



COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 7.2 of the Provisional Agenda

Nineteenth Regular Session

Rome, 17–21 July 2023

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

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I. INTRODUCTION

1. In 2017, at its Sixteenth Regular Session, the Commission revised the timeline for the preparation of *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (Third Report) and postponed its launch to the Nineteenth Regular Session.
2. At its Eighteenth Regular Session, the Commission agreed to extend the deadline for country reporting on the state of plant genetic resources for food and agriculture (PGRFA) and invited National Focal Points (NFPs) that had not yet done so to report on the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA) by the end of December 2021.¹
3. This document briefly recapitulates the preparation of FAO's global assessments of PGRFA, summarizes the process of data collection and the main sources of information for the draft Third Report and outlines the preliminary key findings. The draft Third Report is contained in the document *Draft Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture*.²

II. BACKGROUND

4. 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.³ *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 2009.⁴ 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 related to their management.
5. Both reports attracted considerable attention and generated global policy responses. In response to the findings of the First Report, the Global Plan of Action for 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 at 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 2001, in the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty). In response to the Second Report, the Commission revised the GPA and the FAO Council, on behalf of the FAO Conference, adopted the Second GPA in 2011.⁵
6. As early as in 2013, the Commission endorsed a timeline for the preparation of the Third Report.⁶ 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 country reporting based on agreed indicators and a corresponding reporting format developed for the purpose. The integration of the two processes, the monitoring of the implementation of the Second GPA and country reporting for the Third Report, implied changes to the Third Report. The Third Report follows the structure of the Second GPA and thus provides both a global assessment of PGRFA and a succinct analysis of countries' efforts in the implementation of the Second GPA.

¹ CGRFA-18/21/Report, paragraph 107.

² CGRFA-19/23/7.1.

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

⁴ FAO 2010. *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Rome. <https://www.fao.org/3/i1500e/i1500e00.htm>

⁵ CL 143/REP, paragraph 43.

⁶ CGRFA-14/13/Report, paragraph 101.

III. DATA COLLECTION AND MAIN SOURCES OF INFORMATION

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

8. Following a pilot phase, which allowed the online Reporting Tool to be finalized and fine-tuned, 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 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.⁷ The reporting format developed by FAO in line with the monitoring approach was published in 2015.⁸

9. 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 document *Summary assessment of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture 2012-2014*⁹ and in more detail in the document *Assessment of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture 2012-2014*.¹⁰

10. In 2017, at its Sixteenth Regular Session, the Commission requested FAO to consult Commission Members and observers on options for simplifying country reporting. 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 the end of 2017 and revised the timeline for the preparation of the Third Report. In 2019, at its Seventeenth Regular Session, 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, and invited NFPs to provide a summative narrative of the progress made over the whole reporting period (January 2012 to December 2019). 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 allow countries whose reports had been delayed by the challenges and constraints associated with the COVID-19 pandemic to provide reports.

11. In order to facilitate the reporting process, FAO made the online Reporting Tool available through the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS) portal¹¹ in 2015. The user manual, as well as the guidelines for country reporting, were made available online in all six official languages of FAO. A comprehensive list of frequently asked questions (FAQs), including detailed explanations for all questions and indicators and a glossary, were provided online. In addition, FAO held online training sessions in English, French and Spanish to assist NFPs and other stakeholders in the preparation of country reports. The training sessions provided an overview of the preparation process for the Third Report as well as introductions to the guidelines for country reporting and 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, recordings of which were made available online. In addition to the training sessions, FAO provided bilateral technical assistance, including short training sessions, to address country-specific issues and queries.

12. The draft Third Report draws on contributions from 127 countries. A total of 105 countries provided reports on the implementation of the Second GPA for the reporting period January 2012 to December 2019. A total of 115 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

⁷ CGRFA-14/13/Report, paragraph 23 and *Appendix C*.

⁸ CGRFA-15/15/Inf.9.

⁹ CGRFA-16/17/Inf.17.1.

