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

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 3.2 of the Provisional Agenda

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

Tenth Session

22 – 24 June 2021

IMPLEMENTATION OF THE GENEBANK STANDARDS FOR PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Table of Contents

Paragraphs

I. Introduction 1-4

II. Draft Practical Guides for the Application of the Genebank Standards 5

A. Draft Practical Guide for the Application of the Genebank Standards: Conservation of Orthodox Seeds in Seed Genebanks 6

B. Draft Practical Guide for the Application of the Genebank Standards: Conservation in Field Genebanks 7

C. Draft Practical Guides for the Application of the Genebank Standards: Conservation of PGRFA via *In Vitro* Culture 8

III. Guidance sought 9-10

I. INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture (Commission) at its Fourteenth Regular Session endorsed the *Genebank Standards for Plant Genetic Resources for Food and Agriculture*[1] (Genebank Standards), which provide international standards for the *ex situ* conservation of plant genetic resources for food and agriculture (PGRFA) in seed banks, field genebanks, *in vitro* cultures and under cryopreservation. The Genebank Standards constitute an important tool for implementing both the *International Treaty on Plant Genetic Resources for Food and Agriculture*[2] (the Treaty) and the *Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*[3] (Second GPA).

2. The Commission, at its Fifteenth Regular Session, requested FAO to propose a mechanism for monitoring the application of the Genebank Standards.[4] As step towards responding to this request and in a bid to receive feedback on the utility of the Genebank Standards from a wide stakeholder base, FAO undertook a global survey of the relevant practitioners in national, regional and international genebanks.[5] In general, the Genebank Standards were considered a very useful tool for standardising genebank operations based on validated best practices. However, it was indicated that the step-wise activities of routine genebank operational workflows were not easily evident in the Genebank Standards. To address this identified shortcoming, FAO prepared sequential action steps for genebank operations.[6] These steps were adapted from the Genebank Standards and reflect the current state of the art in genebank operations. Subsequently, FAO, in collaboration with the Global Crop Diversity Trust, organized an expert consultation to examine the findings of the survey and to review and revise the draft action steps. The expert opinions were incorporated into the draft action steps.

3. The Commission, at its Seventeenth Regular Session, considered the draft action steps of the workflows for routine genebank operations for the conservation of plant germplasm as orthodox seeds, in field genebanks, and *in vitro* cultures, respectively.[7] It requested FAO to prepare practical guides for the use of the Genebank Standards, based on the proposed action steps, for consideration at the next sessions of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture (Working Group) and the Commission.[8]

4. This document provides a summary of the contents of the three Draft Practical Guides for the Application of the Genebank Standards (Draft Practical Guides) for the conservation of: orthodox seeds at low temperatures; vegetatively propagated plants in field genebanks; and *in vitro* cultures of meristematic tissues, respectively. The three Draft Practical Guides are presented in the document *Draft Practical Guides for the Application of the Genebank Standards for Plant Genetic Resources for Food and Agriculture.*[9]

II. DRAFT PRACTICAL GUIDES FOR THE APPLICATION OF THE GENEBANK STANDARDS

5. The purpose of the Draft Practical Guides is to present the information contained in the Genebank Standards in a more user-friendly format detailing the different actions of the genebank workflow in a sequential manner and thereby facilitate more widespread application of the Genebank Standards. As such, they aim to contribute to the development of an efficient and sustainable system of

[1] FAO. 2014. *Genebank Standards for Plant Genetic Resources for Food and Agriculture*. Rev. ed. Rome. http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gbs/en/
[2] http://www.fao.org/plant-treaty/en/
[3] http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gpa/en/
[4] CGRFA-15/15/Report, paragraph 51.
[5] CGRFA/WG-PGR-9/18/Inf.3.
[6] CGRFA-17/19/9.2/Inf.5.
[7] CGRFA-17/19/9.2/Inf.5.
[8] CGRFA-17/19/Report, paragraph 65.
[9] CGRFA/WG-PGR-10/21/2.2/Inf.1.

ex situ conservation. The Draft Practical Guides are underpinned by the underlying principles of all genebank management,[10] as outlined in chapter 2 of the Genebank Standards. Genebanks may use the activities outlined in these guides as a basis to develop Standard Operating Procedures and Quality Management Systems for conserving germplasm collections, defining in detail how each activity is carried out.

