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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**

**Tenth Session**

**22–24 June 2021**

# STRENGTHENING COOPERATION AMONG GLOBAL INFORMATION SYSTEMS ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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## I. INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture (Commission), at its Seventeenth Regular Session, requested FAO to continue developing the portal of the World Information and Early Warning System on plant genetic resources for food and agriculture (WIEWS)[1] and strengthening cooperation with the Global Information System (GLIS)[2] and Genesys[3] to avoid duplication of efforts. In addition, it requested a report clarifying the specific roles of these databases to streamline country reporting to the Commission and the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty).[4]

2. This document describes the general purposes and distinct functions of WIEWS, GLIS and Genesys, the way they support each other and how their cooperation is continuously being improved. It has been prepared in close cooperation with the Secretariat of the Treaty, which is in charge of GLIS, and the Global Crop Diversity Trust (Crop Trust) that manages Genesys.

## II. BACKGROUND

3. WIEWS is the information system established by FAO in 1993 for the preparation of periodic, country-driven global assessments of the status of the conservation and use of plant genetic resources for food and agriculture (PGRFA). Through the WIEWS Reporting Tool, an integral part of WIEWS since October 2014, countries report regularly on their activities related to the conservation and sustainable use of PGRFA. Through WIEWS, the Commission monitors the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA). Following the adoption of the global indicator framework for the Sustainable Development Goals (SDGs) by the United Nations General Assembly in 2017,[5] WIEWS also collects data and provides annual reports with national, regional and global aggregates on the plant component of SDG indicator 2.5.1 *Number of plant and animal genetic resources for food and agriculture secured in either medium or long term conservation facilities*.[6]

4. GLIS has been established pursuant to Article 17 of the Treaty, which calls for "a global information system to facilitate the exchange of information, based on existing information systems, on scientific, technical and environmental matters related to plant genetic resources for food and agriculture, with the expectation that such exchange of information will contribute to the sharing of benefits by making information on plant genetic resources for food and agriculture available to all Contracting Parties." At its Sixth Session in 2015, the Governing Body of the Treaty adopted the Vision and the first Programme of Work for GLIS. The Vision states that GLIS "integrates and augments existing systems to create the global entry point to information and knowledge for strengthening the capacity for PGRFA conservation, management and utilization".[7] GLIS links to multiple websites and other platforms providing information and knowledge to strengthen the capacity for the conservation, management and utilization of PGRFA.

5. Genesys was launched in 2011 as a freely accessible online database of accession-level information on *ex situ* PGRFA collections. Following the launch of Genesys, the separate website of SINGER, the germplasm information exchange network formerly maintained by the CGIAR and its partners, was decommissioned. Genesys was originally developed as a collaborative project between Bioversity International (now, Alliance of Bioversity International and CIAT) on behalf of the System-wide Genetic Resources Programme of the CGIAR, the Crop Trust, and the Secretariat of the Treaty. Since 2013, Genesys has been managed by the Crop Trust.

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[1] http://www.fao.org/wiews
[2] https://ssl.fao.org/glis/
[3] https://www.genesys-pgr.org/
[4] CGRFA-17/19/Report, paragraph 66.
[5] UNGA Resolution 71/313 (https://undocs.org/A/RES/71/313).
[6] http://www.fao.org/wiews/data/ex-situ-sdg-251/overview/en/
[7] Resolution 3/2015

## III. MAIN FEATURES OF THE INFORMATION SYSTEMS – A COMPARISON

6. While all three information systems provide information on the conservation and sustainable of PGRFA, they differ as to their (i) principal functions (ii), their scope (iii), the types of information they collect and provide (iv), the target groups they serve (v) and the methods and frequencies of the sourcing and updating of their data.

### (i) Principal functions of the information systems

7. The general purpose of the three information systems is to make accessible, and facilitate the exchange of the information relevant to the conservation and sustainable use of PGRFA and the sharing of benefits derived from their utilization.

8. The key rationale of Genesys is to provide users and managers of genebanks with the information that helps them to locate and access PGRFA and to document and use associated data. Genesys also provides guidance and assistance to genebanks in documenting the data so that they are suitable for publication according to agreed standards.

9. The main purpose of WIEWS is the monitoring of the implementation of the Second GPA through country reporting. In recent years, WIEWS was assigned an additional task pertaining to FAO's role as custodian of SDG indicator 2.5.1. Countries report to FAO on the implementation of SDG 2.5 and the Second GPA through the WIEWS Reporting Tool. The information gathered through WIEWS is also used for the preparation of FAO's periodic reports on the state of the world's plant genetic resources that provide the information basis for the Commission's rolling Global Plan of Action.

