Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Target 2.5: By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed
Indicator 2.5.1.a: Number of plant genetic resources for food and agriculture secured in either medium or long-term conservation facilities

Institutional information

Organization(s):
Food and Agriculture Organization of the United Nations (UN FAO)

Concepts and definitions

Definition:
The conservation of plant genetic resources for food and agriculture (PGRFA) in medium-term or long-term conservation facilities (*ex situ*, in genebanks) represents the most trusted means of conserving genetic resources worldwide. PGRFA conserved in these facilities can be easily used in breeding programmes as well, even directly on-farm.

The measure of trends in *ex situ* conserved materials provides an overall assessment of the extent to which we are managing to maintain and/or increase the total crop diversity available for future use and thus protected from any permanent loss of genetic diversity which may occur in the natural habitat, i.e. *in situ* or on-farm.

The indicator is calculated as the number of accessions of plant genetic resources secured in conservation facilities under medium or long-term conditions, where an '*accession*' is defined as a distinct sample of seeds, planting materials or plants which is maintained in a genebank. Genebank Standards for Plant Genetic Resources for Food and Agriculture (accessible at http://www.fao.org/documents/card/en/c/7b79ee93-0f3c-5f58-9adc-5d4ef063f9c7/), set the benchmark for current scientific and technical best practices for conserving plant genetic resources, and support key international policy instruments for the conservation and use of plant genetic resources. These voluntary standards have been endorsed by the FAO Commission on Genetic Resources for Food and Agriculture at its Fourteenth Regular Session (http://www.fao.org/docrep/meeting/028/mg538e.pdf).

Rationale:
Plant genetic resources for food and agriculture provide the building blocks of food security and, directly or indirectly, support the livelihoods of every person on earth. As the conservation and accessibility to these resources are of vital importance, medium or long-term conservation facilities (genebanks) to preserve and make these resources and their associated information accessible for breeding and research, have been established at country, regional and global levels. Inventories of genebank holdings provide a dynamic measure of the existing plant diversity and its level of preservation. Data relevant to

this indicator facilitate the monitoring of diversity secured and accessible through genebanks and support the development and updating of strategies for the conservation and sustainable use of plant genetic resources.

The indicator is related to a monitoring framework endorsed by the FAO Commission on Genetic Resources for Food and Agriculture in which the status and trends of plant genetic resources are described through globally agreed indicators and regular country-driven assessments.

The number of materials conserved under medium or long-term storage conditions provides an indirect measurement of the total genetic diversity, which is secured for future use. Overall, positive variations are therefore approximated to an increase in the crop diversity secured, while negative variations to a loss of it.

Caution needs to be paid in the reporting and interpretation of the indicator. An uncontrolled addition of accessions that are in fact duplicates of samples already conserved and accounted for, or, *vice versa*, the deletion of redundant duplicates from the reported collections may lead to wrong interpretations.

In order to avoid duplicate counting at the national level and/or at the regional/international centre level, primarily distinct accessions stored in the base collections should be reported. Distinct accessions stored in an active collection should also be reported when (i) these are not already reported in the base collections and (ii) the active collection provides for them the conservation function of a base collection.

Grouping or splitting of accessions needs to be monitored both while reporting and interpreting the results, as in both cases the variation in the accounted number does not reflect a variation in the genetic diversity conserved and secured. Therefore, it is crucial that reporting countries and regional/international centres together with the accession level information reported, explain also the reason for the decrease or increase in the number of accessions, in particular when this does not reflect a real loss or gain in the genetic diversity conserved and secured.

Concepts:
Plant genetic resources for food and agriculture (PGRFA): Any genetic material of plant origin of actual or potential value for food and agriculture.

Accession: An accession is defined as a sample of seeds, planting materials or plants representing either a wild population, a landrace, a breeding line or an improved cultivar, which is conserved in a genebank. Each accession should be distinct and, in terms of genetic integrity, as close as possible to the sample provided originally.

