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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

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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. The Multi-Year Programme of Work of the Commission on Genetic Resources for Food and Agriculture (Commission) foresees the presentation of *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (Third Report) for the forthcoming Nineteenth Regular Session of the Commission. [1]

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) to the end of December 2021[2] 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) through the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS) and to provide a summative narrative of the overall progress made between 1 January 2012 and 31 December 2019 in the conservation and sustainable use of PGRFA, as well as on the remaining gaps and constraints.

3. This document summarizes the process of preparing the draft Third Report, to which country reports and summative narratives made a key contribution. It further outlines its preliminary key findings and seeks the Working Group's guidance as to the next steps towards the finalization of the Third Report. 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*.[3]

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.[4] *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.[5] 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.

5. 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 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 Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA), in 2011.[6]

6. As early as in 2013, the Commission endorsed a timeline for the preparation of *The Third Report on Plant Genetic Resources for Food and Agriculture* (Third Report).[7] 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

[1] CGRFA-17/19/Report, *Appendix F*.
[2] CGRFA-18/21/Report, paragraph 107.
[3] CGRFA/WG-PGR-11/23/3/Inf.1
[4] FAO 1998. The state of the world's plant genetic resources for food and agriculture. Rome. https://www.fao.org/3/w7324e/w7324e.pdf
[5] 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
[6] CL 143/REP, paragraph 43.
[7] CGRFA-14/13/Report, paragraph 101.

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 to the Third Report; the Third Report follows the structure of the Second GPA and thus provides a global assessment of the state of the world's PGRFA and, at the same time, a succinct analysis of countries' efforts in the implementation of the Second GPA.

III. DATA COLLECTION AND MAIN SOURCES OF INFORMATION

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

8. Following a pilot phase, which served to finalize and fine tune 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.[8] The reporting format developed by FAO in line with the monitoring approach was published by FAO in 2015.[9]

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 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*[10] and a more detailed report, the *Assessment of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture 2012-2014*.[11]

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. 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 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 of the COVID-19 pandemic to still provide their reports.

11. In order to facilitate the reporting process, FAO made available the online Reporting Tool through the WIEWS portal in 2015. The user manual, as well as the guidelines for country reporting, were made available online in all six official languages of FAO. Furthermore, 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 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; recordings of the training sessions were made available online. Above and beyond the training sessions, FAO provided bilateral technical assistance, including short training sessions, to address country-specific issues and queries.

12. The draft Third Report has been prepared with contributions from a total of 127 different countries. A total of 105 countries provided reports on the implementation of the Second GPA for the

[8] CGRFA-14/13/Report, paragraph 23 and Appendix C.
[9] CGRFA-15/15/Inf.9
[10] CGRFA-16/17/Inf.17.1.
[11] CGRFA-16/17/Inf.17.2.

reporting period of 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 Second GPA were received from 12 international centres and reports on SDG 2.5.1a from 13 international and 4 regional genebanks complemented the information from countries.

13. The Third Report relies on six different types of information:

i. data on the implementation of the Second GPA provided by a total of 105 different 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 a total of 84 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 during 2016-2021;
v. thematic background studies commission by FAO; and
vi. other relevant information.

