



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

This document is a concise summary of the [Global strategy for the conservation and use of pea genetic resources \(Ambrose et al. 2023\)](#). 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 crops: *Pisum sativum* L.,
P. abyssinicum A. Braun

International collections: International Center for Agricultural Research in the Dry Areas (ICARDA)

Composition and gaps in *ex situ* collections

It is estimated that more than 100,000 accessions of pea germplasm are held globally in 133 institutions. About 80% of these are concentrated in 13 collections and it is difficult to estimate how many of the accessions held *ex situ* are unique. Improved passport data and additional phenotypic and genetic data is needed to rationalize collections and the global system for the conservation of pea genetic resources. Results of gap analyses conducted with different methodologies were used to identify gaps in geographical coverage of pea landraces and two wild peas (*Pisum elatius* and *Pisum fulvum*).

Routine operations and quality management system

The majority of the collections that responded to the *Pisum* survey hold all or a majority of their *Pisum* collec-

tion in long-term storage at -18°C to -20°C. The survey respondents reported great variation in the regulation of relative humidity and in the use of packing materials.¹

All of the survey respondents reported that they have written procedures for storage and maintenance, but the percentage of institutes with written procedures for other operations varied from 44 to 94%. Two collections have developed quality management systems (QMS) and have obtained ISO9001 certification.

About a quarter of survey respondents (23%) mentioned that regeneration activities of the collection are an area of collection management with major limitations. This was due to insufficient funding to cover costs, inadequate field and/or glasshouse space and a lack of specialist staff. About a third of the survey's respondents say current funding for routine operations is not sufficient.

Safety duplication

About three quarters of the responding institutes have safety duplication arrangements on at least one other

¹Responses to the online survey conducted in 2020 were received from 36 genebanks.

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site. An estimated 23% of global pea accessions are safety duplicated within the same country or in another country. An estimated 18% are safety duplicated at the Svalbard Global Seed Vault. Five collections reported safety duplications levels of 100% of their holdings, while 10 institutes reported to have no arrangement for safety duplications in place. The situation at the genebank of the Plant Production Institute V.Y. Yuriev of the National Academy of Agrarian Sciences of Ukraine², located in Kharkiv³, is of particular concern as 47% of their collection is only maintained in short-term seed storage facilities.

Crop descriptors

The situation for characterization and evaluation data within the *ex situ* *Pisum* community remains complex and heterogeneous, because there is little standardization of descriptor lists and states among collections. To date, no minimum descriptor set has been developed for pea. The descriptors are highly divergent among genebanks. There are varied approaches used to describe each character, there is a wide range of terminology used for descriptor states and there are many descriptor states for any given trait. An *ad hoc* working group should be established to review the output of the cross-sectional analysis of descriptor states. The group would formulate options for revising and standardizing morphological descriptors regarding the development and adoption of plant and crop ontologies. The community should work towards the delivery of a consensus minimum descriptor list for *Pisum* that could be agreed upon and adopted by pea collections globally and uploaded into Genesys. The working group should liaise with the Secretariat of the ITPGRFA to ensure compliance with current international standards.

²FAO INSTCODE UKR001

³In 2023 this collection was moved to the west of Ukraine

| Key metrics | Data source | Value | % |
|---|---|---------|-----|
| Estimated global number of accessions <i>ex situ</i> | Genesys, FAO-WIEWS and Survey ⁴ (2020) | 102,917 | |
| Estimated global number of accessions <i>ex situ</i> | Genesys and FAO-WIEWS (2020) | 73,030 | |
| Estimated global number of accessions in the MLS | Plants that feed the world study ⁵ | 62,973 | 61% |
| Estimated global number of accessions notified as available in the MLS | Genesys (2024) | 29,665 | 29% |
| Estimated global number of accessions notified as available in the MLS | GLIS portal (2024) | 23,692 | 23% |
| Accessions with DOI | GLIS portal (2024) | 24,235 | 24% |
| Estimated number of accessions safety duplicated at a different genebank ⁶ | Survey (2020) | 20,113 | 17% |
| Number of accessions safety duplicated at Svalbard Global Seed Vault | SGSV web portal (2024) | 18,962 | 18% |
| Number of samples distributed per year nationally | Survey (2020) | 20,802 | |
| Number of samples distributed per year internationally | Survey (2020) | 14,416 | |
| Passport data completeness index: median value in Genesys (Range 0-10) | Genesys (2024) | 5.5 | |

⁴Responses to the online survey conducted in 2020 were received from 36 genebanks.

⁵Estimate based on country of institute party status to the Plant Treaty. Source: The Plants that Feed the World (Khoury et al., 2023).

⁶This figure does not include safety duplicates at Svalbard Global Seed Vault.

Documentation and Information systems

Most collections (83.8%) have electronic information systems in place for use in stock control management with a further 10.8% stating their records were partially digitized. The proportion of data computerized within collections varied greatly. The most highly computerized category was passport data with 86.6% of the surveyed collections reporting complete coverage. Recent studies on crop wild relatives have identified significant numbers of accessions for which the records are not yet uploaded into regional or central PGR portals. Action should be taken to ensure that such data is uploaded to central portals to enable better estimates of germplasm coverage and to identify gaps where further collection may be required.

Human and financial resources

The majority of *Pisum* collections are experiencing significant operational challenges in many aspects of their important work. Among the survey respondents, 81% cited major limitations relating to finances, facilities or staffing.

Distribution and obstacles to use

All but three of the surveyed genebanks holding *Pisum* germplasm distributed seeds to users. The survey results indicated that the Standard Material Transfer Agreement of the International Treaty is used in the majority of *Pisum* germplasm distributions. 58% of the survey's respondents reported that between 80 and 100% of the collection is available for national and international distribution. Although 22% of respondents also reported that only 0 to 20% of the collection was available for international distribution.

Partnerships and networks

58.3% of collections reported that they have active collaborations in place. The primary areas of collaboration were regeneration, characterization and preliminary evaluation. Collaborations in the areas of regeneration, characterization and evaluation are essential for the operational management of some institutions. Genebanks are also involved in a number of public/private crop improvement networks comprising academia, breeders, producers and the retail sector. The Pulse Genetic Improvement Network (PCGIN), which operates in the United Kingdom, is funded by the Department for Environment, Food & Rural Affairs (DEFRA). The North American Pulse Improvement Association is a forum to share research on pulse crops. The European Cooperative Programme for Plant Genetic Resources (ECPGR) has an active grain legumes working group.

Recommendations and priorities

1. Establish a global pea working group with representatives from key collection holders, breeders and research institutions, and existing relevant networks.
2. Rationalize the global *Pisum* collection by increasing data accessible on international PGRFA portals, improving passport data completeness, using digital object identifiers (DOIs) and genotyping all *Pisum* accessions conserved *ex situ* in key collections.
3. Acquisition priorities: Further collections of cultivated pea should prioritize landraces from Azerbaijan and

Turkmenistan in the Caucasus; Southeast Asia; Iran in western Asia; South Africa, Kenya and Malawi in Africa; Iraq, Israel, Jordan, Lebanon and Palestine in the Middle East; and Estonia, Lithuania, Finland, Norway and Belarus in Europe. Further collections of *P. elatius* should prioritize North Africa, Iran and Jordan, and of *P. fulvum* should prioritize Turkey.

4. Establish an *ad hoc* working group to formulate options for revising and standardizing morphological descriptors with reference to the development and adoption of plant and crop ontologies.

Bibliography

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