Base collection: A base collection is defined as a set of unique accessions to be preserved for a medium to long-term period.

Active collection: An active collection is defined as a set of distinct accessions that is used for regeneration, multiplication, distribution, characterization and evaluation. Active collections are maintained in short to medium-term storage conditions. Active collections may be partially or entirely duplicated in a base collection.

Medium or long-term conservation facilities: Biological diversity is often conserved *ex situ*, outside its natural habitat, in facilities called genebanks. In the case of plant genetic resources, genebanks conserve base collections under medium or long-term storage conditions, in the form of seeds in cold rooms, plants in the field, and tissues *in vitro* and/or cryoconserved.

Comments and limitations:
Broadly, two issues are of concern in using the 'number of accessions' as an indicator of diversity in *ex situ* collections:

Undetected duplicates of accessions may contribute to an increase of the indicator, as each accession is a managed unit, kept and recorded as distinct. The detection of such duplicates will therefore result in a reduction in the number of accession previously reported. This can occur at different levels, for example within genebank collections, at national and also international levels.

A loss of viability of the material(s) conserved that is not promptly detected may similarly not be reflected in the number of accessions, contributing to an overestimate of the actual number of accessions.

Additional information could be provided by other indicators measuring *ex situ* conservation, which are part of the monitoring of the implementation of the Second Global Plan of Action for PGRFA under the FAO Commission on Genetic Resources for Food and Agriculture.

Methodology

Computation Method:
The indicator is calculated as the total number of unique accessions of plant genetic resources secured in medium to long-term conservation facilities. This includes all unique accessions in the base collections of the country or regional/international centre, as well as unique accessions stored in active collections, which are not included in the base collections and for which the active collection also supplies the conservation function of a base collection. Base collections may include both seed, field, cryo-preserved or *in vitro* collections depending on the species conserved and the available facilities in the country.

Disaggregation:
Geographic disaggregation (national, regional, global) is made. Grouping by sex, age etc. is not applicable.

Treatment of missing values:

- At country level
  Missing values are treated as such and not replaced by estimates for those countries that have never reported. Missing values of countries for which a baseline is available, are replaced by the most recent available data and flagged as estimates.

- At regional and global levels
  Missing values are treated as such and not replaced by estimates.

Regional aggregates:
Aggregates are the sum of country values.

Sources of discrepancies:
There are no internationally estimated data. Data on this indicator are all produced by countries and regional or international centres.

Methods and guidance available to countries for the compilation of the data at the national level:
Officially appointed National Focal Points and managers of regional or international genebanks are requested to provide the list of accessions conserved in medium or long-term conservation facilities by filling a spreadsheet contained in document List of descriptors for reporting on the Plant Component of SDG indicator 2.5.1 (see References) accessible from the WIEWS home page (http://www.fao.org/wiews). Out of the 12 passport descriptors which can be used to characterize each accession, four are mandatory: (i) the name of the holding genebank; (ii) the accession number; (iii) the name of the taxon the accession belongs to (including genus, species and lower taxonomic ranking); and (iv) the type of storage. Reporting on the remaining descriptors is highly recommended, as it allows the analysis of changes in different types of diversity concerned, including changes in the type and origin of the material secured (e.g. *biological status*; *country of origin*; *locations of safety duplications*; etc.) and better describes the composition of the secured materials.[1] The descriptors have been agreed by the FAO Commission on Genetic Resources for Food and Agriculture (see question 6.2 in the "Reporting format for monitoring the implementation of the Second global Plan of Action for Plant Genetic Resources for Food and Agriculture" http://www.fao.org/3/a-mm294e.pdf). Genebank holdings are counted based on the list of accessions reported.

Quality assurance
FAO 2014. Genebank Standards for Plant Genetic Resources for Food and Agriculture. Rome. (http://www.fao.org/3/a-i3704e.pdf)

Data Sources

Description:
Data are sourced from officially appointed National Focal Points (NFP) (see http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gpa/national-focal-points/en/) and regional and international agricultural research centres holding PGRFA *ex situ* collections.

