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Woody Plant Physiology
Unit Code: T/602/3921
UNIT GUIDE 2023-24

LO 1. Understand the international system of plant naming

1.1. Define the terms of nomenclature used within the system.

Taxonomy's plant, animal, and microbial nomenclatures provide the language for communication about biodiversity.
Here are some introductory definitions:

Taxonomy (or systematics): The science of classifying organisms.

Classification: A grouping of plants according to shared qualities or characteristics.

Plant taxonomy: A hierarchical classification system based on morphological and phylogenetic similarities among plants.

Nomenclature: A formal system of names attached to taxonomic groupings.

Hierarchy: A system of grouping in which each classification is a subset of a superior grouping, and may contain subordinate categories. As an example: The landmass of the United States (used here as the highest or most inclusive level of classification) is partitioned into states (a middle level of classification). States, in turn, are partitioned into counties (the lowest level in this hierarchy). Counties are subsets of states, which are in turn subsets of the nation. This hierarchical type of grouping system is used in plant taxonomy.

Morphology: The appearance (shape and structure) of a plant. Plant taxonomy is a hierarchy primarily based on grouping together plants that exhibit structural (phenotypic) similarities.

Scientific names for plants are written using the standard Latin binomial system of nomenclature. The first name represents the genus and is capitalized, the second name identifies the species and is written in lowercase, and the entire name is italicized.

A plant is classified in the following taxonomic ranks, for example *Quercus robur*:

-**Kingdom** (Plantae, living beings that photosynthesize)
-**Division** (Tracheo**phyta**, vascular plants that form lignified tissues)
-**Class** (Magnoli**opsida**, plants that flower)
-**Order** (Fag**ales**)
-**Family** (Fag**aceae**)

-**Genus** (*Quercus*)
-**Species** (*Quercus robur*)

Taxonomy divides plants and other organisms into taxonomic levels. These many tiers are as follows:

Kingdom: The highest taxonomic classification. Different species are classified based on the presence of some fundamentally similar traits. Animals, plants, and fungi are among examples.

Phylum: The taxonomic level below kingdom and above class is called the phylum. There are 12 identified plant phyla in total. The lack of actual roots and stems distinguishes the bryophyta, which includes mosses and liverworts. In contrast, angiosperms have flowers, roots, and stems and reproduce through the use of seeds.

'Class' as a level of taxonomic classification was first used by French botanist Joseph Pitton de Tournefort in 1684. It is located above order and beneath phylum. Next in the taxonomic ranking is order.

Taxonomists classify plants into families, which are groups of plants that share several traits. Plant family names that begin with a capital letter and end with '...ceae' are easily identifiable. The plant genera Protea, Leucospermum, and Leucadendron, for example, are members of the Proteaceae family.

The genus is the first part of a plant's binomial scientific name. It is usually italicised and should be capitalised. Gladiolus and Plectranthus are two genera that come to mind.

Species, subspecies, and variants: Genera are groups of species that share particular features and are genetically connected. A species is a group of interbreeding individuals capable of producing viable offspring capable of reproducing themselves. To describe variation within a species, the terms ' subspecies' and 'variant' are employed. Plant species/subspecies/variants are given Italicised binomial scientific names that begin with the genus and then the species, which is always in lowercase, for example, Leucospermum prostratum.

Resources
https://botanicalsociety.org.za/the-science-of-names-an-introduction-to-plant-taxonomy/#:~:text=Plant%20taxonomy%20is%20the%20science,organisms%20into%20different%20taxonomic%20levels.
https://forestrypedia.com/short-notes-plant-taxonomy/
https://plants.sc.egov.usda.gov/home
https://open.lib.umn.edu/horticulture/chapter/2-1-plant-taxonomy/#:~:text=Taxonomy%20(or%20systematics)%3A%20The,see%20below)%20similarities%20among%20plants.
https://letstalkscience.ca/educational-resources/backgrounders/plant-taxonomy
https://www.inspiritvr.com/general-bio/plants/plant-classification-study-guide
https://www.discoverthewild.co.uk/resources

LO 1.2. Identify examples of woody plants to demonstrate an understanding of the terms commonly used in the naming system.