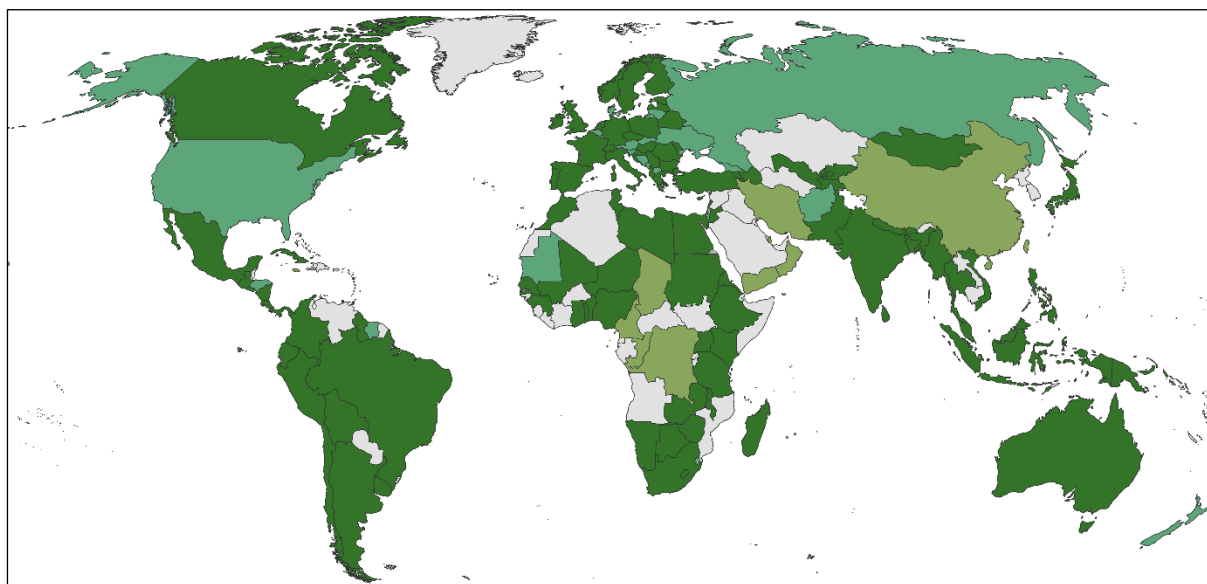
¹⁰ CGRFA-16/17/Inf.17.2.

¹¹ <https://www.fao.org/wiews/en>

Second GPA were received from 12 international centres. Reports from 13 international and four regional genebanks on SDG Indicator 2.5.1a complemented the information provided by countries.

13. The Third Report is based on six different types of information:
- i. data on the implementation of the Second GPA provided by 105 countries, in particular:
 - 90 countries for the period January 2012 to June 2014 (reporting undertaken in 2015–2017); and
 - 94 countries for the period July 2014 to December 2019 (reporting undertaken in 2020–2021);
 - ii. summative narratives provided by 84 countries (reporting undertaken in 2021);
 - iii. ad hoc reports on the implementation of the Second GPA provided by 12 international agricultural research centres;
 - iv. data on SDG Indicator 2.5.1a reported annually by countries and regional and international research centres during 2016–2021;
 - 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



Notes: Countries shown in dark green reported on the implementation of the Second GPA and SDG Indicator 2.5.1a. Countries shown in light green reported on the implementation of the Second GPA only. Countries marked in blue green reported only on the implementation of SDG 2.5.1a. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.

14. At its Eighteenth Regular Session, the Commission endorsed the preparation of thematic background studies on climate change, nutrition, genotyping and phenotyping, novel biotechnologies and germplasm exchange.^{12,13} In response, FAO commissioned subject-matter specialists to prepare thematic background studies, which at the time of writing are still being finalized. The findings of the studies will be reflected in the final version of the Third Report.

¹² CGRFA-18/21/12.4.

¹³ CGRFA-18/21/Report, paragraph 108.

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

15. The Commission's decision to fully integrate the process of monitoring the implementation of the Second GPA with the preparation of the Third Report¹⁴ is reflected in the structure of the Third Report, as agreed by the Commission at its Fifteenth Regular Session.¹⁵ The Third Report, in reflecting the structure of the Second GPA and its 18 Priority Activities, covers the four key areas of the Second GPA and identifies related gaps and needs in these areas:

- (5) The state of *in situ* conservation and management;
- (6) The state of *ex situ* conservation;
- (7) The state of sustainable use;
- (8) The state of human and institutional capacities.