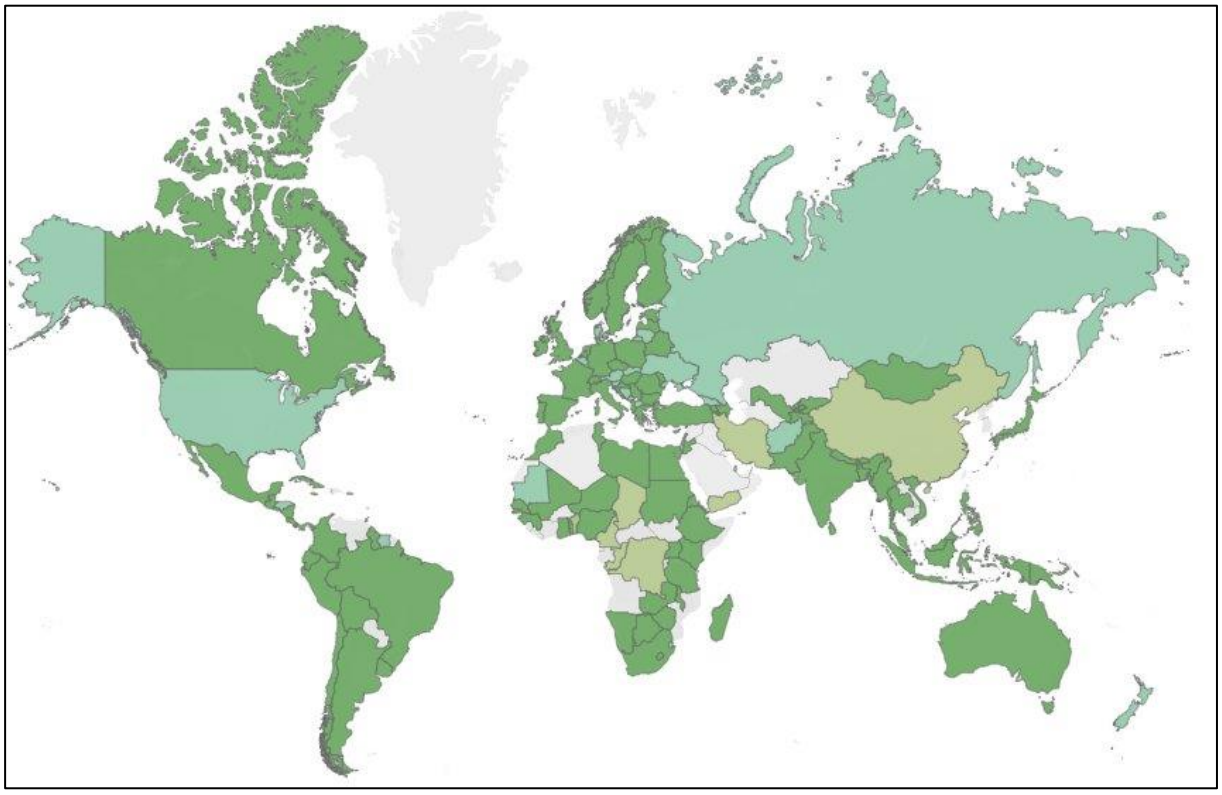

Figure 1. Countries that contributed to the preparation of the draft Third Report. In dark green colour are those that reported both on the implementation of the Second GPA and on SDG 2.5.1a; in light green colour those that did it only on GPA implementation; and in blue green those for SDG 2.5.1a only.

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 the thematic background studies, which are at the time of writing still being finalized. The findings of the studies will be reflected in the final 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 for monitoring the implementation of the Second GPA with the preparation of the Third Report[14] 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:

(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

16. The conservation and management of PGRFA *in situ* and on-farm is essential for allowing evolution and adaptation processes to continue to occur in their natural or usual environment. With increasingly rapid changes in land use, climate, and other factors that threaten PGRFA diversity, the necessity to conserve PGRFA in the wild and on-farm has gained 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 a total of 96 countries. The chapter also discusses assistance provided to farmers in disaster situations and the impact of such emergency assistance on PGRFA diversity and 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 have been made in the number of surveys and inventories of PGRFA undertaken in the wild and on-farm. A total of 81 countries reported over 6,000 species surveyed, about 39 percent of which were reported to be under threat in specific areas, particularly affected by climate change, overexploitation, replacement of traditional varieties by improved varieties, and changes in land use.

