Stephan Weise

Digital Object Identifiers (DOI) for plant genetic resources: Possibilities/benefits and their support through EURISCO

EURISCO training workshop 2023
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The challenge of identification

- Genebanks have been existing for many decades
  - Description and use of plant genetic resources change continuously
  - May result in different accession identifiers over the time
  - Exchange between genebanks and provision of material to researchers
    and breeders

Current number:
PIS 972

Previous numbers:
882/51, 2229/52, 6307/53, 8019/54, 1033/55, 9002/60, 1/61, 6001/62, 8004/62

→ *Use of local identifiers is limited (chains of identifiers over time)*
→ *Difficult to trace transferred material*

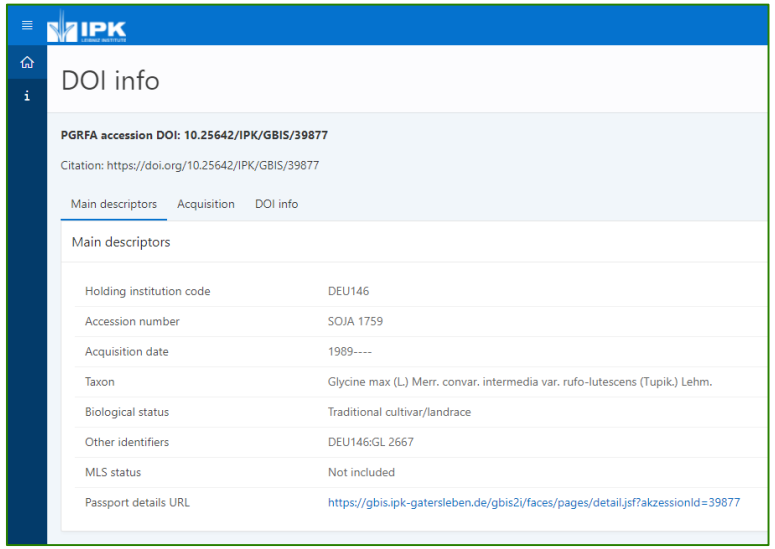
The challenge of identification

- In addition to passport data, other domains exist
  - Phenotypic, genotyping, sequence data, etc.
  - Research projects, publications, etc.
  - Mapping to PGR accessions sometimes very difficult (e.g. old phenotypic data from CCDBs)
- Aggregating information systems, such as EURISCO, Genesys, WIEWS
  - Significant challenges with identical or changing identifiers
  - Use of MCPD standard (FAO) so far: Unique combination of FAO-WIEWS-CODE, GENUS and ACCESSION NUMBER

  → *Items are subject to changes*
  → *Need for widely accepted, unique and stable identifiers for genebank accessions*

