

CONSIDERATIONS REGARDING THE RECENT UPDATES IN BOTANICAL NOMENCLATURE

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Abstract. The use of scientific names of plants is essential in the communication of botanical knowledge. As is known, to scientifically name species we use binary nomenclature introduced by Carl von Linné, in 1753. But taxonomy is not a static science, on the contrary a very dynamic (and controversial) one. The sources of new names are 1) the discovery of new species and 2) the reshaping or revision of classifications through merging, splitting, reassignment, etc. Our work is an update of some scientific names of plant and a reclassification into botanical families, carried out following the investigation of international databases. For example, oriental thuja now has the valid name *Platycladus orientalis* and *Thuja orientalis* has become its synonymous, mahonia has the valid name *Berberis aquifolium* and *Mahonia aquifolium* has become its synonymous, Japanese acacia has the valid name *Styphnolobium japonicum* and *Sophora japonica* has become its synonymous, sedge has the valid name *Noccea perfoliata* and *Thlaspi perfoliatum* has become its synonymous, yellow chamomile has the valid name *Cota tinctoria* and *Anthemis tinctoria* has become its synonymous. At the same time, some genera have been moved to other botanical families: *Acer* is now in Sapindaceae (from Aceraceae, which is no longer recognized), as well *Aesculus* in Sapindaceae (from Hippocastanaceae, also not recognized), *Tilia*, in Malvaceae (from Tiliaceae, also not recognized), *Taxodium* and *Sequoia*, in Cupressaceae (from Taxodiaceae, also not recognized), *Fumaria*, *Corydalis*, *Dicentra*, in Papaveraceae (from Fumariaceae, also not recognized), *Veronica*, *Digitalis*, *Linaria*, *Antirrhinum*, in Plantaginaceae (from Scrophulariaceae, which was reorganized). As can be seen, botanical nomenclature keeps changing, to be in line with advanced molecular biology research, through which the phylogeny of plant species is much better understood and reflects real evolutionary relationships, which morphology alone cannot encompass. Although they are difficult and can create confusion, these updates are essential in scientific activity for the accuracy of research, but also in the didactic process, for re-editing materials and bringing them into line with current discoveries.

Keywords: taxonomy, plant names, valid names, plant families, reclassification

INTRODUCTION

Scientific plant names are given according to the recommendations of The International Code of Nomenclature for algae, fungi and plants - ICN, previously called The International Code of Botanical Nomenclature - ICBN. This code is coordinated by the International Association for Plant Taxonomy - IAPT, and revised at each International Botanical Congress - IBC, the most important scientific meeting on plants. The last congress took place in Spain, at Madrid, in July 2024, and the next one will take place in South Africa, in Cape Town, in July 2029.

At the Madrid Congress, 447 proposals for amending the code were debated and important rules were accepted, such as: it was established that the specific epithet must consist of at least two, but not more than 30 characters (Art. 23), clarifications were made on the naming of fossil taxa (Art. 40), a clear mechanism was introduced for the voluntary registration of plant and algae names (Art. 42), the option of rejecting a new name if it is derogatory for a group of persons was admitted (Art. 56), etc.

In the new code (2025 edition), we find, for example, the change of some species names, for ethical reasons (Art. 61). The "afra/afer" rule establishes that starting in 2026, all names containing the specific epithet "caffra" (which refers to the African origin of the species) will be changed to "afra" or "afer" to eliminate the racial connotation. For example, *Acacia caffra* will become *Acacia afra*, *Protea caffra* will become *Protea afra*. This rule has also been discussed for its ethical implications (e.g. KNAP & TURLAND, 2024; SMITH & FIGUEIREDO, 2022; <https://www.scena9.ro/article/plante-rasism>).

