crossing species is problematic for many genebanks. Over 900 000 accessions were regenerated by CGIAR centres and WorldVeg during the reporting period. At the end of 2019, just under 180 000 accessions (20 percent) were in need of regeneration and the budget to regenerate just over 28 500 accessions was lacking safety duplication at these centres. Among the regional genebanks, NordGen regenerated 17 percent of its holdings over the reporting period, with 14 percent in need of regeneration.

### *Documentation*

33. Documentation has been highlighted as an essential part of genebank management for many years. Despite this, as well as support provided in this regard, including by the Crop Trust, many countries still lack genebank management information systems and thus struggle to document passport and other genebank management data. However, the situation shows signs of improvement with the increasing availability of improved open-source software for genebank data management, such as the new Grin-Global Community Edition. Standardized passport data and Data Object Identifiers (DOIs) are increasingly being applied for germplasm exchange and cross-referencing germplasm in publications. Greater efforts are still needed to train data specialists and genebank managers to adopt and use these improved systems and tools.

### *Germplasm movement*

34. Between 2012 and 2019, national genebanks in 87 countries distributed almost 1.3 million accessions, with over 90 percent distributed domestically. The main recipients included national agricultural research centres, farmers, NGOs and the private sector. Approximately 56 percent of all distributed accessions and 38 percent of distributed samples reported through WIEWS were of crops listed in Annex 1 of the International Treaty. The remaining 44 percent of distributed accessions were soybean, cotton, tomato, tobacco, *Capsicum*, *Acacia*, pear, sesame, cocoa, okra, teff, flax, tea, beets, cucumber and melon, each with over 5 000 accessions distributed.

### *Gaps and needs*

35. Notwithstanding the achievements and advances that have been made over the past ten years, many of the issues that impede the efficient and effective conservation of PGRFA still remain and need to be addressed. *Ex situ* conservation still lacks the necessary political and financial support in many countries, which often results in limited or sporadic funding, lack of sufficiently qualified staff, and insufficient infrastructure and logistics. Key activities, such as viability testing, regeneration and safety duplication, continue to suffer from this lack of support. In addition, several national genebanks lack the human and/or technical capacity necessary to effectively address germplasm health issues.

36. Existing regional genebanks provide a model for collaboration that could support national programmes by coordinating and pooling resources for training, backup storage and collaboration on essential activities, such as viability and germplasm health testing, regeneration and characterization, including molecular characterization. While this approach could result in cost efficiencies, it would still require political commitment and coordination. Collaboration with universities, other research institutes and the private sector could further enhance the conservation and sustainable use of PGRFA.

### **The state of sustainable use**

37. During the reporting period, progress was made in the sustainable use of PGRFA, in particular through: the promotion of diverse farming systems; research on PGRFA; plant breeding; broadening the genetic base of crops through pre-breeding; the utilization of local and locally adapted crops, varieties and underutilized species; and the release of crop varieties and seed delivery systems.

### *Characterization, evaluation and specific subsets of collections*

38. Country data indicates a significant increase in the number of accessions characterized, as well as progress in the development of thematic collections for traits of interest between 2012 and 2019.



This has facilitated a better understanding and improved exploitation of germplasm collections. By the end of 2019, almost 800 000 germplasm accessions – held by 289 genebanks in 70 countries, and representing 30 percent of the total genebank holdings in these countries – were characterized, on average for 24 traits. Recent advances in biotechnologies, especially next-generation sequencing and high-throughput phenotyping, are increasingly utilized to enhance efficiencies in germplasm characterization and evaluation. An overall increase in the adoption of DNA marker technologies for the assessment of genetic variation was reported by 53 countries from five regions. However, not all countries have access to these technologies and many lack the capacity to utilize them. Collaboration, capacity-building and technology transfer are essential to ensure that all countries can fully benefit from the diversity of PGRFA.

39. Most existing characterization and evaluation data are not publicly available due to sub-optimal information and data management systems. Additionally, the ongoing lack of sufficient characterization and evaluation data often hinders targeted selection of accessions possessing specific traits and, in this regard, there is a substantial need for improvement.