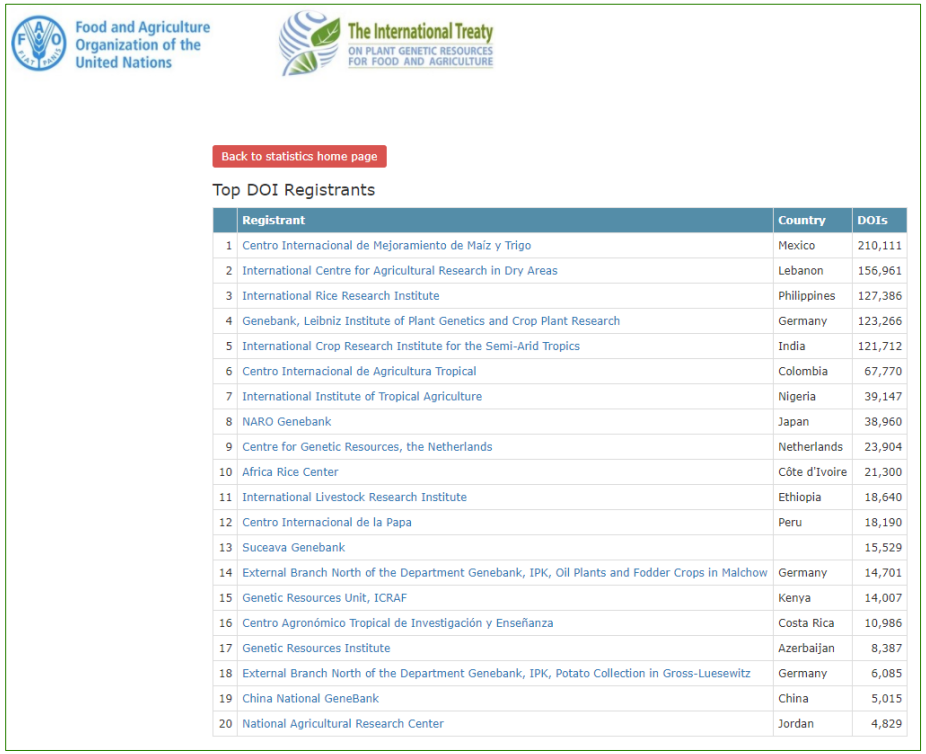
DOIs

- ITPGRFA task force on permanent unique identifiers (2015)
  → *Recommended to use DOIs*
- DOI:
  - Unique and permanent digital identifier of a (digital) object
  - Metadata for the description of the object
  - Name resolution by a resolver system, e.g. *doi.org*
- Advantages:
  - Quasi-standard for PGR material
  - High acceptance in the scientific community
  - Allows traceability when material is distributed, e.g. to another genebank
  - Enables insights into the use of PGR, e.g. from publications
  - Hierarchical relationships possible, e.g. for derived material (SSD line from genebank accession)
- Disadvantages:
  - PGR accessions are not unchangeable (digital) objects
  - Metadata + landing page must be kept up to date



Assignment of DOIs

- Own assignment of DOIs
  - E.g. via membership in the DataCite consortium
  - More freedom, but higher implementation costs (registration/update)
  - Provision and maintenance of own landing pages
- Use of the infrastructure of the ITPGRFA
  - Development of a GLIS-DOI portal
    - Central entry point for searching DOIs of plant genetic resources
    - Allows genebanks to register PGR material for DOIs free of charge
    - Allows registration of own DOIs (see above)
    - Increasingly accepted → more than 1.4 million DOIs in the GLIS-DOI portal
  - Easy registration
    - By XML-API
    - By Excel list
  - Landing pages are created by the Treaty
  - DOI metadata must be maintained



	Registrant	Country	DOIs
1	Centro Internacional de Mejoramiento de Maíz y Trigo	Mexico	210,111
2	International Centre for Agricultural Research in Dry Areas	Lebanon	156,961
3	International Rice Research Institute	Philippines	127,386
4	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	Germany	123,266
5	International Crop Research Institute for the Semi-Arid Tropics	India	121,712
6	Centro Internacional de Agricultura Tropical	Colombia	67,770
7	International Institute of Tropical Agriculture	Nigeria	39,147
8	NARO Genebank	Japan	38,960
9	Centre for Genetic Resources, the Netherlands	Netherlands	23,904
10	Africa Rice Center	Côte d'Ivoire	21,300
11	International Livestock Research Institute	Ethiopia	18,640
12	Centro Internacional de la Papa	Peru	18,190
13	Suceava Genebank		15,529
14	External Branch North of the Department Genebank, IPK, Oil Plants and Fodder Crops in Malchow	Germany	14,701
15	Genetic Resources Unit, ICRAF	Kenya	14,007
16	Centro Agronómico Tropical de Investigación y Enseñanza	Costa Rica	10,986
17	Genetic Resources Institute	Azerbaijan	8,387
18	External Branch North of the Department Genebank, IPK, Potato Collection in Gross-Luesewitz	Germany	6,085
19	China National GeneBank	China	5,015
20	National Agricultural Research Center	Jordan	4,829

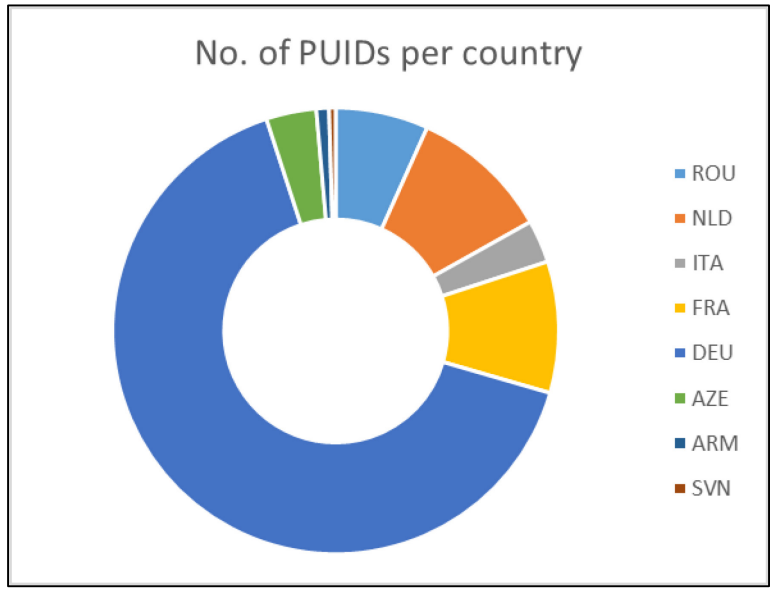
Source: https://ssl.fao.org/glis/

Assignment of DOIs

- Assignment via EURISCO
  - Through cooperation ITPGRFA/EURISCO
  - EURISCO can register PGR material with the GLIS-DOI portal at the request of an NFP
  - Prerequisite: Accession listed in EURISCO
  - This is done on behalf of the responsible genebank
  - Landing pages are created by the Treaty
  - DOI metadata does not need to be maintained by the genebank
  - Changes to the passport data are automatically transferred to the GLIS-DOI portal as DOI metadata