(1) The state of *in situ* conservation and management

16. The conservation and management of PGRFA *in situ* and on-farm allows evolution and adaptation processes to continue in their natural or usual environments. With increasingly rapid changes in land use, climate and other factors that threaten PGRFA diversity, the need to conserve PGRFA in the wild and on-farm has gained increasing recognition. The first chapter of the Third Report addresses the current state of conservation and management of PGRFA *in situ* and on-farm based on reports from 96 countries. The chapter also discusses assistance provided to farmers in disaster situations and the impact that such emergency assistance has on PGRFA diversity. It also summarizes threats, challenges, gaps and needs related to *in situ* conservation and on-farm management.

Surveying and inventorying PGRFA

17. Over the reporting period, important advances were made in the number of surveys and inventories of PGRFA undertaken in the wild and on-farm. A total of 81 countries reported that about 6 000 species were surveyed, 45 percent of which are used for food, 17 percent are crop wild relatives (CWRs) and 6 percent are wild food plants. Among the species surveyed, about 39 percent were reported to be under threat in specific areas, affected particularly by climate change, overexploitation and changes in land use. In addition, about 7 percent of the 107 000 farmers' varieties/landraces (FV/LRs) surveyed were reported to be threatened. Typical threats to FV/LRs as reported include climate change, overexploitation, changes in land use and replacement by improved varieties.

In situ conservation of crop wild relatives and wild food plants

18. Based on Protected Planet data,¹⁶ protected *in situ* conservation sites increased during the reporting period by 14 percent to almost 13 million km² in the 69 reporting countries. CWRs and wild food plants were mainly conserved passively, as only 10 percent of *in situ* conservation sites in the reporting countries had management plans specifically addressing the conservation of these important plant groups. In this regard, many countries highlighted that suboptimal collaboration among relevant ministries is limiting the effective conservation of CWRs and wild food plants, whose management requires highly specialized expertise, *inter alia* in taxonomy. Almost all reporting countries reported that activities relating to the conservation of wild PGRFA were primarily provided by national governments and through projects.

19. A diverse range of *in situ* activities were reported, including the implementation of management practices that maintain high levels of genetic diversity, involvement of local

¹⁴ CGRFA-14/13/Report, paragraph 101.

¹⁵ CGRFA-15/15/Report, *Appendix F*.

¹⁶ <https://www.protectedplanet.net/>.

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

On-farm management and improvement of PGRFA

20. During the reporting period, the number of programmes, projects and activities addressing on-farm conservation and management of FV/LRs increased, including those on the assessment of environmental and socioeconomic features and farmers' knowledge of on-farm PGRFA management, those of the characterization of FV/LRs and those on participatory plant breeding. In addition, community-based approaches for managing local crop diversity, such as community seed banks were adopted in a number of countries. The country reports indicate that, at least in some countries, farmers are increasingly involved in research and training activities. Complementing these efforts, capacity-development and marketing initiatives targeting farmers and other stakeholders with the aim of enhancing on-farm management of PGRFA seem to be on the rise in an increasing number of countries.

Restoration of crop systems after disasters

21. With the increasing frequency and severity of erratic extreme weather events and the increasing incidence of pests and diseases – and because of civil unrest or war – demand for seed aid to restart crop production after crises seems to have risen considerably during the reporting period. Quality seeds and planting materials were distributed to farmers and communities as part of emergency aid in almost 500 interventions in 49 countries. Most of the countries that reported such interventions following disasters are in Africa, while the highest number of interventions was reported by countries in Latin America and the Caribbean. One major difficulty in such situations is the lack of availability of quality seeds and planting materials of adapted varieties from local or nearby sources.

