Organisation des Nations Unies pour l'alimentation et l'agriculture

Traité International SUR LES RESSOURCES PHYTOGÉNÉTIQUES POUR L'ALIMENTATION ET L'AGRICULTURE

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NOTIFICATION

Invitation à formuler des commentaires sur les Directives pour l'attribution des Identifiants numériques d'objets

Chère Madame / Cher Monsieur,

Le Secrétariat du Traité international a le plaisir d'inviter les Parties contractantes et les parties prenantes à formuler des commentaires en vue d'actualiser les Directives pour l'utilisation optimale des Identifiants numériques d'objets en tant qu'identifiants uniques permanents pour les échantillons de germoplasme v.2 (document ci-joint) élaborées dans le cadre du Programme de travail sur le Système mondial d'information (GLIS) visé à l'Article 17.

Les directives expliquent comment les titulaires de RPGAA peuvent identifier leur matériel de façon permanente et avec plus de précision. Elles aident les utilisateurs au cours du processus d'enregistrement de matériel RPGAA dans le Système mondial d'information pour déterminer quand attribuer un identifiant numérique d'objet (DOI en anglais) et quels descripteurs utilisés [http://www.fao.org/3/a-br574e.pdf]. La bonne application des directives permettra au Système mondial d'information de mieux gérer les relations entre les documents lors du transfert du matériel et de créer ainsi une valeur ajoutée aux informations émises par les organisations.

La mise à jour des directives fut suggérée par la première réunion du Comité scientifique consultatif sur le Système mondial d'information du Traité international en novembre 2016, qui a conseillé le Secrétariat de continuer à évaluer et améliorer les directives en collaboration avec les utilisateurs, y compris les banques de gènes et les obtenteurs. Les traductions des directives et des descripteurs en français, espagnol et arabe seront bientôt disponibles sur le site web du Traité international.

Nous vous serions reconnaissants de transmettre également ces directives pour être commentées par les utilisateurs concernés tels que les chercheurs, obtenteurs, agriculteurs, gestionnaires de banques de gènes, généticiens, documentalistes et bio-informaticiens. Le Secrétariat recueillera et analysera toutes les observations reçues. Veuillez les envoyer à l'adresse PGRFA-Treaty@fao.org avec copie à Adriana.Alercia@fao.org avant le 13 avril 2017.

Je vous prie d'agréer, Madame/Monsieur, l'assurance de ma très haute considération

Kent Nnadozie

Secrétaire par intérim
Traité international sur les ressources phytogénétiques
pour l'alimentation et l'agriculture

Guidelines for the optimal use of Digital Object Identifiers as permanent unique identifiers for Plant Genetic Resources for Food and Agriculture - v.2 draft

13 March 2017

1. Introduction

These guidelines are based on a broad consultative process and describe the main features and benefits of Digital Object Identifiers (DOIs) associated to Plant Genetic Resources for Food and Agriculture (PGRFA) and a set of basic rules for users to determine when to assign them.

2. Background

Several communities[1] have highlighted the importance of creating and adopting Permanent Unique Identifiers for improved identification of PGRFA[2]. Following broad consultation, DOIs were selected as the most appropriate, web-resolvable digital identifiers.

In accordance with the requirements set out in the International Treaty on Plant Genetic Resources for Food and Agriculture (the Treaty) for the Global Information System (GLIS), the system under construction will (1) build on and facilitate linkage between existing systems and (2) DOIs be applicable to all types of PGRFA. In addition, (3) GLIS will not replace existing systems or duplicate their functionality but provide new services needed by the user community and missing from existing systems, and (4) DOIs will be easy to implement.

This document along with *Data required for the assignation of DOIs in GLIS* [http://www.fao.org/3/a-br574e.pdf] serve as reference guides for the effective use of DOIs.

3. Bringing new opportunities

The functionality provided by the DOI system brings the following new opportunities for users:

- It exposes the material to the public or collaborators in a format that can be resolved by humans as well as computers.
- It enables information on the material to be harvested by robots searching publications and online databases that refer to the PGRFA by its DOI, and thus to be made more readily available.

[1] Including the genebank community, genomics community, plant breeders and journal editors.
[2] The Treaty defines PGRFA as "any genetic material of plant origin of actual or potential value for food and agriculture". This broad definition encompasses not only accessions conserved in genebanks and PGRFA conserved *in situ*, but also breeding lines, research materials, and protected modern varieties.