A. Draft Practical Guide for the Application of the Genebank Standards: Conservation of Orthodox Seeds in Seed Genebanks

6. The Draft Practical Guide for the conservation of orthodox seeds is structured to align with Chapter 4 of the Genebank Standards.[11] Accordingly, the Draft Practical Guide provides detailed information on the actions and best practices for acquisition of germplasm, drying and storage, seed viability monitoring, regeneration, characterization, evaluation, documentation, distribution and exchange, safety duplication, and personnel and security. Each section is supported by a summary diagram of the actions in sequential order. In addition, the Draft Practical Guide considers the suggested infrastructure and equipment for designing or modifying the facilities of a seed genebank. The final section refers to literature providing further guidance and/or technical background on seed genebank operations and management. An annex identifies the potential risks associated with the different genebank operations and proposes measures to address them.

B. Draft Practical Guide for the Application of the Genebank Standards: Conservation in Field Genebanks

7. The Draft Practical Guide for the conservation in field genebanks is similarly structured to align with Chapter 5 of the Genebank Standards.[12] It provides detailed information on the actions and best practices for choice of location of the field genebank, acquisition of germplasm, establishment of field collections, field management, regeneration and propagation, characterization, evaluation, documentation, distribution and exchange, safety duplication, and personnel and security. Summary schemes outlining each of the sequential steps required when operating a field genebank are provided for each of these topics. In addition, the Draft Practical Guide suggests infrastructure and equipment for designing or modifying field genebank facilities. A list of references to provide guidance and/or technical background on field genebank operations and management comprise the final section. An annex identifies the potential risks associated with the various field genebank operations and proposes preventive measures.

C. Draft Practical Guide for the Application of the Genebank Standards: Conservation of PGRFA via *In Vitro* Culture

8. The Draft Practical Guide for the conservation in *in vitro* genebanks aligns with Chapter 6 of the Genebank Standards.[13] It provides general guidance for the different steps and decisions that need to be taken for *in vitro* conservation, including acquisition of germplasm, *in vitro* culture and slow-growth storage, recycling and rejuvenation, characterization and evaluation, documentation, distribution and exchange, safety duplication, and personnel and security. Each of these steps is supported by a summary diagram of the workflow of the relevant *in vitro* genebank activities in sequential order. As with the other two Draft Practical Guides, an additional section considers the suggested infrastructure and equipment for designing or modifying *in vitro* genebank facilities. A final section includes a list of references to provide guidance and/or technical background on *in vitro*

[10] The underlying principles of genebank management include: identification of accessions; maintenance of viability; maintenance of genetic integrity during storage and regeneration; maintenance of germplasm health; physical security of collections; availability, distribution and use of germplasm; availability of information; and proactive management.

[11] Chapter 4: Genebank standards for orthodox seeds.

[12] Chapter 5: Field genebank standards.

[13] Chapter 6: Genebank standards for *in vitro* culture and cryopreservation. The Draft Practical Guide for the Application of the Genebank Standards: Conservation of PGRFA via *In Vitro* Culture does not consider handling of recalcitrant seeds or cryopreservation.

genebank operations and management. An annex outlines the potential risks associated with the different *in vitro* genebank operations and proposes preventative measures.

III. GUIDANCE SOUGHT

9. The Working Group may wish to review and, as appropriate, revise the three standalone Draft Practical Guides for the Application of the Genebank Standards, and recommend them for endorsement by the Commission.

10. The Working Group may wish to recommend that the Commission

- Request FAO to publish and widely distribute the three *Practical Guides for the Application of the Genebank Standards* to decision makers, practitioners and other relevant stakeholders;
- Request FAO to develop further additional standalone Practical Guides, especially for the conservation of recalcitrant seeds in seed genebanks and for cryopreservation.