Gaps and needs

22. A lack of coordination among ministries of agriculture, forestry and the environment is a major constraint in some countries, often leading to ineffective conservation activities, which could increase the risk of genetic erosion of CWRs and wild food plants. To improve complementarity among *in situ* conservation, on-farm management and *ex situ* conservation, it is essential to strengthen linkages between genebanks and other stakeholders. Participatory variety selection and plant breeding with farmers should be strengthened to increase the adoption of well-adapted quality seeds and planting materials through close cooperation between breeders, genebanks, farmers and community seed banks. Human capacity is another limiting factor and urgently needs to be addressed to ensure an adequate cadre of specialized staff, including taxonomists. The impacts of emergencies on the agricultural sector are often estimated in terms of monetary and nutritional costs. However, many of the reporting countries recognized that there is a gap in terms of the assessment of the impact of disasters on crop diversity. The identification of reliable sources of materials is another challenge. The germplasm distributed to farmers after disasters may not always be fully adapted to local conditions or the cultural environment.

(2) The state of *ex situ* conservation

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

Overview of ex situ collections

24. Germplasm holdings of over 5.8 million accessions are conserved under medium- and long-term storage conditions in the base collections of 827 national genebanks in 115 countries, four regional genebanks and 13 international genebanks. This represents a 17 percent increase over the base collections reported in 2009. The biological status of the germplasm conserved is documented for 71 percent of the accessions reported; about 1 427 000 are FV/LRs, and 716 000 are wild materials, of which approximately 541 000 accessions are CWRs and 45 000 are wild food plants. The remaining

accessions are improved varieties and breeding materials. The country of origin is known for approximately 69 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 vast majority (79 percent) of accessions are conserved as seed, followed by conservation in fields and *in vitro*.

Safety duplication of stored material

25. At the end of 2021, approximately 35 percent of *ex situ* holdings were safety duplicated, a significant increase from the 10 percent that were safety duplicated in 2015. More than half of the safety-duplicated holdings were deposited at the Svalbard Global Seed Vault (SGSV), demonstrating that countries are increasingly taking advantage of the SGSV as a long-term black-box storage facility. However, there is still a need to provide a sustainable, long-term cryostorage backup for species that are vegetatively propagated or produce recalcitrant seeds.

Redundancy within and between collections and the uniqueness of germplasm accessions

26. Continued rationalization efforts have resulted in some progress at country level and in international genebanks with regard to unwanted duplications. However, redundancy within and among collections has remained poorly documented overall and requires continued attention. A number of species (e.g. *Uapaca kirkiana*, *Persea schiedeana*, *Dioscorea rotundata*, *Ensete ventricosum*, *Citrullus amarus*, *Piper aduncum* and *Vigna minima*) are conserved in only one or very few genebanks, which is a concern given that failure to conserve the material in those genebanks could mean complete loss.

Acquisition of germplasm

27. Between 2012 and 2019, almost 250 000 samples were collected by 366 institutes in 87 reporting countries. A number of countries reported having strategies for targeted collections, including for addressing missing genetic diversity and ecogeographic coverage, incomplete coverage of targeted taxa, including CWRs, 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 and better-targeted collecting based on gap analyses. Despite renewed interest in the acquisition of CWRs, collecting wild species often fails because of the unavailability of staff specialized in relevant disciplines such as taxonomy and phenology.

Germplasm health

28. Germplasm health issues seem to be receiving increasing attention in the conservation, distribution and use of PGRFA. The increasing movement of germplasm within and between countries and continents increases the risk that pests and diseases will spread. Overall, awareness of these issues seems to have improved during the reporting period, as does the actual management of germplasm health issues. However, a number of national genebanks still do not have the human and financial resources needed to properly monitor germplasm health, a deficiency that greatly affects germplasm exchange.

Regeneration

29. Regeneration remains one of the main challenges 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 CWRs and out-crossing species is problematic for many genebanks.

Documentation

30. Although documentation has been highlighted as an essential part of genebank management for many years, and despite the 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. With the increasing availability of improved open-source

software for managing genebank data, for example the new Grin-Global Community Edition, the situation shows signs of improvement. Standardized passport data and data object identifiers (DOIs) are increasingly being used in germplasm exchange and for cross-referencing germplasm in publications. Greater efforts to train data specialists and genebank managers on the adoption and use of these improved systems are still needed.