1

Common name: Hazel
Scientific name: *Corylus avellana*
Family: Betulaceae
Genus: Corylus
Species: avellana
Origin: native

Kingdom: Plantae > Division: Tracheophyta > Class: Magnoliopsida > Order: Fagales > Family: Corylaceae > Genus: Corylus > Species: Corylus avellana



2

Common names: English oak, pedunculate oak, common oak
Scientific name: *Quercus robur*
Family: Fagaceae
Genus: Quercus
Species: robur
Origin: native

Kingdom: Plantae > Division: Tracheophyta > Class: Magnoliopsida > Order: Fagales > Family: Fagaceae > Genus: Quercus > Species: Quercus robur > See subspecies



3
Common names: hornbeam, common hornbeam, European hornbeam
Scientific name: Carpinus betulus
Family: Betulaceae
Genus: Carpinus
Species: betulus
Origin: native

Kingdom: Plantae > Division: Tracheophyta > Class: Magnoliopsida > Order: Fagales > Family: Corylaceae > Genus: Carpinus > Species: Carpinus betulus



4
Common names: common beech
Scientific name: Fagus sylvatica
Family: Fagaceae
Genus: Fagus
Species: sylvatica
Origin: native

Kingdom: Plantae > Division: Tracheophyta > Class: Magnoliopsida > Order: Fagales > Family: Fagaceae > Genus: Fagus > Species: Fagus sylvatica > See subspecies



5

Common names: alder, common alder, black alder, European alder
Scientific name: *Alnus glutinosa*
Family: Betulaceae
Genus: Alnus mill.
Species: glutinosa
Origin: native

Kingdom: Plantae > Division: Tracheophyta > Class: Magnoliopsida > Order: Fagales > Family: Betulaceae > Genus: Alnus > Species: Alnus glutinosa



5 shrubs or trees

1

Common names: common box, box, European box
Scientific name: *Buxus sempervirens*
Family: Buxaceae
Genus: Buxus
Species: *sempervirens*
Origin: native

Kingdom: Plantae > Division: Spermatophyta > Class: Dicotyledones > Order: Celastrales > Family: Buxaceae > Genus: Buxus > Species: Buxus sempervirens

2

Common names: Leyland cypress, cypress, leylandii
Scientific name: *Cupressus x leylandii*
Family: Cupressaceae
Origin: non native

Kingdom: Plantae > Division: Pinophyta > Class: Pinopsida > Order: Pinales > Family: Cupressaceae > Genus: Cupressus > Species: Cupressus lusitanica

3

Common names: elder
Scientific name: *Sambucus nigra*
Family: Adoxaceae
Origin: native

Kingdom: Plantae > Division: Spermatophyta > Class: Dicotyledones > Order: Dipsacales > Family: Caprifoliaceae > Genus: Sambucus > Species: Sambucus nigra

4

Common names: juniper, common juniper
Scientific name: *Juniperus communis*
Family: Cupressaceae
Origin: native

Kingdom: Plantae > Division: Pinophyta > Class: Pinopsida > Order: Pinales > Family: Cupressaceae > Genus: Juniperus > Species: Juniperus communis > See subspecies

5
Common names: **spindle**
Scientific name: ***Euonymus europaeus***
Family: Celastraceae
Origin: native

Kingdom: Plantae > Division: Spermatophyta > Class: Dicotyledones > Order: Celastrales > Family: Celastraceae > Genus: Euonymus > Species: Euonymus europaeus

Resources
https://plants.ces.ncsu.edu/plants/
https://eunis.eea.europa.eu/species.jsp
https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/british-trees/
https://plants.sc.egov.usda.gov/home/basicSearchResults?resultId=d6d4c1c5-b606-4a69-87dc-9d96e8a20f71

1.3. Write scientific names correctly

The Code is a set of universally agreed-upon norms and suggestions for naming algae, fungi, and plants.
The scientific naming of plants, algae, and fungi has a long history. The publication of Linnaeus' Species Plantarum in 1753 was an important moment. Alphonse de Candolle's Lois de la Nomenclature Botanique (1867) was the first nomenclature code. The organism naming system was the first global scientific standard, preceding even conventional calendars and units of measurement.

