Plants for Landscape Design
HORT 608
Fall 2018

Intro, Terminology & Definitions

Home pages for HORT 306 & 608 can be found on http://hortsciences.tamu.edu/

Laboratory Assistance?

- Lecture
  - Dr. Michael Arnold
  - Office Hours 11:00 am to noon on Monday & Wednesday & by appointment
- Tuesday 10:00 am – Noon lab & Tuesday 1:00 pm – 3:00 pm lab
  - Mr. Jonathan Caples
- Tuesday 3:00 pm – 5:00 pm lab & Wednesday 3:00 pm – 5:00 pm lab
  - Ms. Amanda Birnbaum
Lecture Examinations (306/608)

• Lecture portion of class = 1200 pts = 50%
  – All materials are cumulative, emphasis on recent
• Lecture midterm 250 pts
  – Wednesday October 10, 2018, in class.
• Lecture quizzes 550 pts (11 at 50 each)
  – Unannounced (pop quizzes/assignments) but mostly on
    Wednesdays each week beginning third week of lecture
• Lecture final 400 pts
  – Monday, December 10, 2018, 10:30 AM - 12:30 PM.
• PLEASE NOTE!!
  – Average lecture grades usually lower than lab grades
    • Lecture exams entail more challenging application of
      material, while lab identification is more rote memory
    • Thus, timely learning of lab materials is easy way to improve grades
    • And, don’t wait until the last minute to study for lecture exams

Laboratory Examinations (306/608)

• Laboratory examinations = 1200 pts = 50%
  – All laboratory material is cumulative
• Laboratory quizzes 900 pts (first 9 required of 11)
  – Weekly beginning second week of classes
  – 1st is morphology & parts of scientific name
  – Remaining 10 lab quizzes are all plant identification
    • Part cuttings, some whole plants, outdoors & indoors
  – Save make-ups for illness / schedule conflicts
• Laboratory final 300 pts
  – 30 cuttings or potted plants, all indoors, last weeks of labs

Recitation Section (HORT 608)

• http://aggie-horticulture.tamu.edu/syllabi/608/index.html
• Graduate students only on Fridays
• 10:20 am – 11:10 am HSFB 105
• Discuss grading differences from
  HORT 306 discussed on 1st Friday
  – Weekly paper reading summaries
  – Two field trips (Oct. 5, Oct. 26)
  – Discussion sessions

Textbook

Arnold, M.A. 2008. Landscape Plants For Texas And
ISBN 1-58874-746-8 (written especially for HORT
    306/308/608/609 courses)

On-line availability
  http://www.stipes.com/horticulture.html
  http://amazon.com

Local availability:
  A&M bookstore (MSC)
  Traditions (Rothers)
  Texas Aggieland
Miscellaneous

• Attendance is mandatory, need medical excuse to miss
• No electronic devices in lecture or lab unless approved ahead of time by Dr. Arnold
  – No texting in lab/lecture, turn off your cell phones!
• Labs meet at classroom at HFSB 110 (default location) unless otherwise notified
• Cheating & Plagiarism
  – Campus-wide emphasis, Aggie-Honor Code
    • http://aggiehonor.tamu.edu/
• Those with special needs, please notify me as soon as possible through requests from student services

Bonus / Extra Credit

• Good news = bonus point opportunities!
  – Extra exam questions
  – Low attendance bonus opportunities
  – Plant materials games
  – Bonus plants on lab quizzes
  – TAMU Gardens & Greenways participation!!!
• Bad news = no individualized extra credit!
  – Bonus points represent approximately a 10% built-in curve
    • So exams and course grades are almost never curved
  – Put your efforts into the assigned work

Average Grade Earned Over Past 14 Yr.