Germplasm movement

31. National genebanks in 87 countries distributed almost 1.3 million accessions between 2012 and 2019, with well over 90 percent distributed within the respective country. The main recipients included national agricultural research centres, farmers, NGOs and the private sector.

Gaps and needs

32. Notwithstanding the achievements and advances made over the past ten years, many of the issues that impede the efficient and effective conservation of PGRFA still remain to be addressed. *Ex situ* conservation of PGRFA 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 do not have the human and/or technical capacity needed to adequately address germplasm-health issues.

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

(3) The state of sustainable use

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

Characterization, evaluation and specific subsets of collections

35. Country data indicate a significant increase in the number of accessions characterized as well as progress in the development of thematic collections for traits of interest, and this has increased understanding of germplasm collections and hence improved their exploitation. Recent advances in biotechnologies, especially next-generation sequencing and high-throughput phenotyping, are increasingly being used to enhance efficiencies in germplasm characterization and evaluation. However, not all countries have access to the relevant technologies, and many countries lack the capacity to make use of them. Better collaboration, capacity-building and technology transfer are needed in order to ensure that all countries can fully benefit from the diversity of PGRFA.

36. Because of suboptimal information and data-management systems, most of the existing characterization and evaluation data are not publicly available. Moreover, the continuing lack of sufficient characterization and evaluation data means that targeted selection of accessions with specific traits is often not feasible. There is a lot of room for improvement in this regard.

Plant breeding, genetic enhancement and base-broadening

37. Over 350 national research organizations from 76 countries reported the use of prebreeding, i.e. the introgression of novel traits from non-adapted materials into breeding populations, for a total of 322 crop species. While prebreeding activities took place in all regions during the reporting period, it

seems that they have not yet become a routine crop-improvement strategy, which suggests that there is a largely unused opportunity for strategic collaboration between genebank managers and breeders.

38. Eighty-seven countries reported breeding activities addressing almost 500 crop species belonging to all major crop groups. Yield continues to be the most sought-after trait in crop breeding programmes. However, 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 reported farmer participatory plant breeding was more than double the number at the time the Second Report was prepared.

39. In addition to the important advances made in high-throughput and low-cost genotyping, in particular in genome sequencing, significant advances in morphological and biochemical characterization of plants also provide new opportunities. Country data indicate an upsurge in the use of modern plant breeding techniques, in particular genomic selection and the more recent genome editing technology, including CRISPR/Cas9, during the reporting period.

Diversification of crop production

40. Activities involving an increase of intraspecific and/or interspecific diversity in crop production systems were reported by 73 countries. In some instances, the diversification of cropping systems is coupled with enhancement of the adaptability of FV/LRs through the introgression of resistance traits. In addition to paying increased attention to mixed cropping and crop rotation, diversification initiatives increasingly focus on the introduction of new crops, the reintroduction of crops and the domestication of wild species.

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

41. Countries reported various measures aimed at enhancing the cultivation of FV/LRs and promoting their development and commercialization. Almost 500 FV/LRs were registered in 29 countries across all regions during the reporting period. Most of them were registered during the last two years of the reporting period (2018–2019), which reflects the resurgent interest in FV/LRs and growing opportunities to market them. This development contrasts with the progressive discontinuation of the cultivation of many FV/LRs, perhaps reflecting the declining number of farmers and the concomitant loss of knowledge of FV/LRs as well as the abandonment of marginal cropping areas.

42. A total of nearly 1 400 programmes on research, crop improvement, processing, public awareness, seed distribution, market development, and policy changes for FV/LRs and underutilized crops or species were reported by 75 countries. Of these, 412 programmes were considered specific to FV/LRs, and 159 specifically target underutilized crops or species.

Strengthening seed systems

43. Informal and formal seed systems co-exist in all countries. Forty countries, more than two-thirds of them developing countries, reported that there had been improvements in their seed systems between 2012 and 2019, and this facilitated the adoption by farmers of the most suitable crop varieties. Globally, the volume of the global seed market increased in value from USD 36 billion in 2007 to over USD 50 billion in 2020.

