Annual versus Perennial

- **Annual** = completes its life cycle within a single year
  - In trade, considered annual if useful landscape life is < 1 year
- **Biennial** = vegetative first year then reproductive the second, then dies
- **Perennial** = lives several to many years

Woody versus Herbaceous

**Woody**
- Above ground portions do not die to ground each year
- Usually perennial
- Secondary growth usually from a vascular cambium
- Size variable, but may exceed 20' heights
- Environment dependent, especially cold

**Herbaceous**
- Often above ground portions die to ground each year
- Usually perennial
- Perennial, biennial, or annual
- May or may not have secondary growth
- Seldom exceeds 20' tall
- Environmental dependent
**Trees**
- Perennial
- Woody, generally upright growth habit
- Single or multiple trunks
- > 4 to 6 in. DBH
- Height variable, few feet to 350’+
- Artificial distinctions, environmental dependent
- For this course:
  - *Small Tree* = < 20’ to 25’ tall
  - *Medium Tree* = 25’ to 50’ tall
  - *Large Tree* = > 50’ tall

**Shrubs (Bushes)**
- Perennial, rarely annual
- Woody, upright or spreading growth habits
- Single or multiple trunks
- < 4” to 6” in DBH
- Height variable, but typically <20’
- Artificial distinctions, environmental dependent
- For this course:
  - *Small Shrub* = < 4’ tall
  - *Medium Shrub* = 4’ to 8’ tall
  - *Large Shrub* = > 8’ tall

**Vines**
- Annual or perennial
- Woody or herbaceous
- Long trailing or climbing stems
- Special climbing structures
- Sometimes exhibit heteroblasty
  - Vine in youth, shrubby at maturity
    - English Ivy (*Hedera helix*)
    - Poison-Ivy (*Toxicodendron radicans*)

**Groundcovers**
- Woody or herbaceous
- Annual or perennial
- Usually low growing and spreading
  - Heights of <2” to 3’ or 4’ tall
- Often forming a dense mat-like growth
- Best if exhibit good weed suppression
- Frequently used for erosion control
**Scientific Names**

**Why not just use common names?**
- Scientific names convey relatedness
- More than one common name per species
- More than one species per common name
- Common names vary from locale to locale
- Legal consequences
- Professionalism
- Product labeling (Ag. Chemicals, etc.)

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**Scientific Names**

- Latin Names, Binomial system, or Linnean system
  - Started by Carl von Linne, known as Linneaus
    - *Species Plantarum*, 1753
    - Previously named descriptively, very cumbersome
  - System extended to families by A.L. de Jussieu
    - *Genera Plantarum*, 1789
  - Rules for naming plant taxa standardized
    - *International Code of Nomenclature for Algae, Fungi, and Plants* (2011 ... periodic updates)
      - Formerly *The International Code of Botanical Nomenclature*
    - *International Code for Nomenclature of Cultivated Plants* (1980, ... periodic updates)
      - [http://www.ishs.org/sci/icracpco.htm](http://www.ishs.org/sci/icracpco.htm)

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**Scientific Names**

- Not perfect system
  - Rules can create frustration in gardening public when they dictate the revision of commonly accepted names
  - Constant revision of genera, species, and particularly within species classifications
  - Latin is dead language, so the pronunciation of names is debatable

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**To Key Or Not To Key?**

*Botanical Keys* =
published systems of dichotomous (yes, no) decisions based on various morphological characteristics (flowers, fruit, roots, stems, buds, leaves, or plant habit) and/or geographic distribution used to determine the identification of unknown taxa
Vegetative Key to Common Palms (Palmae / Arecaceae) in Central Texas

1a. Fronds pinnately divided, feather-like form
   2a. Segments attached with basal fold convex side up (reduplicate) = Butia capitata (Jelly Palm)
   2b. Segments attached with basal fold concave side up (induplicate) = Phoenix canariensis (Canary Island Date Palm)