Study Hints:

• Learn plants as we go
• Review lecture slides for weekly quizzes
• Review lab image review sets / plant picture pages
  – See links on class website, be wary of internet sites
• Review plants from past labs as seasons change
• Make flash cards
• Make lists
• Organize a study group
• Study specimens in timely manner
**Lecture Plans, First 5 days**

- Introduction
- Definitions, taxonomy, nomenclature
- Plant adaptation & hardiness
- Ecological regions of Texas & U.S. regions (out-of-class assignment)
- Genetic variation / provenance
- Key pest and disease concerns
- Implications of cultural practices
- Woody plants as design elements

**Lecture Plan, After First 5 Days**

- Cover important groups of woody shrub and tree species for use in our regional landscapes by usage groups
- Cover important counterparts used in U.S. and to a lesser extent global landscapes
- Discuss implications of plant selection for sustainable designs in built environments
- Apply critical thinking to design challenges
- More discussion for graduate HORT 608 students on Friday
### Laboratory Plans

- Introductory / review lab on morphology & scientific names for lab quizzes
- Introduction to monocots & dicots and short plant list 1 (palms)
- 10 additional plant lists, one each week
  - @ 15 to 20 for ID on each list
  - 11 lab quizzes (10 taxa each)
- Lab final (30 taxa)

### Reading Assignments

**Pages 1-34**

Plus Corresponding Color Plates in *Landscape Plants For Texas And Environs, Third Edition*

**What Does Sustainable Mean?**

Sustainable built environments involve the balancing of social responsibility, environmental and cultural compatibility, economic viability, and effective space utilization to achieve the desired aesthetic impacts and maintenance efficiencies in a dynamic manner that meets current client needs while ensuring continued design integrity and quality of life for future generations.

**Are These Designs Sustainable?**

Depends upon many factors and sustainable relative to what purpose?

Must know many plant characteristics to integrate them successfully as design elements in sustainable combinations and situations.
**Trees, Shrubs, and Scientific Names**

**Woody versus Herbaceous** (somewhat arbitrary)

**Woody**
- Above ground portions usually do not die to ground each year
- Perennial
- Secondary growth is common, usually from a vascular cambium
- Size variable, but many obtain >20' heights
- Environment dependent, especially cold

**Herbaceous**
- Above ground portions often die to ground each year
- Perennial, biennial, or annual
- May or may not have secondary growth
- Size seldom exceeds 20’ tall
- Environment dependent

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**Trees**
- Perennial
- Woody, generally upright growth habit
- Single or multiple trunks
- > 4” to 6” in diameter at breast height (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

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**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
**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 in designs
- Professionalism
- Product labeling (Ag. Chemicals, etc.)
- Truth in labeling laws?

**Taxonomy & Nomenclature**

- **Taxonomy** involves the hierarchical ordering of groups of living organisms
  - Various philosophies and systems in use
  - Most aimed at elucidating the underlying genetic relationships and origins of various taxonomic groups
  - Involves professional judgement and interpretation of data
  - Example 3 versus 1 species of *Taxodium*

**Taxonomy has evolved from morphology based to molecular genetics / systematics**

- **Phylogeny or phylogenetic systematics**
  - Look at proportion of genes / DNA in common and ancestral relationships
- **Cladistics** — classify based on evolutionary ancestry
  - Can help with evolutionary studies / ancestor species determination
  - Look at derived traits
    - Monophyletic — clade — ancestral species & all descendants
    - Paraphyletic — common ancestor & part of descendants
    - Polyphyletic — contains taxa which appear to have similar traits but are not derived from a common ancestor
**Scientific Names**

- **Latin Names, Binomial system, or Linnaean system**
  - Started by Carl von Linne, known as Linnaeus
    - *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* (2016, ... periodic updates)

- Not perfect system
  - Rules can create frustration in gardening public when they dictate the revision of commonly accepted names
  - Changes becoming more common with advent of molecular genetics and DNA sequencing
  - Constant revision of genera, species, and particularly within species classifications
  - Latin is dead language, so debatable pronunciation of names

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**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 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
  - This key is useless in Florida, lower Rio Grande Valley
- Critical morphology feature may be missing
  - Wrong season for fruit/flower or sexually immature plants

**Tools to learn plant identification:**

- More knowledgeable plants-person
- Basic taxonomic vocabulary
- Good texts and web references
- Lots of time, effort, patience, and persistence

