

Global strategy for the conservation and use of sunflower genetic resources: summary for ITPGRFA stakeholders

This document is a concise summary of the [Global Strategy for the Conservation and Use of Sunflower Genetic Resources](#). This summary supports decision making by the stakeholders of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) by providing evidence-based information in an accessible format.

Annex 1 crops: *Helianthus annuus* L., *Helianthus tuberosus* L.

Composition and gaps in *ex situ* collections

Globally more than 40,000 accessions of sunflower and crop wild relatives (CWRs) of sunflower are conserved in at least 107 collections including 55 *Helianthus* species. Nineteen institutions conserve about 90% of the total *Helianthus* accessions held globally. Among the institutions that answered the 2021 survey, five genebanks (Australian Grains Genebank, Leibniz Institute of Plant

Genetics and Crop Plant Research, Institut National de la Recherche Agronomique, N.I. Vavilov Research Institute of Plant Genetic Resources, and USDA North Central Regional Plant Introduction Station) conserved accessions collected from more than 30 countries.

More than half of the accessions of sunflower (*Helianthus annuus*) are the products of research and breeding. Landraces, traditional and obsolete cultivars account for an estimated 13% of the accessions conserved globally. Some wild *Helianthus* species are only conserved by a limited number of institutions due to the difficulties and costs to regenerate them.

Key metrics	Data source	Value	%
Estimated global number of accessions <i>ex situ</i>	Genesys (2021), WIEWS (2021), Terzić et al. (2020), and Survey ¹ (2021)	40,501	
Estimated global number of accessions <i>ex situ</i>	Survey (2021)	30,903	76%
Global number of accessions notified as available in the MLS	GLIS portal (2024)	2,083	5%
Accessions with DOI	GLIS portal (2024)	2,194	5%
Number of accessions safety duplicated at Svalbard Global Seed Vault	SGSV web portal (2024)	4,082	10%
Number of accessions safety duplicated at another genebank	Genesys (2024)	4,569	11%
Number of samples distributed per year nationally and internationally	Survey (2021)	8982	
Passport data completeness index : median value of all <i>Helianthus</i> accessions in Genesys (Range 0-10)	Genesys (2024)	5.05	

¹Responses to the online survey conducted in 2021 were received from 27 genebanks.

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Landraces from North America, open pollinated and farmer varieties of cultivated sunflower, and some wild *Helianthus* species have gaps in *ex situ* conservation.

Future field research and extensive collections are needed to fully document *Helianthus* species in Mexico. There is also a need for further collecting in Canada and in the Eastern United States to sample intraspecific diversity of several CWRs.

Overall, the current global system for the *ex situ* conservation of sunflower genetic resources consists of four elements: 1) the USDA sunflower collection, which is the largest and most diverse and includes all recognized *Helianthus* species and plays both a national and international role for the global system; 2) other genebanks with significant collections of both cultivated and wild diversity; 3) collections holding the products of research and breeding; 4) user collections held by public or private sector breeding programs.

Routine operations, quality management system and safety duplication

Two thirds of the genebanks surveyed in 2021 conserved at least a part of their *Helianthus* collection in long-term storage with temperature according to the [FAO Genebank Standards](#). This accounts for 37% of the accessions conserved in these genebanks. Fifty-nine percent of the accessions in the surveyed institutes are conserved in medium-term storage conditions.¹

¹These estimates differ from the one reported in the strategy as they are based on the reported storage temperature rather than on what was reported to be in long-term storage and medium-term storage.

Five institutions reported that between 80 to 100% of their accessions of cultivated sunflower require urgent regeneration. Two institutions reported a similar backlog for the accessions of wild species.

About 10% of the estimated global *Helianthus* accessions are safety duplicated at the Svalbard Global Seed Vault. Based on Genesys (2024) data, at least more than 4,500 accessions, i.e. 11% of the global *Helianthus ex situ* collection are also duplicated in another genebank. The low level of safety duplication is a risk to the global system that needs to be addressed urgently. Constraints to safety duplications, cited by survey respondents, included limited seed stocks as a primary reason, and in some cases regulatory challenges.

Almost all surveyed genebanks had procedures in place for the conservation and regeneration of accessions. Only fewer than half of the surveyed genebanks had established protocols to safety duplicate accessions and to maintain germplasm health.

Documentation and information systems

Eighty-nine percent of the surveyed genebanks use a computerized database to manage accession information and 41% of the genebanks make their accession data publicly available and searchable. Passport data and taxonomy information are the most available accession data, while characterization and evaluation data are less available and less complete.



In situ conservation

The majority of sunflower wild relatives are abundant in North America, but there are species with a limited distribution or an alarming (or unknown) *in situ* conservation status. These include *H. inexpectatus* D.J., *H. carnosus* Small, *H. x multiflorus*, *H. arizonensis* R.C. Jacks, *H. agrestis* Pollard, and *H. glaucophyllus* D.M. Sm.

Human and financial resources

Thirty-seven percent of surveyed genebanks do not have adequate human resources for their routine operations and only half have sufficient funding for routine operations. One of the main disadvantages of the current system is the lack of committed annual support for conservation of sunflower genetic resources in many national genebanks.

Distribution and obstacles to use

Seventy-four percent of surveyed institutes distribute germplasm and most of these distribute to users internationally. USDA is the primary distributor of *Helianthus* germplasm globally and distributes an order of magnitude more *Helianthus* samples than any other collection. Some of the genebanks surveyed indicated that the low number of seeds and distribution costs limited distribution.

Partnerships and networks

During an expert consultations workshop held in 2021, curators of *Helianthus* collections highlighted the need to work together and develop collaborations among genebanks, as well as public-private partnerships, to facilitate sharing practical expertise and materials. A partnership among North American countries would be instrumental to conduct joint work to address collection gaps in the region.

Recommendations and priorities

- Establish a global international advisory group to engage key collection holders and main users of sunflower genetic resources, and to lead the implementation of agreed priority activities.

- Safety backup of cultivated and CWR accessions. All CWR accessions that are not safety duplicated should be sent to the USDA for regeneration and safety backup. Additionally, a safety duplicate should be deposited at the Svalbard Global Seed Vault.
- Rationalize the global sunflower collection and increase the accessibility of genetic diversity from CWR, landraces and open-pollinated varieties. This includes:
 - increasing accession-level data on international PGRFA portals and its completeness, and using digital object identifiers (DOIs);
 - phenotyping and genotyping accessions together with screening for abiotic/biotic stress resistance;
 - increasing data availability; and
 - developing a minimum descriptor list to stimulate the generation of more data.
- Consult with key representatives of the users of sunflower diversity.

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