1b. Fronds fan-like or costapalmate (fan-like, but with remnant midrib)
   3a. Fronds fan-like and less than 2 ft in diameter/length (minus petiole)
      4a. Petiole sharply spiny = Chamaerops humilis (Mediterranean Fan Palm)
      4b. Petiole undulate to dully serrate, not spiny = Trachycarpus fortunei (Windmill Palm)
   3b. Fronds costapalmate and typically greater than 2 ft in length (minus petiole)
      5a. Petiole entire, smooth edge
         6a. Developing a trunk
            7a. Dominant trunk thick and stout, maturing at < 50 ft tall = Sabal mexicana (Texas Sabal)
            7b. Dominant trunk thinner, maturing at 60 to 80 ft tall = Sabal palmetto (Palmetto Palm)
         6b. Trunk lacking, leaves originating from base, maturing at 3' – 6' = Sabal minor (Dwarf Palmetto)
      5b. Petiole armed with large curved spines
         8a. Trunk with swollen base, maturing at 50 to 100 ft tall, segments slightly to moderately filiferous = Washingtonia robusta (Mexican Fan Palm)
         8b. Trunk stout and tapering uniformly, maturing at 40 to 50, rarely 80 ft tall, segments moderately to strongly filiferous = Washingtonia filifera (California Fan Palm)

Why Not Just Use Keys?

- No key exists for all species
  - Example, Queen Palm (Syagrus romanzoffiana) and Date Palm (Phoenix dactylifera) not on the preceding key
- One wrong decision & you are hopelessly lost
  - Example, trunk development of young Sabal spp.
- Most useful for differentiating among closely related taxa
  - Example, problems such as Sago Palm (Cycas revoluta) which is not really a palm, but a Cycad (Cycadaceae)
- Often regionally specific
  - Example, this key is useless in Florida, lower Rio Grande Valley
- Critical morphology feature may be missing
  - Example, problems such as Sago Palm (Cycas revoluta) which is not really a palm, but a Cycad (Cycadaceae)

Taxonomic Classifications:

<table>
<thead>
<tr>
<th>Taxonomic category</th>
<th>Scientific name of the taxa</th>
<th>Common name of the taxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
<td>Plantae</td>
<td>Plant kingdom</td>
</tr>
<tr>
<td>Phylum (Division)</td>
<td>Angiospermophyta (Magnoliophyta)</td>
<td>Fruit bearing plants</td>
</tr>
<tr>
<td>Class</td>
<td>Angiosperms (Magnoliopsida)</td>
<td>Flowering plants</td>
</tr>
<tr>
<td>Subclass</td>
<td>Dicotyledoneae</td>
<td>Dicotyledonous plants</td>
</tr>
<tr>
<td>Order</td>
<td>Rosidae</td>
<td>Rose superorder</td>
</tr>
<tr>
<td>Family</td>
<td>Fabales</td>
<td>Legume order</td>
</tr>
<tr>
<td>Subfamily</td>
<td>Fabaceae (Leguminosae)</td>
<td>Legume family</td>
</tr>
<tr>
<td>Genus</td>
<td>Mimoeae</td>
<td>Mimoeae subfamily</td>
</tr>
<tr>
<td>Species</td>
<td>Acacia</td>
<td>Acacia genus</td>
</tr>
<tr>
<td></td>
<td>Acacia farnesiana</td>
<td>Sweet Acacia</td>
</tr>
</tbody>
</table>

Taxonomy

- **Taxa** = divisions or groupings of plants
- **Species** = “a kind of plant or animal distinct from other kinds in marked or essential features that has good characters of identification, and may be assumed to represent a continuing succession of individuals from generation to generation”

L.H. Bailey
Comments on Species

- **Bell-shaped curve** for characteristics
- **Plants do not read books!!**
  - Do not always adhere to published descriptions
- Morphologically speaking, fruit and flower structures are best ID features, but often not available
- Non-visible characteristics can be key features
  - Physiological traits, biochemical markers, and molecular genetic evidence
- Estimating underlying genetic relationships
- Species name consists of two words;
  - Should be *italicized* or *underlined* in print
- **Species type system** → type specimen

Superspecific Taxa

- **Genus** = more or less closely related and definable group of plants containing one or more species
  - **Genera** = plural
- Examples of plants in the genus Tagetes
  - *Tagetes erecta*
  - *Tagetes patula*
  - *Tagetes lucida*
  - *Tagetes lemmonii*

- **Family** = more or less closely related and definable group of plants containing one or more genera
  - **Families** = plural
- Examples of plants in the family Asteraceae (Compositae)
  - *Tagetes*
  - *Helianthus*
  - *Aster*
  - *Zinnia*

Infraspecific Taxa

**Subspecies** = a distinctive subdivision of individuals with characteristics different than the species type, but insufficiently different to warrant species status

