

Global strategy for the conservation of potato: summary for ITPGRFA stakeholders

This document is a concise summary of the [Global Strategy for the Conservation of Potato](#) (Nagel et al. 2022). 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 I crop: *Solanum tuberosum* L. Andigenum group (except *Solanum phureja*), *Solanum tuberosum* L. Chilotanum group, *Solanum ajanhuiri* Juz. & Bukasov, *Solanum curtilobium* Juz. & Bukasov, *Solanum juzepczukii* Bukasov

International collections: The International Potato Center (CIP)

Composition and gaps in *ex situ* collections

It is estimated that at least 82,293 accessions of potato germplasm are held globally in 89 institutions and four international centers. Six genebanks conserve more than

50% of global accessions. Gap analysis results indicate that there are still gaps in the coverage of landraces and crop wild relatives in *ex situ* collections. Specifically, collection missions for tetraploid landraces are recommended in Bolivia, in particular in the Tarija and Santa Cruz departments; in Ecuador, in the provinces of Pichincha, Napo, Tungurahua and Zamora-Chinchipec; and in Peru, in the departments of Arequipa, Moquegua, Piura, San Martin and Tacna. Further collecting of landraces from Paraguay and Chile must be also considered. Compared to 2007¹ the number of accessions of wild

¹The previous global conservation strategy for potato was published in 2007.

Key metrics	Data source	Value	%
Estimated accessions ¹ conserved <i>ex situ</i>	Genesys, WIEWS, and survey ² (2020/2021)	82,293	
Accessions with DOI	Genesys (2024)	9,280	11%
Estimated accessions notified as available in the MLS	Survey (2020/2021)	41,873	61%
Passport data completeness index: median value in Genesys (Range 0–10)	Genesys (2023)	6.95	
Estimated accessions safety duplicated at a different genebank ³	Survey (2020/2021)	16,423	24%
Estimated accessions safety duplicated at Svalbard Global Seed Vault	Survey (2020/2021)	9,097	13%
Accessions needing urgent regeneration	Survey (2020/2021)	4,902	7%
Distribution: accessions available internationally	Survey (2020/2021)	25,170	37%
Distribution: accessions available nationally	Survey (2020/2021)	31,584	46%
Distributions per year nationally	Survey (2020/2021)	10,459	
Distributions per year internationally	Survey (2020/2021)	1,139	

¹Accessions estimates in this table include potato's crop wild relatives.

²A survey was conducted in 2020 and 2021 and responses from 32 genebanks were received.

³Excluding Svalbard Global Seed Vault

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species has decreased by 5.8%. Russia and The Netherlands rationalized their collections and other collections lost material. On the contrary, the number of landraces conserved *ex situ* has slightly increased when compared to 2007. However, in the past few years, there have not been many collecting missions and some genebanks have lost some of the landraces they conserved.

Routine operations and quality management system

Some genebanks reported that they rely on older equipment and technologies and have no resources to replace them. Most genebanks need to improve their facilities and the equipment they have available for seed conservation, e.g. by installing additional cold storage and drying facilities and using vacuum sealers and aluminum foil bags.

About 1,600 accessions, which is 53% of the Latin American landrace collection, require urgent regeneration and are affected by plant health issues, staff shortages and outdated infrastructure. Substantial support, in particular staff training, cold storage facilities, *in vitro* backup systems and cryopreservation are needed to safely conserve the traditional landraces in the country of origin.

Fundamental aspects of potato storage and maintenance are documented by the majority of genebanks. However, for at least one function, most genebanks cannot provide protocols. Of the surveyed genebanks, 81% have established protocols and documents for fundamental processes of storage and maintenance of accessions as well for characterization. Among the surveyed genebanks, 75% have written procedures for regeneration and 66% have procedures for the health of germplasm and documentation.