Gaps and needs

44. 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 even to provide the capacities needed for traditional breeding.

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

46. Despite advances in terms of promoting the development and commercialization of FV/LRs and underutilized species, national policies and legal frameworks supporting such initiatives are missing in many countries. Efforts to increase research and utilization of these important PGRFA should be enhanced.

(4) The state of human and institutional capacities

47. 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 the key areas of PGRFA conservation and sustainable use, and across regions and countries. In general, advances seem to have been insufficient to allow full implementation of the Second GPA. Increasing human and institutional capacity remains essential to the implementation of the Second GPA and for meeting related commitments, such as relevant SDGs and relevant targets under the Kunming-Montreal Global Biodiversity Framework.

National programmes for PGRFA

48. During the reporting period, incremental progress was made in the establishment and fostering of national programmes and the development of strategies to guide their operations. The development of national biodiversity strategies and action plans (NBSAPs) was identified as a catalysing factor in this regard. However, less than half the reporting countries indicated that any progress had been made in terms of developing PGRFA-specific strategies or relevant legislation. Only 37 countries reported some progress in developing PGRFA-specific strategies or relevant legislation.

Education and the strengthening of human capacities

49. During the reporting period, education and training opportunities, particularly at secondary school level, increased slightly. However, although about 79 percent of reporting countries indicated that they had postgraduate-level educational programmes on PGRFA, 27 percent or 6 countries in sub-Saharan Africa had none, and the only reporting country from Melanesia, despite being very rich in plant diversity, reported neither undergraduate nor postgraduate education programmes on PGRFA. However, a significant increase was reported in the number of personnel with higher-level educational qualifications, typically master's degrees or doctorates, working in key institutions.

50. In addition to educational institutions, other stakeholders, including botanical gardens, genebanks, seed networks, research institutes, regional and international organizations, NGOs, foundations, associations and museums, were reported to have contributed to training and capacity development. Cooperation between universities, networks, research institutes and regional and international genebanks also increased and led 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, increased the number of trainees that could take part in training programmes from remote locations.

PGRFA networks

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

52. While some new networks have been initiated and others 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, which, coupled with dependence on short-term project funds, often implies fragility. In addition, coordination and collaboration between stakeholders within and among networks at regional and international levels is often suboptimal.

Information systems for PGRFA

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

54. As of 2019, 33 out of 59 reporting countries indicated that they had an operational genebank management information system for PGRFA in place. The recent development of GRIN-Global Community Edition has increased the opportunity for genebanks to adopt an open-access and easy-to-use genebank information management system. Twelve countries reported that they are considering adopting it.

55. Despite numerous advances, a significant amount of data of *ex situ* collections is still not publicly accessible, in particular characterization and evaluation data. This situation is worse with regard to data on the geographic distribution of CWRs and FV/LRs, for which systematic monitoring and inventory remains an unattained objective in all countries.

Monitoring systems for genetic erosion

56. During the reporting period, only a very few countries had a national system for monitoring and safeguarding genetic diversity and minimizing genetic erosion. Many countries reported continuing concern over the extent of genetic vulnerability and the need to deploy more diversity in cropping systems. Awareness of the importance of established mechanisms for monitoring genetic erosion, especially as part of *in situ* conservation, increased.

Access and Benefit-sharing

57. The increase in the number of accessions being made available under the Treaty's Multilateral System (MLS) from less than 600 000 in 2014 to over 2.3 million in 2021 indicates the significant progress achieved in terms of making PGRFA falling under the MLS available for research, breeding and training activities. Some national and regional genebanks also provide PGRFA not falling under the MLS available under the Treaty's standard material transfer agreement.

Farmers' Rights

58. Farmers' Rights, as referred to in Article 9 of the 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.¹⁷

Participation

59. The routine participation of farmers, Indigenous Peoples and local communities and the wider public in decision-making on PGRFA and in the co-development of solutions to issues in this field increased. International institutions, countries and national stakeholders increasingly instituted mechanisms to foster pluralism of this kind. However, there remains significant scope to increase the participation of these groups of stakeholders in decision-making related to the management of PGRFA, including by strengthening capacities to facilitate participatory processes.

