PLANT TAXONOMY AND NOMENCLATURE

A basic introduction for weed scientists

Weed Science is an absorbing, rewarding and worldwide discipline. Consequently it attracts recruits from diverse backgrounds and many different nationalities.

The scientist needs to start with a classification of his subject matter, and a classification of plants, including all weeds, is already available, regulated by a clear set of rules.[1] and adopted worldwide. The enormous value of a single taxonomic system for all plants used in every country of the world is that a weed scientist from Barbados can refer to a plant by its species name and a botanist in Beijing and an ecologist in Bihar completely and unambiguously understand the species being referred to.

This of course assumes that these scientists have an international outlook, which possibly may not be the case if one of these theoretical correspondents is a native of a country with a large forum of resident weed scientists and an inward looking, as opposed to an international, outlook. In this sub-optimal scenario, the weed scientist with a purely local outlook may be disadvantaged by having a poor understanding of international botanical nomenclature, and may to refer plants only by their local common names. Thus *Elymus repens* may be referred to as scutch, couch, twitch, wick, kvik, kweek, quecke, quack, to the incomprehension of someone 100km from the locality in which any of these names are in common use.

Not to use international botanical classification would not only isolate a weed scientist from his counterparts in other countries but also would limit his own efficiency. Formal plant classification makes clear the relationship of a plant to its near and distant relatives. Many herbicides are active on the majority of plants in one or more plant families, and inactive on the majority of plants in certain other families. Consequently the taxonomically aware weed scientist can often predict the effect of a known herbicide on a plant by consideration of which family the plant belongs to, and his knowledge of the effects of the herbicide on other species within that family. Furthermore, by learning the characteristics of important plant families a weed scientist can look at an unknown plant, judge by its appearance what family it belongs to, and judge what herbicides are likely to kill it and which are likely to be safe to it.

How is this achieved? It's all in the way plant taxonomy works.

[1] International Code of Botanical Nomenclature, Utrecht 1961

ESSENTIAL TAXONOMY

All plants are grouped in a series of classes. Algae, mosses, ferns, conifers and flowering plants are some familiar classes. The class of flowering plants (Angiospermae) is divided into two sub classes the Monocotyledonae and the Dicotyledonae. (These formal names are commonly anglicised, as in the rest of this note) Each subclass is composed of several families, each family is composed of several genera and each genus is composed of several species. The following examples illustrate this.

The dicotyledon species in Example 1). belongs to the *Aster* family, members of which have small individual flowers all crowded together on a head and enclosed by many bracts. *Bidens* (Its common name in N. America is beggarticks.) is one of the many genera in this family. The nomenclature of each plant species is composed of the name of the genus plus an adjective which describes it, so *Bidens pilosa* translates directly into hairy beggarticks. The descriptive adjective *pilosa* refers to the felt-like hairiness (etymology: pile on a carpet) on leaves of this species, as opposed to the three times divided leaf of *B. tripartite,* the twice divided leaf of *B. bipinnata* or the nodding head of *B. cernua.*

Example 1).

CLASS:	Angiosperms	flowering plants
SUBCLASS:	Dicotyledons	'broadleaves'
FAMILY:	Asteraceae	Aster family
GENUS:	Bidens	beggarticks
SPECIES:	Bidens pilosa	beggarticks hairy

The formal classification shows clearly the relationships between species. Thus species belonging to the same genus carry the genus name as the first part of their binomial name so *Bidens pilosa* in example 1 is closely related to other species within the genus (*Bidens bipinnata*, *Bidens cernua, Bidens tripartita* etc.). They are all more distantly related to species of other genera within the Asteraceae such as *Aster tripolium* and *Bellis perennis.* All plants within the Asteraceae are more closely interrelated than to plants in any other plant family such as *Epilobium hirsutum* of the Onagraceae and even more tenuously related to Setaria viridis which belongs to the monocotyledons, a different subclass of the flowering plants.

The monocotyledon in example 2). belongs to the family Gramineae, or grasses. One member of the grass family is the genus Setaria and the name of one species noted for its green colour (Latin *viridis* = English green) is Setaria viridis.

Example 2).

CLASS :	Angiosperms	flowering plants
SUBCLASS:	Monocotyledons	'narrowleaves'
FAMILY:	Gramineae	grasses
GENUS:	Setaria	foxtails
SPECIES:	Setaria viridis	foxtail green

Setaria viridis is very closely related to *Setaria lutescens* (Latin *lutescens* = English yellowish) or *Setaria verticillata* (*Latin verticillata* = whorled referring to the seed head of this species), less close to grasses in other genera such as *Panicum* but is classified as closer to other monocotyledons such as *Juncus* than to dicotyledon plants.

WHY A LITTLE LATIN (and a bit of GREEK) CAN OPEN THE DOOR TO UNDERSTANDING PLANT NAMES AND RELATIONSHIPS.

Modern, formal plant taxonomy started in Europe, and like much of 'Western science' is blessed with a basis in Latin (or Latinised terms with a small amount of Greek added). Even Carl Linnae, the Swede credited with establishing the binomial system of naming species in the 18th century, had his name transmogrified by taxonomists into the pseudo-Latin of 'Carolus Linnaeus'!