- It facilitates access to the information about the PGRFA and related PGRFA by pointing to websites and systems where detailed information is created, maintained and made available to the public.
- It enables recipients of PGRFA under an SMTA to comply with their obligations under SMTA Article 6.9 [3] simply by using the DOI to refer to the material received in their publications and online datasets.
- It helps developers of PGRFA to maintain their records and comply with their obligations under SMTA article 6.5b[4]
- It enables families of related PGRFA to be identified and thus jointly searched. For example, it enables a genebank manager to easily find all publications and online datasets created by recipients of accessions from the genebank.
- It facilitates interoperability between databases, by providing a single common standard for sample identification used by all communities.
- It enables collaborating laboratories to track samples between them with any appropriate degree of precision while each laboratory continues to use its own in-house sample tracking system, providing assurance that they are working on the same material.

The precision that a holder of PGRFA needs for the above functions is a primary criterion in acquiring DOIs for PGRFA.

4. What is identified?

DOIs can be used to identify PGRFA held by any individual or organization, including genebanks, plant breeders, geneticists, other plant scientists, extension officers, seed companies, plant variety protection offices, gardeners, farmers, landowners, and land managers. It follows immediately that the DOI identifies PGRFA within the context of the individual or organization that holds it, and thus one DOI maps to the combination of (1) the identity of holder of the PGRFA with (2) how the holder identifies the physical PGRFA material among all other PGRFA held by the holder.

At the discretion of the holder, within the guidelines set out here, the material identified can be any entity recognized as such by the holder. It may be a single DNA sample extracted from a plant, or a single seed or plant or plantlet, or a seed lot contained within a single packet or set of plantlets in one tissue culture tube, or the whole seed lot or set of clonal material harvested from a plot or field, or even multiple generations. The material can be an F1 hybrid, a segregating population, a pure line selected from a mixture or from a segregating population, a mixture of pure lines, or any other genetically homogenous or heterogeneous entity. It may be a landrace or other genetically heterogeneous variety, a modern released

[3] SMTA article 6.9 states "The Recipient shall make available to the Multilateral System, through the information system provided for in Article 17 of the Treaty, all non-confidential information that results from research and development carried out on the Material"

[4] "In the case that the Recipient transfers a Plant Genetic Resource for Food and Agriculture under Development to another person or entity, the Recipient shall […] (b) identify, in Annex 1 to the new material transfer agreement, the Material received from the Multilateral System […]".

cultivar, a genebank accession. It may be formally conserved, for example as in a genebank, or have a transitory existence.

The DOI identifies the material itself, not the associated data. This is an important distinction. Inter alia, it means that if the data associated with the material change, the holder should correct the data without changing the DOI.

5. How is the material identified?

GLIS is not intended to replace existing information systems, and therefore does not replace existing systems for identifying PGRFA. Existing identifiers will continue to be used locally. In a publication or online article, the first reference to the material would include both its DOI and the local identifier normally used by the holder; subsequent references within a single publication may specify only the local identifier.

However, when PGRFAs are transferred across organizations, locally assigned identifiers are no longer sufficient to uniquely identify the material. For this reason, a globally unique, persistent identifier such as a DOI is required to maintain consistency over time, provide for proper recognition of rights and obligations, and facilitate access to research outcomes contributed by subsequent recipients of the material.

To accommodate the diversity of systems and standards used by different holders of PGRFA, no restrictions are placed on the form of the sample identifier, or whatever is being used to distinguish the sample from others that the users hold. Holders should not re-use this identifier for future samples. It may, for example, be an identifier that has been created in accordance with a syntax that was defined for a particular purpose of identifying the sample in the records of the user. There are many forms and terms for such identifiers used by different communities, such as accession ID, Selection ID, Selection Number, Derivative name, Population ID, Seed lot ID, Catalogue entry, Designation, Preferred Name, Preferred ID, Permanent Unique ID etc. Alternatively, if the sample was acquired from a provider and, instead of creating a specific germplasm identification system, the user identifies it using whatever term was given by the provider[5], then that term should be specified here. Again there are many forms, such as cultivar name or common name or the provider's own sample ID (which could be any of the identifiers listed above) or even a sample ID created by a collector when collecting a sample from *in situ* conditions.

The assigned DOI should be used to identify the material publicly, especially in electronic media that can be searched online.

[5] The practice of identifying samples using the identifier supplied by the provider is deprecated in many cases. Any organization with a formal germplasm data management system would and should assign its own internal identifiers to the germplasm it manages. The option is included only to accommodate communities without such formal germplasm data management systems.

6. The PGRFA holder's commitment

A holder of PGRFA who obtains a DOI for a sample of PGRFA makes a commitment to associate that DOI permanently with the material, and not to use the same DOI for any other PGRFA.

Obtaining a DOI does not require or imply any commitment by the holder to maintain the PGRFA alive, and does not change any commitment the holder may or may not already have. If the PGRFA dies or is lost, the DOI persists as an historical record and will not be reused for other PGRFA. This way, any information accrued when the material was available can still be accessed.