*Plant breeding, genetic enhancement and base-broadening*

40. Over 350 national research organizations from 76 countries reported the use of pre-breeding (i.e. the introgression of novel traits from non-adapted materials into breeding populations) for 322 crop species. While pre-breeding activities took place in all regions during the reporting period, they do not appear to have yet become a routine crop improvement strategy. This suggests a largely unused opportunity for strategic collaboration between genebank managers and breeders.

41. Breeding activities were reported by 87 countries, targeting almost 500 crop species across all major crop groups. While yield continues to be the prioritized trait in crop breeding programs, resistance to biotic and abiotic stresses – especially as a climate change adaptation strategy – and quality traits for enhanced nutrition are also frequently cited as breeding objectives. The number of countries that report farmer participatory plant breeding more than doubled since the Second Report.

42. Alongside important advances in high-throughput and low-cost genotyping, in particular genome sequencing, significant advances in morphological and biochemical characterization of plants provide new opportunities. Country data indicates an upsurge in the application of modern plant breeding techniques, in particular genomic selection and the more recent genome editing technologies, including CRISPR/Cas9, during the reporting period.

*Diversification of crop production*

43. Activities aimed at increasing of intra- and/or inter-specific diversity in crop production systems were reported by 73 countries. In addition to focusing attention on mixed cropping and crop rotation, diversification initiatives increasingly focus on the introduction of new crops, the re-introduction of crops and the domestication of wild species.

*Development and commercialization of farmers' varieties/landraces and underutilized species*

44. Countries report various measures aimed at enhancing the cultivation of FV/LR and promoting their development and commercialization. Over 500 FV/LR were registered in 29 countries across all regions during the reporting period. Most registrations occurred during the last two years of the reporting period (2018–2019), reflecting the resurgent interest in FV/LR and their growing market opportunities. This development is contrasted with the progressive discontinuation in the cultivation of many FV/LR, perhaps reflecting the declining number of farmers – and with them, knowledge associated with FV/LR – as well as the abandonment of marginal cropping areas.

45. Nearly 1 400 programmes on research, crop improvement, improving processing, public awareness, seed distribution, market development, and policy changes for FV/LR and underutilized crops or species, were reported by 75 countries. Of these programmes, 412 are considered specific to FV/LR, whereas 159 specifically target underutilized crops or species.

*Strengthening seed systems*

46. Informal and formal seed systems co-exist in all countries. Forty countries, more than two-thirds of them developing countries, reported improvements in their seed systems between 2012 and

2019, facilitating farmers' adoption of the most suitable crop varieties. Globally, the global seed market increased in value from USD 36 billion in 2007 to over USD 50 billion in 2020.

#### *Gaps and needs*

47. Despite progress in characterization, the limited availability of trait-specific subsets continues to constrain the use of PGRFA in research and plant breeding. Modern biotechnologies and molecular genetic tools remain too costly for regular use in crop breeding in many national programmes, which are often insufficiently funded to even support capacities for traditional breeding.

48. The cost of quality seeds of suitable crop varieties remains an important constraint to their wider application in many developing countries. This could be mitigated through targeted policies and incentives that address components of the seed value chain.

49. Despite advances in promoting the development and commercialization of FV/LR and underutilized species, many countries still lack national policies and legal frameworks to support these initiatives. Efforts to increase research and the utilization of PGRFA should be enhanced.

#### **The state of human and institutional capacities**

50. Globally, human and institutional capacities to use and conserve PGRFA have increased since the publication of the Second Report, although progress has been uneven across key areas of PGRFA conservation and sustainable use, and across regions and countries. In general, these advances appear inadequate to fully implement the Second GPA. Strengthening human and institutional capacities remains essential for the implementation of the Second GPA and for meeting other related commitments, such as the SDGs and relevant targets of the Kunming-Montreal Global Biodiversity Framework.

#### *National programmes for PGRFA*

51. During the reporting period, incremental progress has been made in the establishment and strengthening of national programmes, as well as the development of strategies to guide their operations. The development of National Biodiversity Strategies and Action Plans has been identified as a catalyzing factor in this regard. However, less than half of the countries (37 countries) reported progress in the development of PGRFA-specific strategies or relevant legislation.