One of the great challenges for taxonomy is certainly Sequence-Based Nomenclature - SBN, a major change, which will bring a true scientific revolution in biology. The transition from physical to molecular is desired, that is, the names of plant species will be validated by DNA sequences and digital data will be used, without the need for physical specimens (vouchers). The method is discussed in microbiology, for fungal taxonomy (THINES et al., 2018, LÜCKING et al., 2021) and accepted for prokaryotes, SeqCode (HEDLUND et al., 2022). Regarding cormophytes, for example DNA barcoding has been studied by ZHU et al. (2022) for the authentication of plant species in traditional Chinese medicine, while LIU et al. (2022) conducted an analysis of the molecular phylogeny of terrestrial plants and show how far this field has evolved in the last two decades. Based on molecular data, in another recent study, XIANG et al. (2026) propose a new subfamilial, tribal, and generic classification of *Ranunculaceae* in which 5 subfamilies, 14 tribes (one newly described - *Glaucidieae*), and 58 genera (three newly described: *Cymatenemion*, *Neoenemion*, *Paranemone*) are recognized. Works of this kind can be found in TAXON (<https://onlinelibrary.wiley.com/journal/19968175>).

From a paedagogical perspective, the use of online databases becomes mandatory due to the need to use updated information, because floras and reference manuals are outdated. In addition, they are very well received by students, as our experience with biology, agronomy, forestry, horticulture and landscaping students demonstrates. For example, KIRCHOFF et al. (2014) created a recognition program in an active learning format for a systematics course on species identification, which was successful among students, who obtained much better results on the recognition exam.

MATERIAL AND METHODS

For this study we investigated International Code of Nomenclature for algae, fungi, and plants (Madrid Code) - ICN and the main recognized reference databases, such as: World Flora Online - WFO, Plants of the World Online - POWO, Euro+Med PlantBase, Global Biodiversity Information Facility - GBIF, International Plant Names Index - IPNI, Angiosperm Phylogeny Group (III, IV) - APG III, APG IV, FloraVeg.EU. APG IV is considered the latest official version for the classification of flowering plants and POWO is the current reference standard for global botanical nomenclature for vascular plants, because is updated weekly based on the World Checklist of Vascular Plants - WCVP. Next we updated the classical names of some common plant species with current valid names and we presented the reorganized botanical families and reclassified genera. These data are presented in tabular form and the taxa were organized alphabetically, for easy viewing. We note that the choice of taxa was subjective, based on our scientific and didactic interest.

RESULTS AND DISCUSSIONS

In tables 1-4 we present the updated taxa: species, genera, families. Table 1 contains 25 species with current, accepted names and old names that have become synonymous. Here

are some examples: rosemary has now the accepted name *Salvia rosmarinus* Spenn. and *Rosmarinus officinalis* L. is synonymous, ragged-robin has the accepted name *Silene flos-cuculi* (L.) Greuter & Burdet and *Lychnis flos-cuculi* L. is synonymous, sedge has the accepted name *Noccaea perfoliata* (L.) Al-Shehbaz and *Thlaspi perfoliatum* L. is synonymous, silverweed has the accepted name *Argentina anserina* (L.) Rydb. and *Potentilla anserina* L. is synonymous, bleeding heart has the accepted name *Lamprocapnos spectabilis* (L.) Fukuhara and *Dicentra spectabilis* (L.) Lem. is synonymous, Japanese acacia has the accepted name *Styphnolobium japonicum* (L.) Schott and *Sophora japonica* L. is synonymous, mahonia has the accepted name *Berberis aquifolium* Pursh and *Mahonia aquifolium* (Pursh) Nutt. is synonymous, mother-in-law's tongue has the accepted name *Dracaena trifasciata* (Prain) Mabb. and *Sansevieria trifasciata* Prain is synonymous, angel's trumpet has the accepted name *Brugmansia arborea* (L.) Sweet and *Datura arborea* L. is synonymous, dahlia has the accepted name *Dahlia pinnata* Cav. and *Dahlia variabilis* Desf. is synonymous, etc. These are the currently accepted scientific names according to POWO. Also, from genus *Polygonum*, several species have been reclassified and moved to the genera *Persicaria*, *Bistorta*, *Fagopyrum*, *Fallopia*, *Reynoutria*, *Koenigia*. Last year we have updated the knotweed species of wetzones (NEACŞU et al., 2025): the accepted name is *Persicaria amphibia* (L.) Delarbre and *Polygonum amphibium* L. has become synonymous, the accepted name is *Persicaria hydropiper* (L.) Delarbre and *Polygonum hydropiper* L. has become synonymous, the accepted name is *Persicaria lapathifolia* (L.) Delarbre and *Polygonum lapathyfolium* L. has become synonymous, the accepted name is *Persicaria minor* (Huds.) Opiz and *Polygonum minus* Hudson has become synonymous, the accepted name is *Persicaria mitis* (Schrank) Assenov and *Polygonum mite* Schrank has become synonymous, the accepted name is *Persicaria maculosa* Gray and *Polygonum persicaria* L. has become synonymous, the accepted name is *Reynoutria japonica* Houtt. and *Polygonum cuspidatum* Sieb. et Zucc. has become synonymous.

