

Implications of Taxonomic Inconsistencies for Plant Genetic Resources Documentation

M.G.P. van Veller, R. Hoekstra and W. van Dooijeweert
Centre for Genetic Resources, P.O. Box 16, 6700 AA Wageningen
The Netherlands

CENTRE FOR GENETIC RESOURCES, THE NETHERLANDS

The Centre for Genetic Resources, (CGN) holds the mandate to conserve and promote the utilization of plant and animal genetic resources in the Netherlands. The genebank at the Plant Genetic Resources Group (PGR) of CGN maintains seed samples of 24,000 accessions of 25 horticultural and agricultural crops. Accessions are the units of the genebank and include cultivars, land varieties, research material and wild relatives of crop species. Information on the identity of the accession (e.g. passport data on origin, taxonomic classification and history), its traits (e.g. morphological, quality and disease resistance traits), as well as seed storage location and stock management is stored in the genebank documentation system.

TAXONOMY IN PLANT GENETIC RESOURCES COLLECTIONS

Taxonomy is an important input to the documentation of plant genetic resources collections. It is the basis for various genebank management activities such as the identification of the accessions and structuring of the collection. For identification purposes, taxonomic inputs such as genus, species, and intraspecific name (including authorities) are generally included in the documentation systems of genebanks. Besides these formal taxonomic ranks, a classification of the accessions into crops and sub-crops, cultivar or common names may also be included.

Moreover, taxonomy is an essential input in evaluating the coverage of variability within a particular crop in a genebank, as well as its utilization in breeding and research activities. Structuring the collections is important for defining representative samples from genebank collections. Hereby, these samples can be selected from the perspective of the curator or from the perspective of a user interested in particular characteristics. Either way, for the selection of representative samples, a priori structuring of the collection by (e.g.) taxonomic, geographical and descriptive data is essential.

For these genebank management activities, a stable taxonomy for the material included in the genebank collections is desired. However, changing insights in taxonomy, the use of different nomenclature as well as spelling errors, hamper stability and standardization.

TAXONOMIC PROBLEMS IN (INTER)NATIONAL DATABASES

To increase the use of plant genetic resources, information from several genebank collections is combined in central (inter)national databases that are searchable or downloadable via internet. Examples of such (inter)national databases are the ECPGR central crop databases (a listing of these databases is available via <http://www.bioversityinternational.org/networks/ecpgr/links/selectcrop.asp>), EURISCO (<http://eurisco.ecpgr.org/>) and SINGER (<http://singer.grinfo.net/>). Figure 1 shows the search form of the European Wheat Database, an ECPGR central crop database.

In compiling (inter)national central databases, data from various genebank documentation systems are combined. Hereby different, possibly inconsistent, taxonomies are brought together, because each genebank curator uses a classification system of his/her choice. As a result, it may have become very difficult to search and find data for particular species in central databases, in particular when the content of the central database is not being harmonised by a central database manager or strict input formats.

EXAMPLES OF TAXONOMIC INCONSISTENCIES

An example of taxonomic inconsistencies which hamper the searching and finding

of tomato accessions in European genebank collections can be found in EURISCO. For the crop tomato two different spellings are used for the genus name: *Lycopersicon* and *Lycopersicum*, and the genus may also be *Solanum*. Whereas “*Lycopersicum*” is a wrong spelling of the correct *Lycopersicon*, the use of “*Solanum*” has been proposed to encompass tomato as well as potato species. The most recent (recommended) classification as well several older/alternative classifications for tomato species is published by Spooner et al., 2003. In this publication *Lycopersicon esculentum* is renamed as *Solanum lycopersicum*.

Taxonomic inconsistencies due to the use of these different genus names are also present in other central databases. A solution to overcome these difficulties is the ability to search for both “*Solanum*” and “*Lycopersicon*”. This solution has been implemented in C.M. Rick’s search form for the Tomato Genetics Resource Center (TGRC) (Fig. 2). This page however, does not provide information on synonyms in the two classifications.

Another example is the different classifications for wheat. In some of these classifications *Aegilops* is recognized as a separate genus while in others only *Triticum* is used (Table 1). Although comparative classification tables are available (<http://www.k-state.edu/wgrc/Taxonomy/taxintro.html>), the user needs to be aware of the differences in order to find all accessions for the wheat crop; in some circumstances, *Aegilops* in addition to *Triticum* should be included in the search queries.

RECOMMENDATIONS FOR DEALING WITH TAXONOMIC INCONSISTENCIES

A solution to such taxonomic inconsistencies may be achieved by assigning someone as responsible for harmonisation of taxonomy in the database. In addition, extra fields could be included containing a standard classification system, and to preserve the classification according to the genebank holding the accession. In this way data suppliers can continue to use their preferred taxonomy, while allowing users to search using a standard taxonomy, including synonyms.