#### *Education and the strengthening of human capacities*

52. During the reporting period, education and training opportunities, particularly at the secondary school level, increased slightly. However, although approximately 80 percent of reporting countries had postgraduate level educational programmes, 27 percent (6 countries) in sub-Saharan Africa did not. Additionally, the only reporting country from Melanesia, despite being very rich in plant diversity, reported neither graduate nor postgraduate education programmes on PGRFA. On the other hand, a significant increase was observed in the number of personnel working in key institutions with higher levels of educational qualifications, typically at the master's and doctoral levels.

53. In addition to educational institutions, other stakeholders, such as botanical gardens, genebanks, seed networks, research institutes, regional and international organizations, NGOs, foundations, associations and museums, contributed to training and capacity development. Cooperation between universities, networks, research institutes, and regional and international genebanks also increased, leading to joint educational and research activities in 43 percent of reporting countries. The increased use of online tools and platforms, coupled with the development of several innovative teaching materials – including videos and e-learning resources – enhanced participation in training programmes from remote locations.

#### *PGRFA networks*

54. Over 90 percent of reporting countries are members of networks for the management of PGRFA. These networks remain important hubs of activity for promoting the conservation and sustainable use of PGRFA, and the important benefits of international collaboration are widely recognised among stakeholders. For example, a large number of publications have been produced through participation in these networks.

55. While some new networks have been initiated and other have renewed their efforts, other important regional networks, such as CAPGNET, PROCITROPICOS and REMERFI in Latin America and the Caribbean, have had to pause or cease their activities. Many networks are managed by volunteers and depend on short-term project funds, leading to fragility. In addition, coordination and collaboration among different stakeholders within and among networks at regional and international levels is often sub-optimal.

*Information systems for PGRFA*

56. International information systems have expanded and proliferated. Cross-platform interoperability and data-sharing initiatives have been further advanced with the development of the International Treaty's Global Information System (GLIS),<sup>20</sup> including Genesys<sup>21</sup> and WIEWS. The application of DOIs under GLIS has continued to provide opportunities to improve efficiencies in tracing germplasm through research publications. The UN General Assembly's adoption in 2017 of SDG indicator 2.5.1a on *ex situ* conservation<sup>22</sup> stressed the key role of genebanks in preserving PGRFA and fostered country reporting and dissemination of standardized information through WIEWS.

57. As of 2019, almost 56 percent of 59 countries reporting on this topic had an operational genebank management information system for PGRFA in place. The recent development of GRIN-Global Community Edition<sup>23</sup> has expanded the opportunities for genebanks to adopt an open-access and user-friendly genebank information management system; 12 countries reported to be considering its adoption.

58. Despite the numerous advances, a significant amount of data, particularly from characterization and evaluation trials, are not readily available or publicly accessible. Data standardization remains a major challenge, although the progressive adoption of DOIs promises improvements in this area. This situation was even more challenging with regard to data on the geographic distribution of CWR and FV/LR, for which systematic monitoring and inventory remains an unattained objective in all countries. Additionally, indigenous knowledge on PGRFA appears to be rarely documented, nor included in information systems where documentation exists.

*Monitoring systems for genetic erosion*

59. During the reporting period, only a few countries had a national system for monitoring and safeguarding genetic diversity and minimizing genetic erosion. Many countries reported continued concern over the extent of genetic vulnerability and the need for a greater deployment of diversity in cropping systems. Awareness increased on the importance of establishing mechanisms for monitoring genetic erosion, especially as part of *in situ* conservation approaches.

*Access and Benefit-sharing*

60. The number of accessions included under the International Treaty's Multilateral System<sup>24</sup> (MLS) increased from approximately 600 000 in 2014 to over 2.3 million in 2022, indicating the progress made in making PGRFA available for research, breeding and training activities under the MLS. Some national and regional genebanks also provide PGRFA that do not fall under the MLS under the same terms and conditions as PGRFA.<sup>25</sup>

*Farmers' Rights*

61. Farmers' Rights, as provided for in Article 9 of the International Treaty, remained topical during the reporting period, as indicated by the development of an inventory of national measures, best practices and lessons learned from the realization of Farmers' Rights.<sup>26</sup>

<sup>20</sup> <https://glis.fao.org/glis/>

<sup>21</sup> <https://www.genesys-pgr.org/>

<sup>22</sup> <https://documents.un.org/doc/undoc/gen/n17/207/63/pdf/n1720763.pdf>