10. The key function of GLIS is to act as entry point to information and knowledge relevant to strengthening the capacity for PGRFA conservation, management and utilization.[8] As the information system of the Treaty, GLIS provides information on the Treaty and its Multilateral System, but it also links to sources of information covering a broad range of issues relevant to PGRFA, including legal and policy matters, Digital Object Identifiers (DOIs), etc.

### (ii) Scope of the information systems

11. While WIEWS and GLIS cover a wide range of issues related to PGRFA, the scope of Genesys is more limited in that it serves primarily as online database for PGRFA conserved in genebanks. The data available in Genesys are those reported by genebanks at their own initiative to the system and not all genebanks have acted on the invitation to submit their data to Genesys. In line with the Governing Body's vision, the intended scope of GLIS might be the most comprehensive, given that it is to serve as global entry point for any information and knowledge that is relevant to strengthening the capacity for PGRFA conservation, management and utilization. The scope of WIEWS, on the other hand, is defined by the scope of the Second GPA and its different priority activities. In practical terms, the scope of WIEWS is further specified by the reports submitted by countries, following country questionnaires agreed by the Commission, even though, as far as *ex situ* collections are concerned, WIEWS also provides information on the international collections of the CGIAR and other international genebanks as well as data from the European network of genebanks (EURISCO), the USDA and other genebanks.

### (iii) Types of information

12. The differences in purpose and scope of the three information systems are also reflected in the types of information they provide.

13. Both, Genesys and WIEWS provide accession-level passport data on *ex situ* collections. However, the accession-level information provided by Genesys is generally more detailed than the information provided by WIEWS. Genesys publishes passport, characterization and evaluation data, and images of the accessions conserved in genebanks. Users can discover materials of interest on Genesys and then continue to refine their search on the websites of individual genebanks (if available).

[8] Resolution 3/2015

As needed, they can also then reach out to genebank curators for assistance in obtaining the materials most relevant for their needs. In addition to passport data, genebanks publish images of seeds, plants and fruits, information on specific collection subsets, and documented datasets of characterization and evaluation data.

14. WIEWS, on the other hand, collects accession-specific data primarily for the purpose of monitoring national, regional and international *ex situ* germplasm collections over defined periods of time. The information gathered and provided by WIEWS on *ex situ* collections is less detailed than the information provided in Genesys, as it relies on a subset of the FAO/Bioversity Multi-Crop Passport Descriptors (MCPD). WIEWS and Genesys also differ as to the types of *ex situ* collections they report. WIEWS collects primarily information on distinct accessions stored in base collections. Accessions stored in active collections can be reported to WIEWS only when the accessions (i) are not already included in the base collections reports; and (ii) the accessions will in the near future become part of a base collection. Genesys, on the other hand, collects data on both base and active collections.

15. In addition to accession-level data on *ex situ* collections, WIEWS collects and provides detailed information as well as metadata on many matters, other than *ex situ* collections, such as *in situ* conservation and on farm management of PGRFA, sustainable use, and the building of institutional and human capacities. The information available on WIEWS includes, for example: lists of species surveyed and found threatened *in situ*; number of households supported after disaster situations with locally sourced seeds; number of newly collected germplasm samples; lists of species and number of accessions regenerated, in need of regeneration and at risk; number of characterized traits per *ex situ* conserved accession; lists of species and number of gene bank samples distributed; lists of crops with public pre-breeding and breeding programmes; and lists of released varieties. All the information may be aggregated by country, region and at global level, and thus provides an overview of the state of the implementation of the Second GPA at these levels.

16. GLIS provides, in line with its entry-point or platform concept, links to a whole range of different sources of information, including WIEWS and Genesys. It provides a standardized automated one-stop resource for PGRFA. In addition, easy access to information on seeds and other crop materials for research, training and plant breeding, is provided through the development and promotion of the use of DOIs, an international standard for identifying objects uniquely which was adapted for plant germplasm worldwide. By using the DOIs standards adopted by the Governing Body of the Treaty, users are able to identify and document their plant materials uniquely and permanently and will facilitate data interoperability among different systems. The use of DOIs is voluntary. The System is still under development in 2021, with a new directory of links to third party resources available on the web for various types and sources of plant material.

17. DOIs are used by other systems, including Genesys and WIEWS, to facilitate the identification of the material to which the information they offer refers. GLIS DOIs are associated with a description based on the FAO/Bioversity MCPD standard that is common to both Genesys and WIEWS. This facilitates keeping the three systems aligned. Thanks to the DOI System, GLIS also helps users find publications and datasets related to the material. Additionally, GLIS maintains a relationship graph recording the ancestry and progeny of a PGRFA. This is particularly useful for breeding but also for genebanks that are now able to more easily find out how the material they distribute is used in research projects. GLIS links all types of resources independently of their source: *ex situ*, *in situ* and on-farm and offers facilitated access to information on tools, projects, initiatives and organizations with relevant roles in the field of PGRFA information management and exchange.