Literature Cited

Spooner, D.M., Hetterscheid, W.L.A., Van den Berg, R.G. and Brandenburg, W.A. 2003. Plant Nomenclature and Taxonomy: an Horticultural and Agronomic Perspective. Horticultural Reviews 28:1-60.

Tables

Table 1. Part of the *Aegilops* comparative classification table; complete table available at <http://www.k-state.edu/wgrc/Taxonomy/compaeg.html>.

<i>Aegilops</i> comparative classification		
Hammer	van Slageren	Kimber & Sears
<i>A. crassa</i>	<i>A. crassa</i>	<i>Triticum crassum</i>
<i>A. crassa</i> subsp. <i>vavilovii</i>	<i>A. vavilovii</i>	<i>T. syriacum</i>
<i>A. juvenalis</i>	<i>A. juvenalis</i>	<i>T. juvenale</i>
<i>A. turcomanica</i>	-	-
<i>A. ventricosa</i>	<i>A. ventricosa</i>	<i>T. ventricosum</i>
<i>A. comosa</i> subsp. <i>comosa</i>	<i>A. comosa</i> var. <i>comosa</i>	<i>T. comosum</i>

Figures

European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR) European Wheat Data - Microsoft Int...

Address <http://genbank.vurv.cz/ewdb/>

European Wheat Database

EWDB

Information

- [background](#)
- [descriptors](#)

On-line access

- [quick overview](#)
- [single search](#)
- [advanced search](#)

Off-line/download

Related links

Home page

Enter criteria:

Passport information

Accession number

Accession name

Species

Subtaxa

Country of origin

Status

Growth class

Genebank code

Other number

Acquisition date

Donor institute

Donor number

Breeding institute

Year of registration

Safety duplication

Collecting information

Collecting institute

Collecting number

Collecting date

Latitude

Longitude

Elevation from (m asl) to (m asl)

Characterisation descriptors

Descriptor

Score


Operator

Operator

Operator

Fig. 1. Search form of European Wheat Database, hosted at <http://genbank.vurv.cz/ewdb/>.

Address <http://tgrc.ucdavis.edu/Data/acc/dataframe.aspx?start=AccSearch.aspx&navstart=nav.html> Go

C.M. Rick
TGRC 
 Tomato Genetics Resource Center

[Home](#) [About Us](#) [Database Query](#) [Stock Lists](#) [New Resources](#) [Submit Seed Request](#) [Related Links](#) [Contact Information](#)

Accessions [Genes](#) [Colleagues](#) [Images](#)

Search the TGRC for Accessions

Please enter your search criteria below (Note: all fields are optional; multiple entries are linked by 'AND' operator, by default, only 'Active' accessions are shown):

Accession Number:
 (Enter all or part of the accession number, e.g. LA0716, 2-005, 3-003, delta-01)

Other identifier:
 (Enter all or part of the Other ID or collection number, e.g. PI 126443 or SAL3179; case insensitive)

Accession Category:

Cultivar:

Sporophytic Chromosome Number:

Status:

Notes (comments):
 (key word(s) search eg. BCTV, Tolerant, Resistance to Verticillium, Tobacco Mosaic Virus etc.)

Collection Site:
 (Enter all or part of the collection site, eg. Jipijapa, Nazca, Timar, 14 km west of Chusmiza etc.)

Collection notes:
 (Enter a habitat description, e.g. dry, mesic, rocky.)

Province/Department:

Country:

(Lycopersicon) (Solanum)

Taxon:	Taxon:
L. esculentum	S. lycopersicum
L. cheesmanii	S. arcanum
L. cheesmanii f. minor	S. cheesmaniae
L. chilense	S. chilense
L. chmielewskii	S. chmielewskii
L. esculentum	S. corneliomulleri
L. esculentum var. cerasiforme	S. galapagense
L. hirsutum	S. habrochaites
L. hirsutum f. glabratum	S. huaylasense
L. parviflorum	S. juglandifolium
L. pennellii	S. lycopersicoides
L. pennellii var. puberulum	S. lycopersicum
L. peruvianum	S. neorickii
L. peruvianum f. glandulosum	S. ochranthum
L. peruvianum var. humifusum	S. pennellii
L. pimpinellifolium	S. pennellii var. puberulum
Other	S. peruvianum
S. juglandifolium	S. pimpinellifolium
S. lycopersicoides	S. sitiens
S. ochranthum	
S. sitiens	

Search

Accessions with GIS data, e.g. wild species)

Fig. 2. Search form for tomato accessions in the collection of the C.M. Rick Tomato Genetics Resource Center (TGRC), available via <http://tgrc.ucdavis.edu/>.