Unique identifiers in EURISCO

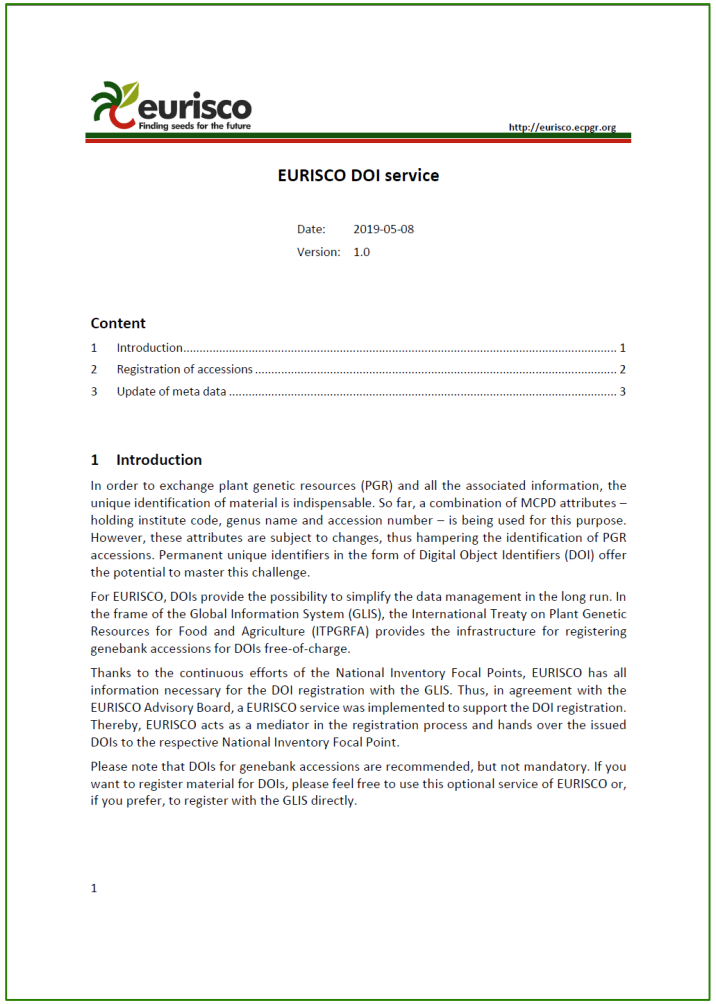
- 230,758 PUIDs
  - DOI assignment is a time consuming process
  - 23 institutes from 8 countries
  - Most of them DOIs (all except Italy)
- Own assignment of DOIs
  - France, Germany
- Use of the Treaty infrastructure
  - Netherlands
- Use of the EURISCO DOI service
  - Armenia, Azerbaijan, Romania, Slovenia
- Other type of PUIDs
  - Italy → about to switch to DOIs



as of 2023-08-29

EURISCO DOI service

- Only possible for accs. with acquisition date
- Registration process:
  - Genebank sends its request for DOIs to its NFP
  - NFP submits the request to EURISCO
    - INSTCODE, GENUS, ACCENUMB (all passport data in EURISCO)
    - Permanent identifier number (PID) of Treaty's Easy-SMTA
  - EURISCO does the registration with the GLIS-DOI portal
    - Use of minimum set of passport descriptors only
    - Handover of DOIs to the NFP → transfer to requesting genebank
- Requesting genebank needs to maintain the new DOIs together with their passport data



eurisco
Finding seeds for the future
http://eurisco.ecpgr.org

EURISCO DOI service

Date: 2019-05-08
Version: 1.0

Content

1 Introduction

In order to exchange plant genetic resources (PGR) and all the associated information, the unique identification of material is indispensable. So far, a combination of MCPD attributes – holding institute code, genus name and accession number – is being used for this purpose. However, these attributes are subject to changes, thus hampering the identification of PGR accessions. Permanent unique identifiers in the form of Digital Object Identifiers (DOI) offer the potential to master this challenge.