### (iv) Target groups

18. The three information systems are publicly accessible and searchable by everyone. However, while being accessible to everyone, they target different groups of PGRFA stakeholders. GLIS aims at probably the widest group of stakeholders as it links to a vast number of websites, which provide information on PGRFA that range from the general to highly specialized. As the Treaty's information system, GLIS serves Contracting Parties of the Treaty and other stakeholders with interest in PGRFA, including breeders, researchers and genebank managers.

19. Given its primary function of monitoring the implementation of the Second GPA, WIEWS targets the Commission's Member Nations and National Focal Points (NFPs) as well as national administrations responsible for the implementation of the Second GPA. NFPs use the WIEWS Reporting Tool to report on the implementation of the Second GPA in their countries and to contribute to the preparation of the Commission's periodic reports on the state of the world's PGRFA. As FAO's reports on the state of the world's PGRFA and the GPAs on PGRFA are supporting components of the International Treaty, WIEWS also serves the Treaty's Contracting Parties. Since the adoption of the global indicator framework for the SDGs, WIEWS also targets policy-makers in the widest sense as it collects, processes and reports data on the status of the implementation of the plant component of SDG Target 2.5.

20. Genesys targets the users of PGRFA conserved *ex situ* and assists them in locating PGRFA of interest to them. End-users can request germplasm via Genesys if the holding genebank opts into this service. Genesys also supports national, regional and international genebanks in making information about their *ex situ* collections publicly accessible online, while retaining ownership and control. Genesys works directly with individual international, regional and national genebanks in data uploading and updating, providing tools for data validation and assisting with data cleaning. It supports genebanks in the adoption of the agreed community data standards before making data accessible to the public.

### (v) Acquisition of data

21. Both WIEWS and Genesys collect data from national and international genebanks.

22. *WIEWS* invites NFPs to report periodically on the implementation of the Second GPA through the WIEWS Reporting Tool. NFPs receive credentials for accessing the WIEWS Reporting Tool. NFPs may in turn generate credentials for their alternates, as well as for selected stakeholders. Data content is detailed in the Reporting Format for monitoring the implementation of the Second GPA for 58 indicators and 48 questions. *Ex situ* PGRFA collections are annually reported for SDG indicator 2.5.1. Data can be reported directly to WIEWS or by making them available for download in the required standardized format from online platforms (e.g. Genesys; EURISCO). Direct reporting can be done through an Excel file, accessible from the WIEWS home page, which once filled in is sent to WIEWS by email.[9] Annual updates may include the list of new accessions and the lists of those lost since the previous report. Data reported on the previous year can be downloaded from WIEWS and used for the update of the following year.

Table 1. WIEWS data sourcing for indicator SDG 2.5.1 in 2021.

| Data sourcing | Accessions, number | Accessions, percent | Countries, number | Countries, percent | International centres, number | International centres, percent | Regional centres, number | Regional centres, percent |
|---|---|---|---|---|---|---|---|---|
| **Direct** | 2 104 069 | 36.9 | 85 | 74.6 | 0 | 0 | 4 | 80 |
| **Through Genesys** | 1 901 106 | 33.3 | 3 | 2.6 | 12 | 100 | 1 | 20 |
| **Through EURISCO** | 1 695 651 | 29.7 | 26 | 22.8 | 0 | 0 | 0 | 0 |
| **TOTAL** | 5 700 826 | 100 | 114 | 100 | 12 | 100 | 5 | 100 |

23. As shown in Table 1, in 2021 about 75 percent of the countries and 80 percent of the regional centres reported on SDG indicator 2.5.1 directly to WIEWS by using Excel files. In terms of the number of accessions reported, however, data were sourced almost equally through direct reporting, Genesys and EURISCO.

[9] http://www.fao.org/fileadmin/user_upload/wiews/docs/SDG_251_data_requirement_sheet_table_EN.docx

24. Genesys attempts to make available to users the most current information on accessions in genebanks. Genebanks may add data on Genesys at any time: images, subsets and datasets are added immediately when ready for sharing with users. As of 31 May 2021, Genesys provided access to MCPD passport data on over 4 million accessions from 32 partner networks and genebanks. At least once a year Genesys checks for the availability of new data from partner genebanks and updates its database accordingly.