Obtaining a DOI does not require or imply any commitment by the holder to make the PGRFA or associated data available to others, and does not change any commitment the holder may or may not already have about the material or the associated information.

7. Relationship with existing systems

Many holders of PGRFA have some form of inventory management system and/or workflow system, with provision for quality control, tracking and data collection. For genebanks this requires the documentation of accessions and their origins, maintaining records of viability, health, genetic integrity and quantity of seeds or clones, tracking progress through viability tests, characterization, and growing out to rejuvenate or multiply stocks. For plant breeders it requires identification and tracking progress through crossing, selection, multiplication, evaluation and release. For the seed industry it involves tracking progress through seed maintenance from breeders' seed to seed sold to farmers, with appropriate verification of genetic identity.

In addition, some communities have developed portals to expose data on the material they hold and to enable users to search those data. An example is Genesys (www.genesys-pgr.org), enabling the public to search for accessions available in participating genebanks across the world.

GLIS is not designed to replace any of these systems, and hence does not duplicate their functionality. Genebanks, breeders and others lacking such functionality may acquire it through relevant capacity-building initiatives.

The DOI system makes no assumption about the nature of the documentation system of a holder of PGRFA. It assumes only that the holder can identify the PGRFA held with sufficient precision and permanence to meet the holder's commitments as described above.

8. When to obtain a DOI

Based on the above, the basic rule for when to obtain a DOI for a PGRFA is simple:

assign a DOI to any PGRFA that you manage and whose present or past existence you wish or need to make publicly known, at the level of detail you choose

Some examples:

- You are a genebank manager and you wish to make known the availability of your accessions under the Multilateral System of the Treaty. *You obtain a DOI for each accession.*
- You are a Contracting Party to the Treaty and in compliance with the decisions of the Governing Body you wish to notify to the Governing Body all the PGRFA that are under your management and control on in the public domain. *You obtain a DOI for each PGRFA in this category*.
- You are a natural or legal person who, in accordance with the invitation of the Governing Body, and possibly also in accordance with the steps taken by your Government to encourage you to do so, you wish to notify the Governing Body that you are making PGRFA available under the Multilateral System of the Treaty. *You obtain a DOI for each PGRFA in this category*.
- You hold a sample of PGRFA that is genetically heterogeneous (it may be a physical mixture of two or more varieties, or a segregating population) and you derive from it a deliberately less heterogeneous sample (for example by making a single seed selection, or a single plant selection, or dividing the original mixed sample into its components). The DOI of the original heterogeneous sample should not be used for derived progeny, since the progeny have a different genetic composition. *You therefore obtain a new DOI for the progeny, and link it back to the DOI of the parent*.
- You create novel PGRFA that is distinct from its parent(s), for example through crossing with other samples, inducing mutations or genetic modification. *You need a new DOI for this sample because it is genetically different from its parent*. Under the Treaty, when developers of such novel PGRFA send their "PGRFA under development" to recipients with a SMTA, they are required to identify the original materials from which they derived their PGRFA under development. Full pedigrees are not required. GLIS would simplify the documentation and processing for this case. *The developer would obtain a new DOI for the PGRFA under development*; and its source DOI(s) would be the DOI(s) of the material(s) they previously received under an SMTA and used to develop the PGRFA under development
- You are concerned about the loss of genetic integrity that occurs during the *ex situ* conservation of your samples (for example through uncontrolled genetic drift, selection, pollen contamination, seed contamination, natural mutation, or mislabelling during seed multiplication and storage) and you want to be fully and publicly transparent in your management of the material. *You therefore choose to assign a new DOI to each new sample that you create of each accession, even though it may not differ significantly from its parent sample*.
- You are a genebank manager providing a sample to a recipient, and you and the recipient have jointly agreed that the recipient needs to know, in a web-resolvable form, not just which accession(s) you are providing but also more specific details about which particular seed lot or seed or tissue sample or DNA sample. *In this case, you would obtain a DOI for the specific material sent; and the DOI of the specific material that you send would link back to the DOI of the accession*.

- You receive material from a provider under an SMTA and you intend to conserve the material received. *You obtain a new DOI for each sample received (thus identifying yourself as the holder), and link it back to the provider's DOI*. If the transfer of the material you received was managed by the GLIS IT infrastructure, you would also have received an invitation to register a DOI: accepting this invitation will initiate a simplified registration process, ensuring the correct linkage between your new DOI and the provider's DOI.
- You receive material from a provider under an SMTA and you intend to publish your research results in an online dataset and you wish to identify yourself as the holder of the PGRFA and creator of associated data. *To ensure correct attribution of the data to you, you choose to obtain a new DOI for each sample received (thus identifying yourself as the holder), and link it back to the provider's DOI.*
- You hold material (whether obtained from others or created by you) and you intend to publish your research results in an online dataset or database. *To make your results more readily discoverable and useable by others, you choose to obtain a new DOI for each sample. If known, link it back to the DOI of the parental sample(s).*
- You hold material (whether obtained from others or created by you) that you wish to share with collaborators who have their own data management system. *To enable reliable tracking of material between you and them, you obtain a DOI for the material to be transferred*.
- You hold material (whether obtained from others or created by you) that you decide to transfer to a recipient with SMTA, even though you haven't previously publicized its availability through DOIs, in order to simplify your processing of the shipment, you choose to use GLIS IT infrastructure being developed. *The IT tools will give you a DOI for the material transferred.*