Table 1

Species accepted name and synonymy

No.	Valid name	Synonymous	Vernacular name (most common)
1.	<i>Argentina anserina</i> (L.) Rydb.	<i>Potentilla anserina</i> L.	silverweed
2.	<i>Berberis aquifolium</i> Pursh	<i>Mahonia aquifolium</i> (Pursh) Nutt.	mahonia
3.	<i>Brugmansia arborea</i> (L.) Sweet	<i>Datura arborea</i> L.	angel's trumpet
4.	<i>Cardamine bulbifera</i> (L.) Crantz	<i>Dentaria bulbifera</i> L.	coralroot bittercress
5.	<i>Cota tinctoria</i> (L.) J. Gay	<i>Anthemis tinctoria</i> L.	yellow chamomile
6.	<i>Dahlia pinnata</i> Cav.	<i>Dahlia variabilis</i> Desf.	dahlia
7.	<i>Dracaena trifasciata</i> (Prain) Mabb.	<i>Sansevieria trifasciata</i> Prain	mother-in-law's tongue
8.	<i>Erophila verna</i> (L.) DC.	<i>Draba verna</i> L.	whitlowgrass
9.	<i>Erysimum × cheiri</i> (L.) Crantz	<i>Cheiranthus × cheiri</i> L.	common wallflower
10.	<i>Lamprocapnos spectabilis</i> (L.) Fukuhara	<i>Dicentra spectabilis</i> (L.) Lem.	bleeding heart
11.	<i>Leucanthemum vulgare</i> Lam.	<i>Chrysanthemum leucanthemum</i> L.	marguerite
12.	<i>Lysimachia arvensis</i> (L.) U.Manns & Anderb.	<i>Anagallis arvensis</i> L.	scarlet pimpernel
13.	<i>Noccaea perfoliata</i> (L.) Al-Shehbaz	<i>Thlaspi perfoliatum</i> L.	sedge
14.	<i>Persicaria amphibia</i> (L.) Delarbre	<i>Polygonum amphibium</i> L.	water knotweed
15.	<i>Persicaria hydropiper</i> (L.) Delarbre	<i>Polygonum hydropiper</i> L.	marshpepper knotweed
16.	<i>Persicaria maculosa</i> Gray	<i>Polygonum persicaria</i> L.	lady's thumb
17.	<i>Petroselinum crispum</i> subsp. <i>crispum</i>	<i>Petroselinum hortense</i> Hoffm.	parsley
18.	<i>Platycladus orientalis</i> (L.) Franco	<i>Thuja orientalis</i> L.	oriental thuja