**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 Plantae</td>
<td>Plantae</td>
<td>Plant kingdom</td>
</tr>
<tr>
<td>Phylum (Division)</td>
<td>Angiospermae (Magnoliophyta)</td>
<td>Fruit bearing plants</td>
</tr>
<tr>
<td>Class</td>
<td>Angiospermae (Magnoliopsida)</td>
<td>Flowering plants</td>
</tr>
<tr>
<td>Subclass</td>
<td>Dicotyledoneae</td>
<td>Dicotyledous plants</td>
</tr>
<tr>
<td>Superorder</td>
<td>Rosidae</td>
<td>Rose superorder</td>
</tr>
<tr>
<td>Order</td>
<td>Fabales</td>
<td>Legume order</td>
</tr>
<tr>
<td>Family</td>
<td>Fabaceae (Leguminosae)</td>
<td>Legume family</td>
</tr>
<tr>
<td>Subfamily</td>
<td>Mimosoideae</td>
<td>Mimosa subfamily</td>
</tr>
<tr>
<td>Genus</td>
<td>Acacia</td>
<td>Acacia genus</td>
</tr>
<tr>
<td>Species</td>
<td><em>Acacia farnesiana</em></td>
<td>Sweet Acacia</td>
</tr>
</tbody>
</table>

We deal with mostly Family or lower in the hierarchy.

**Taxonomy**

- **Taxa** = divisions or groupings of plants
  - Singular is **taxon**
- **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 or google websites!!
  • 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 / biochemical traits and molecular genetic evidence
• Trying to estimate underlying genetic relationships
• Species name consists of two words;
  Species name = genus and specific epithet
  • Should be italicized or underlined in print
• Species type system → type specimen

Botanist’s vs. Horticulturist Perspective

• Usefulness of taxonomic groups
  – Aceraceae versus Sapindaceae debate
  – Lumpers versus splitters
  

\[ \text{Acer truncatum} \quad \text{Sapindus drummondii} \]

• Geography may play a larger role
  – Old world Cassia versus new world Senna

Superspecific Taxa

• Genus = more or less closely related and definable group of plants containing one or more species

\[ \text{Quercus} \quad Q. \text{acutissima} \quad Q. \text{havardii} \quad Q. \text{macrocarpa} \quad Q. \text{virginiana} \]

• Family = more or less closely related and definable group of plants containing one or more genera

\[ \text{Fagaceae} \quad Quercus \quad Fagus \quad Castanea \]

Infraspecific Taxa

\[ \text{Subspecies} = \text{a distinctive subdivision of individuals with characteristics different than the species type, but insufficiently different to warrant species status} \]

Nearly always geographically related

– Often represents incomplete speciation
– Abbreviated “subsp.”
  • Chilopsis linearis subsp. arcuata
  • Acer tataricum subsp. ginnala
  • Similar to variety, easy prey for over zealous taxonomists
**Infraspecific Taxa**

**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 strongly discontinuous as with a subspecies.
- Note: public confuses variety and cultivar!

**Variety** (continued)

- Abbreviated as “var.”
  - Placed between specific epithet and variety
  - Italicize or underline variety name, but not “var.”
  - *Cercis canadensis var. mexicana*

- 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**

**Varieties of *Cercis canadensis***

- *C. canadensis var. texensis*
- *C. canadensis var. mexicana*
- *C. canadensis var. canadensis* (species type)
- *C. canadensis var. texensis* and species type hybrid swarm

**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.
- Less frequently used today.
  - Many groups previously designated as forma are today being designated as varieties.

- Abbreviated as “f.”
- *Ilex verticillata f. aurantiaca*
- *Ilex verticillata f. verticillata*
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 & does not typically reproduce itself “true-to-type” unaided by man
- Designated by enclosing the cultivar name in single quotes, or by placing the abbreviation cv. after the specific epithet, subspecies, variety or forma name
- Not italicized, capitalize first letter of each word
- Typically a vegetatively propagated clone
  - *Chilopsis linearis* ‘White Storm’
  - *Chilopsis linearis* cv. White Storm
- Sometimes a highly inbred seed line
  - *Zea mays* var. *rugosa* ‘Golden Bantam’
  - Can have a cultivar from the species or from a naturally occurring subspecies, variety, or forma

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 found “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
  - Sometimes substitute different genotypes under same trademarked name (common in bedding plants)

Infraspecific versus interspecific 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 genus and specific epithet
  - *Acer x freemani* = *Acer rubrum* x *Acer saccharinum*

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 Cupressocyparis leylandii* = *Cupressus macrocarpa* X *Chamaecyparis nootkatensis*
**Scientific Authorities**

(or as students ask what numbskull came up with this idea?)

- 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 the taxon.

  - *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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