In situ conservation of crop wild relatives and wild food plants

18. During the reporting period, protected *in situ* conservation sites increased by 16 percent to almost 13 million km^2 in 59 out of 69 reporting countries, versus 11 percent to a total of 22.4 million km^2 at the global level.[16] Crop wild relatives (CWR) and wild food plants were mainly conserved passively, as only 10% 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 sub-optimal collaboration among relevant ministries, limiting the effective conservation of CWR 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. *In situ* conservation entailed a range of diverse activities, including the implementation of management practices to maintain high levels of genetic diversity, involvement of local communities, arrangements for *ex situ* conservation of threatened and endangered populations, and/or plans for encouraging public participation.

On-farm management and improvement of PGRFA

20. During the reporting period, the numbers of programs, projects and activities for on-farm conservation and management of farmers' varieties/landraces (FV/LR) increased, including of those

[14] CGRFA-14/13/Report, paragraph 101.
[15] CGRFA-15/15/Report, *Appendix F*.
[16] https://www.protectedplanet.net/.

addressing the assessment of environment and socioeconomic features and farmers' knowledge for on-farm PGRFA management, the characterization of FV/LR, and 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 farmers are increasingly involved, at least in some countries, in research and training activities. Complementing these efforts, capacity development and marketing initiatives targeting farmers and other stakeholders to enhance 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 increasing frequency and severity of erratic extreme weather events, the increased incidence of pests and diseases and due to civil unrest or war, the demand for seed aid to restart crop production after crises seems to have risen considerably during the reporting period. Quality seeds and planting materials to farmers and communities as part of the emergency aid were distributed in almost 500 interventions in 49 countries. Most of the countries that report such interventions following disasters are in Africa, while the highest number of interventions is reported by countries in Latin America and the Caribbean. One major difficulty in such situations is the 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 environment is a major constraint in some countries, often leading to ineffective conservation activities, which could enhance the risk of genetic erosion of CWR and wild food plants. Strengthening linkages with genebanks is essential for enhancing complementarity among *in situ* conservation, on-farm management and *ex situ* conservation. Participatory variety selection and plant breeding with farmers should be strengthened to enhance adoption of well-adapted quality seeds and planting materials 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 cadre of specialized staff, including taxonomists. Impacts on the agricultural sector after emergencies are often estimated in terms of monetary and nutrition costs; however, a gap recognized by many of the reporting countries is the lack of assessment of the impact 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

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 back-up 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 base collections of 827 national genebanks in 115 countries, of four regional 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/LR, 716 000 wild materials, of which approximately 541 000 accessions are CWR 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 the field and *in vitro*.

Safety duplication of stored material

25. At the end of 2021, approximately 35 percent of all *ex situ* holdings were safety duplicated, a significant increase from 10 percent in 2015. More than half of the safety duplicated holdings were

deposited at the Svalbard Global Seed Vault (SGSV), demonstrating that countries are taking increasingly advantage of the SGSV as a long-term black-box storage facility. However, there is still a need to provide a 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

26. Continued rationalization efforts have resulted in some progress made at country level and by international genebanks with regard to unwanted duplications. However, redundancy within and among collections has remained poorly documented overall and requires continued attention. There are a number of species (e.g. Uapaca kirkiana, Persea schiedeana, Dioscorea rotundata, Ensete ventricosum, Citrullus amarus, Piper aduncum, Vigna minima, etc.) that 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 a 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 report to have strategies for targeted collections, including addressing missing genetic diversity and eco-geographic coverage, incomplete coverage of the 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 more targeted collecting based on gap analyses. Despite renewed interest in the acquisition of CWRs, collecting wild species often fails due to the unavailability of staff specialized in relevant disciplines, such as taxonomy and phenology.

Germplasm health

28. 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, the awareness of these issues as well as the actual management of germplasm health issues seem to have improved during the reporting period. However, a number of national genebanks still lack adequate human and financial resources to properly monitor germplasm health, which 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 have been 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.