No.	Valid name	Synonymous	Vernacular name (most common)
19.	<i>Reynoutria japonica</i> Houtt.	<i>Polygonum cuspidatum</i> Sieb. et Zucc.	Japanese knotweed
20.	<i>Salvia rosmarinus</i> Spenn.	<i>Rosmarinus officinalis</i> L.	rosemary
21.	<i>Silene flos-cuculi</i> (L.) Greuter & Burdet	<i>Lychnis flos-cuculi</i> L.	ragged-robin
22.	<i>Styphnolobium japonicum</i> (L.) Schott	<i>Sophora japonica</i> L.	Japanese acacia
23.	<i>Taraxacum</i> sect. <i>Taraxacum</i> F.H. Wigg.	<i>Taraxacum officinale</i> F.H. Wigg.	dandelion
24.	<i>Tripleurospermum inodorum</i> (L.) Sch.Bip.	<i>Matricaria inodora</i> L.	scentless chamomile
25.	<i>Vincetoxicum hirundinaria</i> Medik.	<i>Cynanchum vincetoxicum</i> (L.) Pers.	white swallow-wort

At the same time, from Table 2 we observe that some genera have been moved to other botanical families. The genera *Taxodium* and *Sequoia* have been moved in *Cupressaceae* (from *Taxodiaceae*, now considered a subfamily - see Table 3), the genera *Fumaria*, *Corydalis*, *Dicentra*, have been moved in *Papaveraceae* (from *Fumariaceae*, now considered a subfamily), *Acer* and *Aesculus* have been moved in *Sapindaceae* (from *Aceraceae* unrecognized and *Hippocastanaceae*, now considered a subfamily), the genus *Tilia* and *Corchorus*, in *Malvaceae* (from *Tiliaceae*, considered a subfamily), the genera *Veronica*, *Digitalis*, *Linaria*, *Antirrhinum*, in *Plantaginaceae* (from *Scrophulariaceae*, which was reclassified), the genus *Ornithogalum*, in *Asparagaceae*, from *Liliaceae* (while *Gagea* it still remained in *Liliaceae*), and the list goes on.

Many well-known genera now have synonym status. For example: the genus *Mahonia* is synonymous with *Berberis*, *Sansevieria* with *Dracaena*, *Cheiranthus* with *Erysimum*, *Anagallis* with *Lysimachia*, *Rosmarinus* with *Salvia*, *Lychnis* with *Silene*, etc. Also, the extended use of the genus *Prunus* has been reverted to, for most species that had previously been separated into distinct genera: *Amygdalus*, *Armeniaca*, *Cerasus*, *Laurocerassus*, *Persica*, now considered subgenera.

Table 2

Examples of genera name and current classification.

No.	Genera name	Current classification	Old classification
1.	<i>Acer</i>	<i>Sapindaceae</i>	<i>Aceraceae</i>
2.	<i>Aesculus</i>	<i>Sapindaceae</i>	<i>Hippocastanaceae</i>
3.	<i>Agave</i>	<i>Asparagaceae</i>	<i>Agavaceae</i>
4.	<i>Albizia</i>	<i>Fabaceae</i>	<i>Mimosaceae</i>
5.	<i>Aloe</i>	<i>Asphodelaceae</i>	<i>Liliaceae</i>
6.	<i>Antirrhinum</i>	<i>Plantaginaceae</i>	<i>Scrophulariaceae</i>
7.	<i>Asclepias</i>	<i>Apocynaceae</i>	<i>Asclepiadaceae</i>
8.	<i>Cercis</i>	<i>Fabaceae</i>	<i>Caesalpiniaceae</i>
9.	<i>Colchicum</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
10.	<i>Convallaria</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
11.	<i>Cynanchum</i>	<i>Asclepiadaceae</i>	<i>Apocynaceae</i>
12.	<i>Digitalis</i>	<i>Plantaginaceae</i>	<i>Scrophulariaceae</i>
13.	<i>Dipsacus</i>	<i>Caprifoliaceae</i>	<i>Dipsacaceae</i>
14.	<i>Gleditsia</i>	<i>Fabaceae</i>	<i>Caesalpiniaceae</i>
15.	<i>Gratiola</i>	<i>Plantaginaceae</i>	<i>Scrophulariaceae</i>
16.	<i>Hemerocallis</i>	<i>Asphodelaceae</i>	<i>Liliaceae</i>
17.	<i>Hyacinthus</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
18.	<i>Hypericum</i>	<i>Hypericaceae</i>	<i>Clusiaceae</i>