- Nearly always geographically related
  - Often represents incomplete speciation
  - Abbreviated “subsp.”
    - *Daucus carota* subsp. *carota*
    - *Daucus carota* subsp. *sativus* (cultivated carrots vs. Queen Ann’s lace)
  - Similar to variety, easy prey for over zealous taxonomists

**Varietas** or **Variety** = a distinctive subdivision of individuals with characteristics distinct from the species type, but not to the extent that they warrant subspecies or species designation

- Differ from the species in several important characteristics
  - Usually in response to some environmental gradient, but it is often not as discontinuous as with a subspecies
Variety (continued)

- Abbreviated as “var.”
  - Placed between specific epithet and variety
  - Italicize or underline variety name, but not “var.”
  - *Cercis canadensis* var. *texensis*
- Current trend is to use subspecies for former subspecies and variety categories and to use variety for what was once a forma designation
- Not the same thing as a cultivar or cultivated variety, varieties must be naturally occurring

Infraspecific Taxa

Forma or Form = a subdivision of plants within a species that differs in one or a few characteristics from the species type

- Often not geographical or environmentally related
- Seldom used classification today
  - Many groups previously designated as forma are today being designated as varieties
  - Abbreviated as “f.”
  - *Wisteria sinensis* f. *alba*

Infraspecific Taxa

Cultivar or Cultivated Variety = subgroup within a species that is a cultivated clone or highly inbred line

- Key is that it is propagated and continued by cultivation and does not usually reproduce true to type unaided by man
- Designated by enclosing the cultivar name in single quotes, placed after specific epithet, subspecies, variety or forma names
- Not italicized, capitalize first letter of each word
- Typically a vegetatively propagated clone
  - *Bulbine frutescens* ‘Hallmark’
  - *Bulbine frutescens* cv. *Hallmark*
  - Sometimes a highly inbred line
  - *Zea mays* var. *rugosa* ‘Golden Bantam’

Trademark Versus Cultivar Names

- Cultivar names are not protected (i.e. in public domain)
- Plant patents are limited, 17-20 yr. duration
  - Generally cannot be “wild plants”
- Trademarks can be protected indefinitely
  - ™ versus ® designation
  - Also allows branding, example Texas Superstar®
  - Protect “found plants”
- Promotion of plants by trademarked names allows companies to control marketing of their cultivars
  - Creates major confusion in the trade
  - Substitute different genotypes
Infraspecific Taxa

**Hybrid** = progeny of 2 genetically different organisms

- Technically progeny from any two individuals that are not the same clone
- Typically assumed to be between two species (intergeneric or intrageneric interspecific hybrids) or two distinct inbred lines (example intraspecific hybrid corn or F₁, bedding plants)
- **Intrageneric hybrid** = progeny of a cross between different species within the same genus
  - Common occurrence in plant kingdom
  - Designate with lower case “x” or multiplication symbol between the genus and specific epithet
  - *Brugmansia x candida* = *Brugmansia versicolor x Brugmansia aurea*

Interspecific Taxa

**Intergeneric Hybrid** = progeny from different species each within different genera

- Relatively rare occurrences
  - Perhaps questions the validity of genera differences
  - Designated with capital “X” or large multiplication symbol placed in front of the genus name

* X Chitalpa tashkentensis = Catalpa bignonioides X Chilopsis linearis
* X Cupressocypris leylandii = Cupressus macrocarpa X Chamaecyparis nootkatensis

Scientific Authorities

(or as students ask what numskull came up with this name?)

- The honor of naming a newly described plant taxon is accorded to the person who first publishes a valid description
- Hence the initials and/or letters following various taxa in a formal written context indicate the scientific authority (s) that named that taxon

Examples:
- Acer rubrum L.
- Brassica oleracea L. var. acephala A.P. de Candolle
- Ziziphus obtusifolia (W. Hooker ex J. Torrey & A. Gray) A. Gray

Clarifying Some Design Terms

- **Use Your Glossary!**
  - Many other terms used or referenced during lecture, labs and in your assigned readings are defined in the expanded glossary at the back of your text
  - If you still do not understand them or cannot find them
    - Write them down to ask in class
Questions / Comments?

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Dr. Michael A. Arnold
Dept. of Horticultural Sciences
Texas A&M University
College Station, TX 77843-2133
email ma-arnold@tamu.edu