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 genebank data management, such as the new Grin-Global Community Edition, the situation shows signs of improvement. Standardized passport data and Data Object Identifiers (DOIs) are increasingly being applied for germplasm exchange and for cross-referencing germplasm in publications. Greater efforts are still needed to train data specialists and genebank managers to adopt and use these improved systems.

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 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 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 necessary 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 still require political commitment and coordination. Collaboration with universities, other research institutes and the private sector, could also benefit the conservation and enhance the sustainable use of PGRFA.

The state of use

34. 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; utilization of local and locally adapted crops, varieties and underutilized species; on-farm diversity; 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 we well as progress in the development of thematic collections for traits of interest, which facilitated a better understanding and hence the improved exploitation of germplasm collections. 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 technologies and many countries lack the capacity to make use of them. Collaboration, capacity-building and technology transfer are essential to ensure that all countries may fully benefit from the diversity of PGRFA.

36. Most of the existing characterization and evaluation data are not publicly available due to sub-optimal information and data management systems. Also, due to the continuing lack of sufficient characterization and evaluation data, the targeted selection of accessions possessing specific traits is often not feasible and, in this regard, there is large room for improvement.

Plant breeding, genetic enhancement and base-broadening

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

38. A total of 87 countries report breeding activities addressing almost 500 crop species of all major crop groups. In crop breeding programs, yield continues to be the most sought-after trait. However, resistance to biotic and abiotic stresses – especially as 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.

39. Beyond and above 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 indicate an upsurge in the application 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 intra- and/or inter-specific diversity in crop production systems are reported by 73 countries. In some instances, the diversification of cropping systems is coupled with enhancing the adaptability of FV/LR 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 re-introduction of crops and the domestication of wild species.

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

41. Countries report various measures aiming at enhancing the cultivation of FV/LR and promoting their development and commercialization. Almost 500 FV/LR 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/LR and their growing market opportunities. This development is contrasted with the progressive discontinuation of the cultivation of many FV/LR, perhaps a reflection of the declining number of farmers and with them of the knowledge associated with these materials, as well as the abandonment of marginal cropping areas.

42. 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 are reported by 75 countries. Of these, 412 programs are considered specific to FV/LR whereas 159 specifically target underutilized crops or species.

Strengthening seed systems

43. The informal and formal seed systems co-exist in all countries. Forty countries, more than two thirds of them developing countries, report improvements in their seed systems between 2012 and 2019, facilitating 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 continue to constrain the extent of 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.

45. The cost of quality seeds of suitable crop varieties remain 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 in concert.

46. In spite of advances in promoting the development and commercialization of FV/LR and underutilized species, national policies and legal frameworks to support these initiatives are missing in many countries. Efforts to increase research and utilization of these important PGRFA should be enhanced.

The state of human and institutional capacities

47. Globally, the human and institutional capacities to use and conserve PGRFA increased since the publication of the Second Report, though progress was uneven across the key areas of PGRFA conservation and sustainable use, and across regions and countries. In general, advances seemed inadequate to fully implement the Second GPA. Increasing human and institutional capacities remains essential for the implementation of the Second GPA and for meeting other related commitments, such SDGs and relevant targets of the Kunming-Montreal Global Biodiversity Framework.

National programmes for PGRFA

48. During the reporting period, incremental progress has been made in the establishment and fostering of national programmes, and the development of strategies to guide their operations. The development of NBSAPs was identified as a catalyzing factor in this regard. However, only less than half of the 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 had postgraduate level educational programmes, 27 percent or 6 countries in Sub Saharan Africa had not, and 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 numbers of personnel working in key institutions with higher levels of educational qualifications, typically masters and doctorates.

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, 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, enhanced the number of trainees who 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 for the promotion of 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 were produced through participation in networks.