No.	Genera name	Current classification	Old classification
19.	<i>Knautia</i>	<i>Caprifoliaceae</i>	<i>Dipsacaceae</i>
20.	<i>Linaria</i>	<i>Plantaginaceae</i>	<i>Scrophulariaceae</i>
21.	<i>Liquidambar</i>	<i>Altingiaceae</i>	<i>Hamamelidaceae</i>
22.	<i>Mimosa</i>	<i>Fabaceae</i>	<i>Mimosaceae</i>
23.	<i>Muscari</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
24.	<i>Ornithogalum</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
25.	<i>Paris</i>	<i>Melanthiaceae</i>	<i>Trilliaceae</i>
26.	<i>Paulownia</i>	<i>Paulowniaceae</i>	<i>Scrophulariaceae</i>
27.	<i>Polygonatum</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
28.	<i>Ruscus</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
29.	<i>Sambucus</i>	<i>Viburnaceae</i>	<i>Caprifoliaceae</i>
30.	<i>Scabiosa</i>	<i>Caprifoliaceae</i>	<i>Dipsacaceae</i>
31.	<i>Scilla</i>	<i>Asparagaceae</i>	<i>Liliaceae</i>
32.	<i>Tilia</i>	<i>Malvaceae</i>	<i>Tiliaceae</i>
33.	<i>Valeriana</i>	<i>Caprifoliaceae</i>	<i>Valerianaceae</i>
34.	<i>Valerianella</i>	<i>Caprifoliaceae</i>	<i>Valerianaceae</i>
35.	<i>Veratrum</i>	<i>Melanthiaceae</i>	<i>Liliaceae</i>
36.	<i>Veronica</i>	<i>Plantaginaceae</i>	<i>Scrophulariaceae</i>
37.	<i>Viburnum</i>	<i>Viburnaceae</i>	<i>Caprifoliaceae</i>
38.	<i>Yucca</i>	<i>Asparagaceae</i>	<i>Agavaceae</i>

Polyphyletic families, classified according to artificial criteria, which do not have a common ancestor, have been revised and reclassified into monophyletic groups. As examples of families that are no longer recognized and have been completely taken over by others, we mention: *Alliaceae* by *Amaryllidaceae*, *Caesalpiniaceae* and *Mimosaceae* by *Fabaceae*, *Chenopodiaceae*, absorbed by *Amaranthaceae*, *Asclepiadaceae* by *Apocynaceae*, etc. All of these families have now the status of subfamilies: *Allioideae*, *Caesalpinioideae*, *Mimosoideae*, *Chenopodioideae*, *Asclepiadoideae* (see Table 3).

Table 3

Current classification of some botanical families

No.	Unrecognized	Recently reclassified	Synonymous / with subfamily status	Known as
1.	<i>Aceraceae</i>	<i>Sapindaceae</i>	<i>synonymous</i>	maple family
2.	<i>Adoxaceae</i>	<i>Viburnaceae</i>	<i>synonymous</i>	elderberry family
3.	<i>Agavaceae</i>	<i>Asparagaceae</i>	<i>Agavoideae</i>	agave family
4.	<i>Alliaceae</i>	<i>Amaryllidaceae</i>	<i>Allioideae</i>	onion family
5.	<i>Asclepiadaceae</i>	<i>Apocynaceae</i>	<i>Asclepiadoideae</i>	beeswax family
6.	<i>Caesalpiniaceae</i>	<i>Fabaceae</i>	<i>Caesalpinioideae</i>	tree of Judah family
7.	<i>Chenopodiaceae</i>	<i>Amaranthaceae</i>	<i>Chenopodioideae</i>	beets and spinach family
8.	<i>Corylaceae</i>	<i>Betulaceae</i>	<i>Coryloideae</i>	hazelnut family
9.	<i>Dipsacaceae</i>	<i>Caprifoliaceae</i>	<i>Dipsacoideae</i>	teasel family
10.	<i>Fumariaceae</i>	<i>Papaveraceae</i>	<i>Fumarioideae</i>	fumewort family
11.	<i>Hippocastanaceae</i>	<i>Sapindaceae</i>	<i>Hippocastanoideae</i>	ornamental chestnut family
12.	<i>Mimosaceae</i>	<i>Fabaceae</i>	<i>Mimosoideae</i>	mimosa family
13.	<i>Najadaceae</i>	<i>Hydrocharitaceae</i>	<i>synonymous</i>	naiads' family
14.	<i>Taxodiaceae</i>	<i>Cupressaceae</i>	<i>Taxodioideae</i>	bald cypress family
15.	<i>Tiliaceae</i>	<i>Malvaceae</i>	<i>Tilioideae</i>	linden family
16.	<i>Valerianaceae</i>	<i>Caprifoliaceae</i>	<i>Valerianoideae</i>	valerian family