25. GLIS links to multiple sources of information in line with its one-stop-shop concept. Users assign DOIs to PGRFA on GLIS when needed using one or more of the available options: a web form, a batch method based on Excel documents or an XML-based integration protocol. Registrations are submitted by anybody interested in assigning DOIs to their collections: individuals, national and international genebanks, universities and research centers. The integration with Genesys allows registrants to obtain the DOIs from GLIS and then only update Genesys when necessary while GLIS is updated automatically. Accession level information stored under GLIS include DOI, 20 MCPD descriptors and 4 DOI descriptors.[10] As of March 2021, the System had facilitated access to 1.1 million accession of PGRFA thanks to the assignation of DOIs.

### (vi) Conclusion

26. A comparison of the three information systems shows that they serve distinctly different purposes and different main target groups, provide different types of information and rely on different reporting mechanisms. Even where the systems provide similar information, for example with regard to accession-specific information on *ex situ* collections, which is available in WIEWS and Genesys, the differences in their functions, levels of detail, processes and target groups to which the information has been tailored, demonstrate that the systems complement, rather than duplicate each other.

## IV. SYNERGIES AND COLLABORATION

27. Genesys, WIEWS and GLIS have been continuously working to improve public access to quality information on PGRFA. Through continuous exchange of information and collaboration, the three information systems have also helped reducing the reporting burden for NFPs and genebank managers.

28. The adoption of the DOIs and MCPD by Genesys, GLIS and WIEWS provides for a strengthened interoperability among the three systems. Capacity building activities have been carried out by Genesys, GLIS and WIEWS to promote the use of these standards for PGRFA information exchange, the adoption of advanced genebank information management systems, like GRIN Global, and the use of tools to monitor progress in the implementation of the Treaty, the Second GPA and SDG Target 2.5. This has contributed to the overall improvement of documentation of *ex situ* collections, which facilitates the effective management, accessibility and use of PGRFA germplasm.[11]

29. Countries and relevant regional/international centers have been given different options to report on SDG 2.5.1, either by sending data to WIEWS directly, or by notifying WIEWS that updated MCPD-compliant information can be accessed and downloaded from Genesys or EURISCO. Upon notification, MCPD-compliant data reports generated and exported through Genesys have been used to report on the plant component of SDG indicator 2.5.1 since 2016 and for monitoring the Second GPA implementation in 2014, as per *ex situ* collection holdings. In the last report produced by FAO through WIEWS, data on 1.9 million accessions from three countries and thirteen international and regional centres were downloaded from Genesys.

30. Another example of the use of synergies between the information systems is the reporting process for *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (Third Report). When contributing their summative narratives for the Third Report, the WIEWS Reporting Tool gives National Focal Points the option of referring to information previously

[10] http://www.fao.org/3/I8840EN/i8840en.pdf

[11] The number of genebanks reporting to WIEWS on their *ex situ* collections with MCPD-compliant descriptors has increased by 75 percent from 2014 to 2020.

provided through the Online Reporting System of the Treaty. Countries may therefore decide to refer to information previously provided, rather than providing the same information for a second time.

31. Under the Treaty, providers of PGRFA materials accessed under a Standard Material Transfer Agreement (SMTA) report to the Governing Body at least once every two years. To facilitate this process, the Secretariat has established the Easy-SMTA. Under the Compliance Procedures, Contracting Parties are also requested to report information on the implementation of the Treaty through an online reporting format. The Compliance Committee of the Treaty considered in 2019 a synthetic comparison report between the reporting formats for the monitoring of the GPA and the implementation of the Treaty. It was noted that the information provided by countries through these processes was publicly available and that its availability facilitated the various authorities and respondents of the other body to have easy access to baseline information for updating and reuse. [12]

32. DOIs, which are used by the three systems, play a connectivity role to access and link all available information on single accessions. As a 'live' system, Genesys automatically informs the *GLIS DOI Registration Service* of any updates received to passport data of material with an assigned DOI.

33. Relevant PGRFA institutions, as curated by NFPs through the WIEWS Reporting Tool, together with their globally assigned institution codes are made available for download on a daily basis and used by GLIS and Genesys to qualify germplasm holders and beneficiaries.

## V. CONCLUSION

34. The three information systems serve distinctly different purposes and different main target groups, provide different types of information and rely on different reporting mechanisms.

35. At various levels and in different areas, efforts have been made to exploit the synergies and improve collaboration between the three information systems. These efforts have reduced the reporting burden for NFPs of the Commission and the Treaty and genebank managers. At a technical level, collaboration between the three information systems contributed to a significant increase of data volumes and improved the quality of information published through each individual system.

36. Going forward, further opportunities for taking advantage of the synergies will be explored with the aim of combining efforts, in particular to strengthen the capacity of national and international stakeholders in documenting data on the progress in the implementation of SDG Target 2.5, the Treaty and the Second GPA.

[12] IT/GB8/CC-3/19/5 http://www.fao.org/3/CA3003EN/ca3003en.pdf