The binomial name of each plant (and animal) is officially a 'Latin' term (even though parts of it may derive from Greek). The genus is a noun so has a capital letter. It is described by a single adjective (not capitalised) which ideally describes an important characteristic of the species which sets it apart from other species in the same genus. Thus understanding the meaning of the specific adjective provides a clue of what the plant looks like, where it is found or some other useful fact about it. So one knows better than to grab a piece of *Ononis spinosa* or *Urtica urens* with an ungloved hand, recognises that there is something black about *Solanum nigrum* and goes looking for *Anthemis arvensis* in an arable field, because that's what their adjectives tell us about them.

SOME COMMON DESCRIPTORS

The following is a list of Latin (occasionally Greek) roots which commonly form parts of plant names. Familiarity with these will help identify the characteristics of many plants, and hopefully deepen the appreciation of their names and relationships. For a more comprehensive account of plant names, see the two booklets recommended below.

COLOUR

alba	white	nigr	black
caerul-	blue	ochro	pale yellow
chloro	green	purpuro	purple
cyan	blue	rhodo	red
erythro	red	rubra	red
fuscus	dusky, dull	tincto	coloured
glauca	blue-grey	viola	violet
rubi/rubra	red	viridi	green
lutei	mid yellow	xantho	dark yellow

PLANT FEATURES

acanth	spiny	maculat	spotted
acu	needle	molli	soft
amplexi	embracing	obtusi	blunt
angusti	narrow	odorata	scented
dactyl	finger	officinal	healing, useful
digit	finger	repen	creeping
edul	edible	sagit	arrow shaped
esculent	good tasting	sativa	nourishing
fasci	bundle	seta	a bristle
foli	leaf	spin	spine
frument	corn-like	tenui	thin
glutino	sticky	toxi	toxic
hetero	different	urens	stinging
lati	broad	util	useful
laxi	lax	visc	sticky
longi	long	vulg	common

HABITAT

agresti	field	humi	damp
aren	sand	mari	sea
arvensi	(cultivated) field	palustri	swamp
aquati-	associated with water	palud	swamp
commun	common	pratens	meadow
fluvi	river	sylvestris	woods
litor	shore		

This note may seem elementary to many westerners who learned their botany in a Latin based language. However, as more countries in East Europe and Asia increase commercial contacts with the West, the greater will be the need for commonality of language at the (agricultural) field level. Westerners do not

have to think twice about the meaning of ‘monocotyledon’, ‘uniseriate’, ‘biennial,’ ‘trifoliate’. Not so the Slav, Arab, Indian or Chinese, who have to learn botanical terms from scratch rather than subconsciously analyse the components of Latin- or Greek- based composite technical terms.

Westerners should be aware that although many of us have a subconscious familiarity with Latin derived terms such as biennial, trifoliate etc. this is not necessarily the case with other languages and cultures. The managerial efficiency at Herbiseed’s farm in Serbia has improved significantly since we realised the need to explain the terms annual, biennial, and perennial. The term grass weed also needed much explanation because in Serbian two words are commonly used for ‘weed’ but both are used entirely interchangeably to mean ‘all weeds’. Serb farmers make no linguistic distinction between any of grasses, monocotyledon or dicotyledon weeds. We’re still working on gaining understanding of the relationship between key selective herbicides and the plant families to which our weed crops belong (see next paragraph).

Plant families

The next most useful bit of taxonomy to discover is how to tell what family a plant belongs to. With this knowledge it’s possible to predict whether a herbicide is likely to control a particular plant. So if a new weed is a member of the Asteraceae family there is a fair chance that it will not be killed by trifluralin and other dinitroaniline herbicides. Conversly grasses belong to the family Poaceae, a family which are (mostly) killed by Fusilade and other acc-ase inhibitors.

How to learn the characteristics of important Northern hemisphere flowering plants? Buy yourself the following book (no, we don’t get a commission):

BOTANY IN A DAY-The patterns method of plant identification.
By Thomas J. Elpel, 200 pages.
Cost $25
Buy online from www.wildflowers-and-weeds.com

There are seven illustrations of the content at www.wildflowers-and-weeds.com/plant_families/patterns_in_plants.htm

This is an unpretentious, practical book (with a bit of a herbal bent) aimed at complete novices. It has excellent drawings of the plant parts characteristic of each family. If you need help in the field to identify plant families, take this book with you.

REFERENCES:

Two excellent books on the meanings of words and word-fragments used in botanical nomenclature are cited below. The first is concerned with the

etymological derivation of individual plant names, especially those of genera, and is more interesting to the general user. However, it lacks translations of descriptive adjectives such as those listed above.

The second is essentially a spreadsheet of Latin, Greek and English terms used in plant names. Much more comprehensive than the first, but a dry, functional reference book rather than an interesting read.

1). Plant Names Simplified. Their Pronunciation Derivation and Meaning by A.T.Johnson and H.A.Smith. Landsmans bookshop Ltd. Buckenhill, Bromyard, Herefordshire, HR7 4PH, England, 1931, Reprinted 1986. . ISBN 0900513 04 7.

2). Three-language list of botanical name components. A. Radcliffe-Smith, Published by Royal Botanic Gardens, Kew, London. 1998. ISBN 1 900347 50 4.

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