Some families are monogeneric, such as *Altingiaceae* with only one genus, *Liquidambar*, while others, such as *Plantaginaceae*, with huge expansion, after new absorptions, exceed 100 genera. Mallow family, *Malvaceae*, is another example that was

massively expanded to include the families *Tiliaceae*, *Sterculiaceae*, *Bombacaceae* (treated as subfamilies). Among the most divided families are *Liliaceae* and *Scrophulariaceae* (Table 4) and in their current form, these families are much smaller than in the old classifications, because are split into several distinct families.

Table 4

Divided families			
No.	Reclassified family	Current reorganization	Known genera (examples)
1.	<i>Liliaceae</i>	<i>Amaryllidaceae</i>	<i>Allium</i> + <i>Amaryllis</i> , <i>Narcissus</i> , <i>Galanthus</i> , <i>Leucojum</i> , etc
		<i>Asparagaceae</i>	<i>Hyacinthus</i> , <i>Muscari</i> , <i>Scilla</i> , <i>Convallaria</i> , <i>Polygonatum</i> , <i>Asparagus</i> , <i>Aspidistra</i> , <i>Agave</i>
		<i>Colchicaceae</i>	<i>Colchicum</i> , <i>Gloriosa</i>
		<i>Melanthiaceae</i>	<i>Paris</i> , <i>Veratrum</i>
		<i>Asphodelaceae</i>	<i>Hemerocallis</i> , <i>Aloe</i>
2.	<i>Scrophulariaceae</i>	<i>Plantaginaceae</i>	<i>Digitalis</i> , <i>Veronica</i> , <i>Linaria</i> , <i>Antirrhinum</i>
		<i>Orobanchaceae</i>	<i>Pedicularis</i> , <i>Melampyrum</i> , <i>Rhinanthus</i> , <i>Lathraea</i> + <i>Orobanche</i> , etc
		<i>Linderniaceae</i>	<i>Lindernia</i>
		<i>Calceolariaceae</i>	<i>Calceolaria</i>
		<i>Phrymaceae</i>	<i>Mimulus</i>
		<i>Paulowniaceae</i>	<i>Paulownia</i>

CONCLUSIONS

Taxonomic updates, now based on molecular phylogenetic studies, cannot be ignored by researchers and teachers. The use of valid species names and the ongoing revision of taxa are linked to the rigor of the scientific approach and represent a professional standard who supports the quality of research and teaching. In the field of education, the impact of digital technologies is evident, and teachers are faced with the necessity of integrating SBN (Sequence-Based Nomenclature) systems with morphological ones, in order to reconcile the need for scientific accuracy with the use of identification tools based on morphological characters. The exclusive use of tools such as iNaturalist and Pl@ntNet may give students the impression that species identification is an easy task and that classic paper-based identification keys are obsolete. On the other hand, the contributory aspect of science can prove extremely useful: the development of online tools by integrating detailed discriminatory criteria is a path already being pursued. A secondary consequence of classification reshuffling is the necessity to update collections (primarily herbaria) used in universities and other education and research institutions.

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