For EURISCO, DOIs provide the possibility to simplify the data management in the long run. In the frame of the Global Information System (GLIS), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) provides the infrastructure for registering genebank accessions for DOIs free-of-charge.

Thanks to the continuous efforts of the National Inventory Focal Points, EURISCO has all information necessary for the DOI registration with the GLIS. Thus, in agreement with the EURISCO Advisory Board, a EURISCO service was implemented to support the DOI registration. Thereby, EURISCO acts as a mediator in the registration process and hands over the issued DOIs to the respective National Inventory Focal Point.

Please note that DOIs for genebank accessions are recommended, but not mandatory. If you want to register material for DOIs, please feel free to use this optional service of EURISCO or, if you prefer, to register with the GLIS directly.

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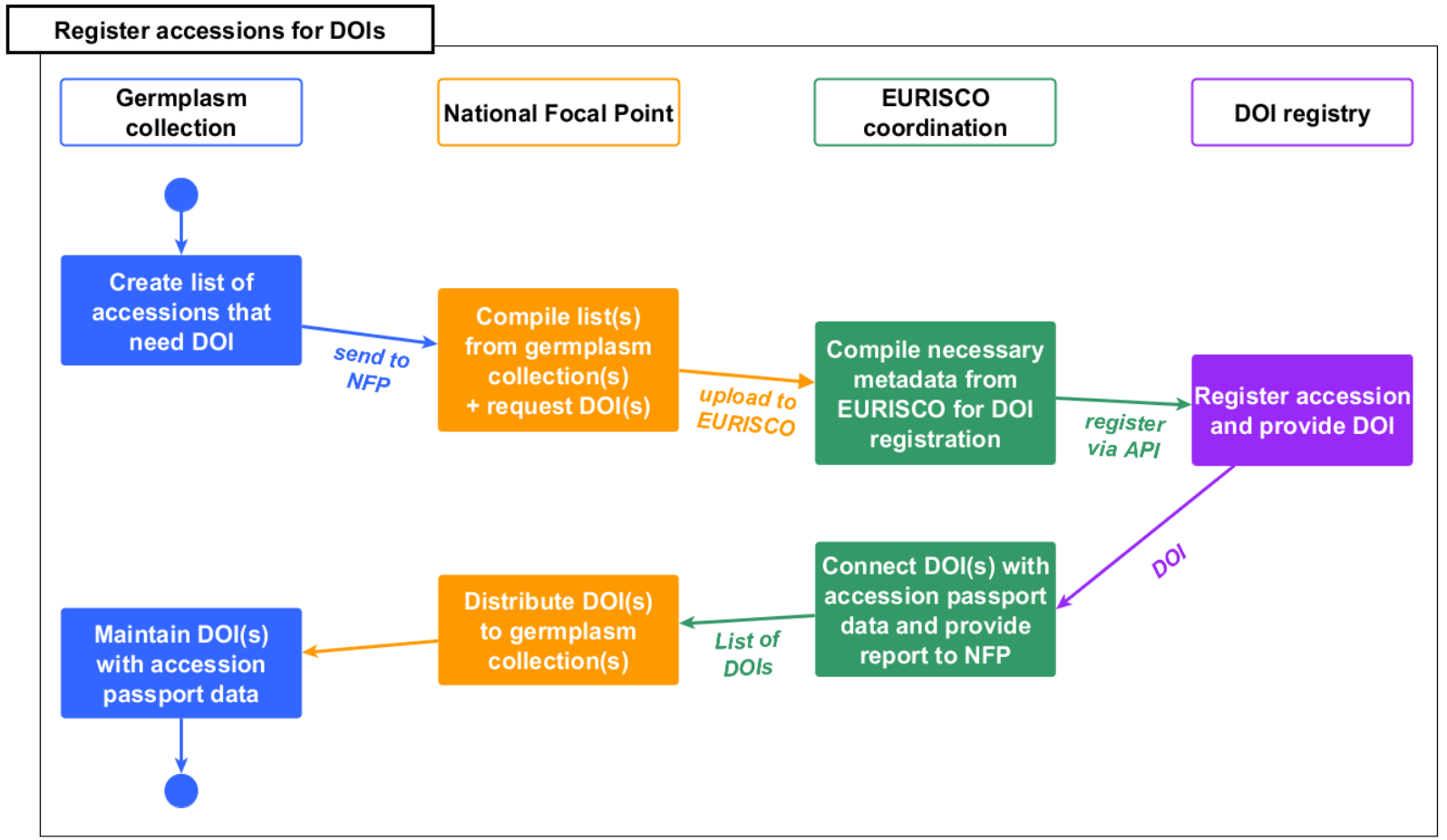
EURISCO DOI service



EURISCO DOI service