Safety duplication

About 47% of the survey participants indicated that they have organized an active safety backup system at an external location or at their own facility (25%). This system is well developed for wild species maintained as orthodox seed and, except for the COL017², ECU023³ and GTM001⁴, most seed accessions are also kept at the Svalbard Global Seed Vault (SGSV). Landraces, improved varieties and breeding lines maintained as clonal plants in the field or *in vitro* are backed up to a lesser extent. Only a few institutions have initiated safety duplication through cryopreservation.

Documentation and information systems

The surveyed genebanks have made 61% of passport data, 35% of characterization data and 33% of evaluation data available in electronic form. Sixty-two percent of the genebanks surveyed provide this information at least partly via the internet or via international aggregator systems.

Distribution and obstacles to use

Access to potato genetic resources is limited and 37% of wild species, 43% of landraces, 64% of improved varieties and 82% of the breeding lines are not available for distribution. Among the reasons are the unavailability of seeds/tubers/*in vitro* plants, insufficient plant health status, packaging and shipping processes and difficulties in obtaining phytosanitary certificates.

²Corporación Colombiana de Investigación Agropecuaria in Colombia

³Instituto Nacional de Investigaciones Agropecuarias in Ecuador

⁴Instituto de Ciencia y Tecnología Agrícolas in Guatemala



About 88% of the accessions distributed by the surveyed genebanks can be provided with an SMTA. Some Latin American, Asian and European collections have not yet assigned their collections to the MLS and primarily distribute the material through institute-specific MTAs.

The limited data and material availability may restrict users' ability to search and request suitable material. To improve the usability of the collections, accessions should be linked to a Digital Object Identifiers (DOI) issued by FAO and trained staff should produce Findable, Accessible, Interoperable and Reusable (FAIR) phenotypic data and store all information on genebank information systems.

In situ and on-farm conservation

Among wild potatoes, 26 species are on the IUCN Red List. Projects in Peru, Bolivia, Ecuador, Argentina, Chile and Brazil have identified conservation sites and strategies to maintain potato genetic diversity as well as knowledge, culture and traditions. "Guardians" of potato diversity cultivate and conserve native varieties and pass on traditional knowledge to the next generation.

Recommendations and priorities

- Comprehensive genotyping of *ex situ* and *in situ* collections.
- Harmonization of potato taxonomy. The international community needs to agree on a universal and predictive taxonomy and/or the classification system used needs to be stated in documentation systems.
- Documentation and monitoring of *in situ* populations and traditional landraces maintained on-farm in American countries. Inventories of CWRs, including IUCN Red List status, ecology, distribution patterns, taxonomy, traditional knowledge and use should be conducted. Changes in diversity in wild populations and of potato landraces should be monitored. The international community needs to agree on standard procedures to measure the conservation status of these populations and landraces in selected hotspots.

- Capacity building for *in situ* conservation and improved strategic concepts for on-farm conservation.
- Collecting missions and linkage between *in situ* on-farm and *ex situ* conservation. Activities will include: the repatriation of native potatoes to local communities, supporting on-farm management by providing disease-free propagules and *ex situ* conservation of diversity found on-farm and *in situ*.
- Capacity building to maintain high quality *ex situ* collections, in particular in Latin America. Genebanks in Latin America need facilities and documentation of all procedures to conserve their material according to internationally agreed genebank standards.
- Global Cryopreservation Initiative and cryopreservation of all unique potato accessions.
- Digitalization and better linkage of data for *ex situ* and *in situ* conservation management.
- Accessibility of collections for breeding and use. There is a need for well-documented core collections, further development of databases for easy access of accession data, healthy-virus-free plant material available in required quantities through SMTA and further research to overcome breeding barriers.
- Networking and training. Interdisciplinary and international collaborations are required among breeders, curators, geneticists, conservation biologists, phytopathologists, data managers and agronomists.

Bibliography

Nagel, M., Dulloo, M. E., Bissessur, P., Gavrilenko, T., Bamberg, J., Ellis, D. and Giovannini, P. 2022. Global strategy for the conservation of potato. Global Crop Diversity Trust: Bonn, Germany. <https://doi.org/10.5447/ipk/2022/29>

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