<sup>23</sup> <https://ggce.genesys-pgr.org/>

<sup>24</sup> <https://www.fao.org/plant-treaty/areas-of-work/the-multilateral-system/>

<sup>25</sup> <https://www.fao.org/plant-treaty/areas-of-work/the-multilateral-system/smta/en/>

<sup>26</sup> <https://www.fao.org/plant-treaty/areas-of-work/farmers-rights/inventory-on-frs/en/>

### *Participation*

62. There was an increase in the routine participation of farmers, Indigenous Peoples and local communities, and the wider public in decision-making and the co-development of solutions related to PGRFA. International institutions, countries and national stakeholders increasingly instituted mechanisms to foster this pluralism. However, there remains significant scope for increasing participation of these groups in decision-making related to the management of PGRFA, especially by strengthening capacities for facilitating participatory processes.

### *Public awareness*

63. Almost 80 percent of 89 countries reporting on this topic had a public awareness programme in place. No formal programme existed in Northern America, while in the other regions the percentage of countries with a programme varied between 63 percent in Latin America and the Caribbean to 90 percent in sub-Saharan Africa. The increasing number of awareness-raising activities corresponds with an increase in public understanding on the complexities of the management of PGRFA. It appears that decision-makers, civil society and farming communities have become more aware of the importance of PGRFA and its associated challenges. Greater attention is given to the importance of conserving local crop diversity by promoting the diversity of native varieties, as well as local seeds and traditional food products and their nutritional value. New actors with strong linkages to farmers and rural communities – such as civil society organizations, social movements and seed networks – increasingly participate in the dissemination of information. Additionally, the increased use of digital and social media platforms has expanded the reach of information dissemination on PGRFA to a much broader audience, including young people.

### *Gaps and needs*

64. Collaboration among national stakeholders and institutions remains weak, while initiatives that are driven by civil society organizations are usually insufficiently supported and not well integrated into national programmes. Despite significant progress made during the reporting period, there is a need to strengthen academic institutions and develop educational programmes on plant breeding, genetic improvement and biotechnology in all regions. Similarly, there is a need for more targeted training courses, in all technical and legal aspects of PGRFA, aimed at a greater number of professionals, farmers and civil society.

65. A younger generation of professionals is needed to replace retiring experts in many countries, with efforts to build sufficient capacity and transfer knowledge. The chronic lack of research funding, including for scholarships, post-doctoral fellowships and long-term breeding programmes, remains a major bottleneck to strengthening capacities in the management of PGRFA. Weaknesses in collaboration and partnerships within and between national higher education institutions, research centres, networks and international institutions also remain unaddressed in many countries.

66. Although it is increasingly addressed, there remains scope to improve the interoperability of existing information systems through the adoption of shared and open standards. Data on CWR and FV/LR are insufficiently covered by existing information systems. There is also often a lack of technological capacity to both manage and access information on PGRFA. Overall, key constraints to strengthening information systems are: weaknesses in expertise on plant taxonomy, information management and bioinformatics; a lack of necessary digital infrastructure; and sub-optimal funding and financial support.

67. There remains a critical need to develop mechanisms for monitoring genetic erosion, especially for PGRFA conserved *in situ*, in most national and regional contexts. Surveys and baseline studies are needed, as well as indicators to assess genetic vulnerability and erosion. The lack of dedicated budgetary resources or long-term funding, as well as weak coordination amongst stakeholders, remain significant hurdles to assess and effectively address genetic erosion.

68. National communication strategies and targeted public awareness programmes on the value of PGRFA require continued renewal and dedicated resources. Although a number of countries have an overall public awareness programme, inter-institutional coordination, collaboration and partnerships on communication activities – including engagements with media organizations – remain weak across

all regions, resulting in shortcomings in information dissemination. Gaps also remain in tailoring effective communication messages to a diversity of audiences and delivering these in local languages. The lack of funding and dedicated budgets for communication constituted a key constraint for public awareness-raising.

#### **V. GUIDANCE SOUGHT**

69. The Working Group may wish to take note of the Third Report and recommend that:
- (i) it be published and widely disseminated;
  - (ii) its key findings be presented at relevant international meetings to inform global processes on the conservation and sustainable use of PGRFA; and
  - (iii) an in-brief version of the Third Report be prepared and published in all official languages of FAO.