9. When not to obtain a DOI

As a corollary to the last section, the basic rule for when *not* to obtain a DOI for a PGRFA is equally simple:

*do **not** assign a DOI to any PGRFA whose present or past existence you do **not** wish or need to make publicly known*

Some examples:

- You are a genebank manager, you already have DOIs for your accessions, and you are providing a sample of an accession to a recipient. You decide that the recipient needs to know only what accession, not what specific sample of the accession, you are providing. *In this case, do not obtain a DOI for the specific sample, and instead identify the material sent using the DOI of the accession*.
- You are a member of a partnership through which one partner provides samples of the same materials to all partners, including you, as part of a single joint trial conducted by all members. Partners will not retain material for their own use outside the joint trial. The partnership relies on each partner's internal tracking and quality assurance

processes for managing samples in the trial. *The partnership agrees that you will not obtain new DOIs for the samples you received, but would use the DOIs provided to you by the provider of the material*.

- You receive material from a provider, and you do not intend to conserve the material received, and you intend to publish your research results in a journal, but you want the provider to be recognized as the primary holder of the material. *You decide to identify the material in your publication using the DOI of the provider's sample. In this case you would not obtain a new DOI for your sample*.
- You receive material from a provider, and you do not intend to conserve the material received, and you intend to publish your research results in an online dataset or database. You are not concerned about ensuring correct attribution of the data to you through the DOI. You agree with the provider that publishing data under the provider's DOI will not compromise the integrity of the provider's data on the material, and therefore you decide to identify the material in your online dataset or database using the DOI of the provider's sample. *In this case you would not obtain a new DOI for your sample*.

10. Relationships between DOIs

Much of the core novel functions of GLIS derives from the capacity to establish relationships between DOIs, thus connecting records across systems. They are of two kinds:

- A DOI for a PGRFA is related to DOIs for digital resources containing information about the PGRFA. The latter include online datasets and publications containing data and information about the PGRFA. The user may explicitly declare them within GLIS as "targets" (see the descriptor R01). In addition, GLIS will systematically trawl the web for resources containing references to the DOI for the PGRFA, and will automatically add these to the DOI's targets. This will enable users to easily discover online data and information associated with the PGRFA.
- A DOI for a PGRFA is related to its progenitor(s), which, being themselves PGRFA, may also have a DOI (see the descriptor R02 DOIs of progenitors). The genetic relationship between a PGRFA and its progenitors can be one of several types depending on how the PGRFA came into existence (see descriptor M04 Method): the DOI may be a genetic copy of, or a variant of, or novel PGRFA incorporating, its progenitor(s). This will enable users to search whole sets of PGRFA: for example, a set of PGRFA that are at least intended to be copies, or the set of PGRFA that are variants of one specified PGRFA, or the set of PGRFA that incorporates one specific progenitor.

  In the case that a provider transfers a PGRFA to a recipient and the recipient chooses to obtain a separate DOI using the GLIS tools, the provider's DOI will be automatically identified as the progenitor of the recipient's DOI. This will help assuring the accurate documentation of transfers of PGRFA between providers and recipients.

  In the case that a holder of PGRFA changes the genetic composition of a

PGRFA, or wishes to ensure against possible changes in genetic composition (see the next section), it will ultimately be the user's responsibility to ensure that each DOI is correctly associated with its progenitor(s), although GLIS will provide tools to help the user.

11. Managing and using DOIs

- Germplasm holders will prepare to adopt DOIs by adding an additional field in their database that will receive the DOI assigned to each eligible material.
- If a holder loses a sample for which a DOI has been assigned, the status of the DOI can be changed on the GLIS server to "historic". The status cannot be historic at the moment of assigning the DOI (although this rule may be relaxed in future if a need emerges to use DOIs to track historical samples that are known only through information such as pedigrees).
- The holder is encouraged to use the DOI in all publications and online articles and databases containing data collected on the germplasm. In a publication or online article, the first reference to the germplasm should include both its DOI and the local identifier normally used by the holder; subsequent references within a single publication may specify only the local identifier.