Public awareness

60. 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 from 63 percent in Latin America and the Caribbean to 90 percent in sub-Saharan Africa. The increasing number of awareness-raising activities

¹⁷ <https://www.fao.org/plant-treaty/areas-of-work/farmers-rights/inventory-on-frs/en/>

corresponds with an increase in public awareness regarding the intricacies of the management of PGRFA. It seems that decision-makers, civil society and farming communities have become more mindful of the importance of PGRFA and that challenges to PGRFA management are now more widely understood than ever before. Greater attention is being paid to the importance of conserving local crop diversity by promoting the diversity of native varieties, 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. The increased use of digital and social media platforms contributes to the dissemination of information on PGRFA to a much broader audience, including among young people in particular.

Gaps and needs

61. Collaborations among national stakeholders and institutions remain weak, and initiatives driven by civil society organizations are usually neither supported sufficiently nor integrated into national programmes. Despite the significant progress made during the reporting period, there is a need to strengthen academic institutions and to develop educational programmes on plant breeding, genetic improvement and biotechnology in all regions. Similarly, targeted training courses on all technical and legal aspects of PGRFA need to be provided to a greater number of professionals, farmers and civil-society stakeholders.

62. A younger generation of professionals is needed to replace retiring experts in many countries, and building sufficient capacity and transferring knowledge remains a significant challenge. Moreover, the perennial lack of research funding, including for scholarships, postdoctoral fellowships, and long-term breeding programmes, is a noteworthy 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.

63. While the interoperability of existing information systems is increasingly being addressed, there remains room for improvement through shared, open standards. CWR and FV/LR data are insufficiently covered by existing information systems, which often lack the technological capacity both to manage PGRFA-related information and to access them. Overall, the key constraints to strengthening information systems are lack of expertise in plant taxonomy, information management and bioinformatics, lack of the necessary digital infrastructure, and suboptimal funding and financial support.

64. In most national and regional contexts, there remains a critical need to develop the mechanisms for monitoring genetic erosion, especially for PGRFA conserved *in situ*. Surveys and baseline studies are needed as are indicators for assessing genetic vulnerability and erosion. Weak coordination among stakeholders and a lack of dedicated budgetary resources and long-term funding, remain significant hurdles to the assessment of genetic erosion and the implementation of action to address it.

65. National communication strategies and targeted public-awareness programmes on the value of PGRFA require continued renewal and dedicated resources. Although an overall public-awareness programme exists in a number of countries, interinstitutional coordination, collaboration and partnerships on communication activities, including engagement with media organizations, are still weak across all regions, resulting in shortcomings in information dissemination. Gaps also remain with regard to tailoring effective communication messages to diverse audiences and to the use of local languages. The lack of funding and dedicated budgets for communication constitutes a key constraint to raising public awareness.

V. BUDGET

66. The draft Third Report was prepared with funding from FAO's Regular Programme (USD 668 000) and the Commission's Multi-donor Trust Fund (USD 273 300). A total of 47 countries received financial support for the preparation of their country reports, including stakeholder consultations at national level.

VI. GUIDANCE SOUGHT

67. The Commission may wish to take note of the draft Third Report and provide inputs and comments, as appropriate.
68. The Commission may wish to recommend that FAO
- (i) share the draft Third Report with the Governing Body of the Treaty for inputs and comments;
 - (ii) invite Members and observers to provide comments on the draft Third Report by 30 November 2023;
 - (iii) produce a revised draft Third Report, reflecting the findings of the thematic background studies and taking into account comments and inputs received from the Governing Body of the Treaty and from Members and observers, and make it available to Members and the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture (Working Group) during the first half of 2024 for further comments;
 - (iv) finalize the Third Report, taking into account the comments received, make it available in due time for the Twelfth Session of the Working Group and publish it;
 - (v) prepare and publish an in-brief version of the Third Report in all official languages of FAO; and
 - (vi) present the Third Report at relevant international meetings and actively disseminate its findings to inform global processes on biodiversity, climate change, forests and ecosystem restoration.