52. While some new networks have been initiated and other networks renewed their efforts, other important regional networks, such as CAPGERNET, PROCITROPICOS and REMERFI in Latin America and the Caribbean, had to pause or cease their activities. Many networks are managed by volunteers, which, coupled with the invariable dependence on short-term project funds, often implies 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

53. International information systems expanded and proliferated and cross-platform interoperability and data-sharing initiatives further advanced with the development of the Treaty's Global Information System (GLIS), including Genesys and WIEWS. The application of digital object identifiers (DOIs) under GLIS has continued to provide opportunities to improve efficiencies in tracing germplasm through research publications. UNGA's adoption 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 countries report to have an operational genebank management information system for PGRFA in place. The recent development of GRIN-Global Community Edition has expanded the opportunities for genebanks to adopt an open-access and easy-to-use genebank information management system. Twelve countries report to consider its adoption.

55. In spite of the numerous advances, a significant amount of data particularly from characterization and evaluation trials were not readily available and even in situations where information existed, it was often not publicly accessible. This situation was worse with regard to data

on geographic distribution of CWR and FV/LR, for which systematic monitoring and inventory remains an unattained objective in all countries.

Monitoring systems for genetic erosion

56. During the reporting period, only very few countries had a national system for monitoring and safeguarding genetic diversity and minimizing genetic erosion. Many countries reported a continuing concern over the extent of genetic vulnerability and the need for a greater deployment of 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 increased number of accessions from less than 600 000 in 2014 to over 2.3 million accessions in 2021 being made available under the International Treaty's Multilateral System (MLS) is indicative of the significant progress made in 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 SMTA.

Farmers' Rights

58. Farmers' Rights, as enunciated in Article 9 of the International Treaty, remain 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 and in the co-development of solutions to issues relating to PGRFA increased. International institutions, countries, and national stakeholders increasingly instituted mechanisms to foster this pluralism. However, there remains significant room for increasing the participation of farmers, Indigenous Peoples and local communities and the wider public in decision-making related to the management of PGRFA, including through the strengthening of capacities for the facilitation of 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 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 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 attendant challenges to PGRFA are now more widely understood than ever before. Greater attention is 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 with 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 disseminating information on PGRFA to a much broader audience, including young people.

Gaps and needs

61. Collaborations among national stakeholders and institutions remain weak while initiatives that are 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, more targeted training courses, in all technical and legal aspects of PGRFA, to a greater number of professionals, farmers and civil society, are needed.

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

62. A younger generation of professionals is needed to replace retiring experts in many countries while the imperative of building sufficient capacity and transferring knowledge remains a significant challenge. Also, the perennial lack of research funding, including for scholarships, post-doctoral 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 increasingly addressed, there remain room to improve the interoperability of existing information systems through shared, open standards. CWR and FV/LR data are insufficiently covered by existing information systems and often lack the technological capacity to both manage PGRFA-related information and access them. Overall, the key constraints to strengthened information systems are weaknesses in expertise in plant taxonomy, information management and bioinformatics; necessary digital infrastructure; and sub-optimal funding and financial support.

64. There remains a critical need to develop the 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 address genetic erosion.

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, inter-institutional coordination, collaboration and partnerships on communication activities, including engagements with media organizations, are still weak across all regions, resulting in shortcomings in information dissemination. Gaps also remain with tailoring effective communication messages to a diversity of audiences, and in local languages. The lack of funding and dedicated budgets for communication constituted a key constraint for public awareness-raising.

V. BUDGET

66. The draft Third Report was prepared with funding from the 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 Working Group may wish to:

(i) take note of the progress made in the preparation of the Third Report and the activities in support of its preparation;

(ii) review the draft Third Report, recommend changes and provide further guidance, as appropriate;

(iii) recommend that the Commission review the draft Second Report and request the Secretariat to

a. share the draft Third Report with the Tenth Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, for its comments;

b. invite Members and observers to provide comments on the draft Third Report by 30 November 2023;

c. publish the finalized Third Report prior to the next session of the Working Group, taking into due account the comments received;

d. prepare and publish an in-brief version of the Third Report in all official languages of FAO; and

e. 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.