Collection process:
Data providers report either (i) directly to FAO by using the spreadsheet contained in document List of descriptors for reporting on the Plant Component of SDG indicator 2.5.1 (see References) accessible from the WIEWS home page (http://www.fao.org/wiews) or (ii) through published information systems which comply with the standard of the FAO/Bioversity Multi-crop Passport Descriptor List (MCPD) v. 2 (see References), e.g. EURISCO (http://eurisco.ipk-gatersleben.de/) and Genesys (https://www.genesys-pgr.org).

Data are stored and made accessible through the World Information and Early Warning System for plant genetic resources for food and agriculture (WIEWS - http://www.fao.org/wiews), the FAO platform

[1] The distinction between 'mandatory' and 'highly recommended' descriptors does not reflect any subjective classification by 'importance' of the descriptors. For example, the 'acquisition date' or the 'genebank(s) holding safety duplications' may be considered critically important in the context of the indicator, however they are not always known and therefore cannot be treated as mandatory.

established to facilitate information exchange as well as periodic assessments of the state of the world's PGRFA.

Data Availability

Description:
The data collected as part of the first monitoring cycle of the implementation of the Second Global Plan of Action for PGRFA serve as baseline (number of accessions as of June 2014).

As of March 2019, data on over 5.3 million accessions from 100 countries and 17 international/regional centres are being published in WIEWS. The data collection is carried out annually in January. Continued efforts are made to improve the coverage of countries and international/regional centres, as well as the quality of the information.

Time series:
Data are available in WIEWS for 2014, 2016, 2017 and 2018. Estimates of the status of the indicator before 2014 are made using the *acquisition date* of the accessions reported in 2014.

Calendar

Data collection:
Data collection is undertaken on an annual basis in January in the context of the FAO Commission on Genetic Resources for Food and Agriculture.

Data release:
First quarter of the year.

Data providers

The officially nominated National Focal Points / National Coordinators, and managers of regional/international genebanks. For information by country see http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gpa/national-focal-points/en/.

Data compilers

Food and Agriculture Organization of the United Nations (UN FAO)

References

National Focal Points for monitoring the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture and the preparation of country reports for The Third Report on the State of the

World's Plant Genetic Resources for Food and Agriculture, http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gpa/national-focal-points/en/

List of descriptors for reporting on the Plant Component of SDG indicator 2.5.1, FAO, 2017, http://www.fao.org/fileadmin/user_upload/wiews/docs/SDG_251_data_requirement_sheet_table_EN.docx

Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, FAO, 2011, accessible at http://www.fao.org/docrep/015/i2624e/i2624e00.htm

Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture, FAO, 2010, http://www.fao.org/docrep/013/i1500e/i1500e00.htm

Genebank Standards for Plant Genetic Resources for Food and Agriculture, FAO, 2014, http://www.fao.org/documents/card/en/c/7b79ee93-0f3c-5f58-9adc-5d4ef063f9c7/

Targets and Indicators for Plant Genetic Resources for Food and Agriculture, In: Report of the Fourteenth Regular Session of the Commission on Genetic Resources for Food and Agriculture, CGRFA-14/13/Report, Appendix C, http://www.fao.org/docrep/meeting/028/mg538e.pdf

Reporting Format for Monitoring the Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, CGRFA-15/15/Inf.9, http://www.fao.org/3/a-mm294e.pdf

Draft Revised Reporting Format for Monitoring the Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, CGRFA-17/19/9.2/Inf.6, http://www.fao.org/3/my818en/my818en.pdf

FAO/Bioversity Multi-Crop Passport Descriptor (MCPD) v. 2 http://www.bioversityinternational.org/fileadmin/user_upload/online_library/publications/pdfs/FAO-Bioversity_multi_crop_passport_descriptors_V_2_Final_rev_1526.pdf

Related indicators

The indicator has linkages with indicator 2.5.1.b on animal genetic resources for food and agriculture.