The Code is amended every six years at an International Botanical Congress (IBC).

Latin served as the common scientific language during the 16th to 18th century, when the scientific nomenclature of organisms began to take shape. The names are in Latin because of this. Words from numerous other languages, including those descended from Greek, are also used, but they are always treated as being Latin. The fundamental idea is that scientific names, often known as Latin names, are used universally, allowing scientists of various languages to easily interact with one another.

A taxon (plural: taxa) is defined by the Code as any taxonomic group at any rank (Art. 1.1), such as a variation, species, genus, family, or kingdom, where a taxonomic group is a group of organisms in a classification.

The name "taxonomy" is derived from two words: "taxis" (arrangement) and "nomos" (rules). Plant taxonomy is the classification of plants based on specific standards.
The similarity of organisms, which suggests lineage from a recent common ancestor, forms the basis of modern taxonomy. As a result, two plants are regarded taxonomically related if they share characteristics such as the ability to store carbohydrates in a specific type of molecule.
Plant taxonomy is the discipline of botany concerned with the identification, categorization, and nomenclature of plants based on their similarities and differences.
The following are the purposes of plant taxonomy:
Identification: Determine the unknown species' traits and compare them to those of recognised species. The process of recognising an organism's essential traits is known as identification.
Characterization is the process of describing all of the characteristics of a newly recognised species.
Classification is the process of grouping and organising known species into different groups or taxa based on similarities and differences.
Nomenclature is the process of assigning scientific names in accordance with established conventions.

Systematics and Taxonomy
The term systematics is derived from the word 'systema,' which means the systematic arrangement of organisms. It considers the organisms' evolutionary relationship. Plant systematics is concerned with the interrelationships of plants and their evolutionary descent. Systematics is the study of biological diversity and the organisation of that information into a classification. Organisms are classed based on their similarities, closeness, or relationships. It depicts the phylogenetic taxonomy relationship and line of ancestry of several creatures. Individuals' commonalities indicate that they may have descended from a common ancestor. It depicts the evolution of current living beings. A group of closely related creatures that share a shared gene pool is included.
Organisms are classified into taxonomic groups based on their commonalities and distinguishing characteristics. In their hierarchical order, the many taxonomic categories are:

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

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The number of shared qualities diminishes as we proceed from species to kingdom, with species sharing the most fundamental similarities and organisms in the same kingdom sharing the fewest.

There are three main types of systems for plant classification. Here is the list of systems of plant taxonomy:

1. Artificial system of Classification
2. Natural system of Classification
3. Phylogenetic system of Classification

TERM	EXPLANATION	EXAMPLE
Family	Single or group of genera that closely or uniformly resemble each other in general appearance and technical character	**Aceraceae**
Genus	A group of tree species that have fundamental traits in common but that differ in other, lesser characteristics	**Maple** (Common Name) **Acer** (Scientific Name)
Species	A natural group of trees in the same genus made up of similar individuals	**Red Maple** **Acer rubrum**
Variety	A subdivision of a species having a distinct, though often inconspicuous, difference and breeding true to that difference	**Acer rubrum var. drummondi**
Cultivar	A variety, selected for one or more outstanding characteristics, that is being cultivated and usually reproduced by asexual means to preserve genetic makeup	**Acer rubrum 'Autumn Flame'**

TERM	EXPLANATION	EXAMPLE
Superior Selection	Individual trees that display one or more notable, desirable traits (also called superior trees)	
Hybrid	A tree that results from mating genetically unlike individuals (can occur in nature or artificially)	
Clone	 A tree derived vegetatively from one parent, thereby being genetically identical to the parent tree	
	Grafting and budding are also reproductive techniques used to develop clones, but complete genetic uniformity is not possible unless root stock is part of the parent material.	
	The genetic makeup of cultivars is preserved through asexual propagation methods.	
	Some cultivars are developed from native trees, others from exotics.	

https://www.arborday.org/trees/treeguide/classification.cfm

Resources

https://arboriculture.wordpress.com/2015/12/
https://byjus.com/neet/important-notes-of-biology-for-neet-plant-taxonomy/
https://www.iaptglobal.org/
https://www.iapt-taxon.org/nomen/main.php