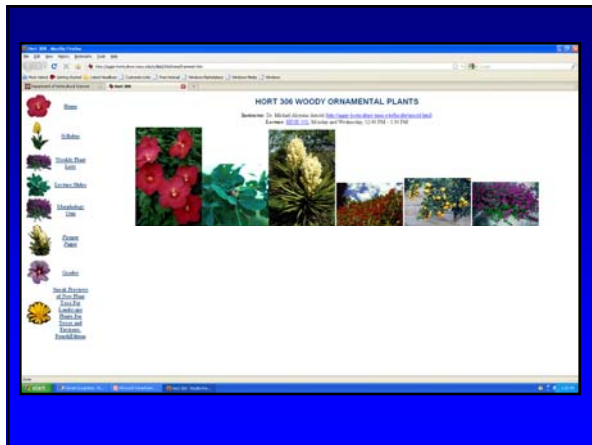
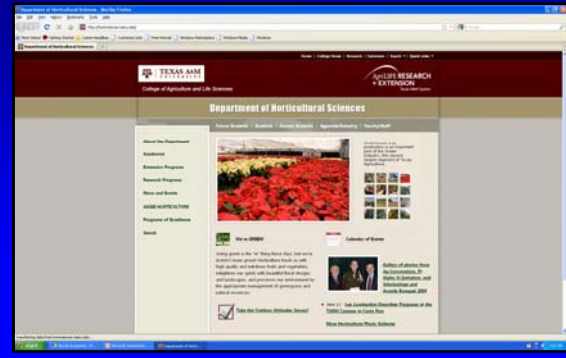


# Woody Ornamental Plants HORT 306 Fall 2011



## General 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
- **Tuesday 10 am – Noon lab**
  - Ms. Andrew King
- **Tuesday 1 - 3 pm & 3 - 5 pm labs**
  - Mr. Kirk Laminack
- **Wednesday 9:10 - 11:10 am & 3 - 5 pm lab**
  - Mr. Sean Carver

## Lecture Examinations (306)

- **Lecture portion of class = 1200 pts = 50%**
  - All materials are cumulative, emphasis on recent
- **Lecture exam 1 250 pts**
  - Monday October 3, 2011, in class.
- **Lecture exam 2 250 pts**
  - Wednesday, November 2, 2011, in class.
- **Lecture quizzes 200 pts (10 at 20 each)**
  - Unannounced (pop quizzes/assignments)
- **Lecture final 500 pts**
  - Monday, December 12, 2011, 3:30 pm - 5:30 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 lab materials is easy way to improve grades
    - And, don't wait until the last minute to study for lecture exams
    - Scientific names are a must!

## Laboratory Examinations (306)

- **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
  - 1<sup>st</sup> is morphology & parts of scientific name
  - Remaining 10 lab quizzes are all plant identification
    - Part cuttings, part whole plants, outdoors & indoors
    - Save drops for illness / schedule conflicts
- **Laboratory final 300 pts**
  - 30 cuttings or potted plants, all indoors, last full week of labs

## Recitation Section (HORT 608)

- Graduate students only on Fridays
- 10:20 am – 11:10 am HSF 104
- Discuss grading differences from HORT 306 on 1<sup>st</sup> Friday
  - Weekly paper reading summaries
  - Two field trips
  - Discussion sessions

## Textbook

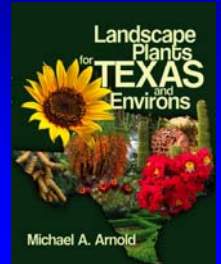
Arnold, M.A. 2008. Landscape Plants For Texas And Environs, Third Ed. Stipes Publ. L.L.C., p. 1334.  
ISBN 1-58874-746-8 (written especially for HORT 306/308/608 courses)

### On-line availability

<http://www.stipes.com/horticulture.html>  
<http://amazon.com>

### Local availability:

A&M bookstore (MSC)  
Traditions (Rothers)  
Texas Aggield



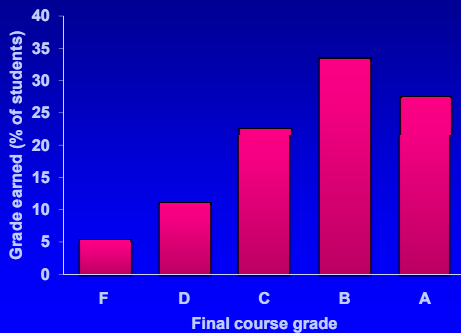
## Miscellaneous

- Attendance is mandatory, need medical excuse
- No electronic devices in lecture or lab unless approved ahead of time by Dr. Arnold
- Labs meet at classroom at the TAMU Horticultural Gardens (default location) unless otherwise notified
- Cheating & Plagiarism
  - Campus-wide crackdown, Aggie-Honor Code
  - <http://www.tamu.edu/aggiehonor/index.html>
- Those with special needs, please notify me as soon as possible

## Bonus / Extra Credit

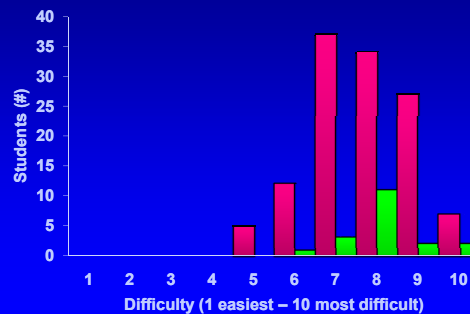
- Good news = bonus point opportunities!
  - Extra exam questions
  - Low attendance bonus quizzes
  - Plant materials game days
  - Bonus plants on lab quizzes
  - Mystery plants?
- Bad news = no individualized extra credit!
  - Bonus points represent approximately a 10% built-in curve
    - So exams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

## Average Grade Earned Over Past 5 Yr.



## Student Ratings of Course Difficulty

(1 easiest course ever to 10 scale most difficult course taken)



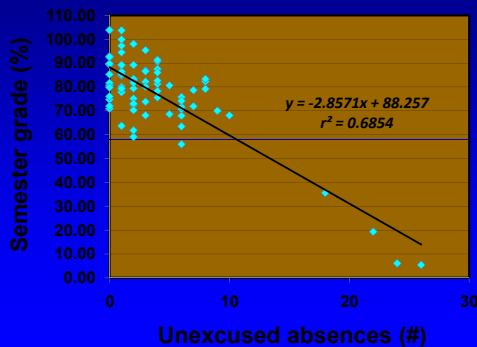
### **Average Time Students Spent On Various Activities Outside of Class**

<u>Activity</u>	<u>Hours per week</u>
Studying plant ID	2.2
Learn scientific names	2.9
Study lecture notes	3.5
Read text / handouts	1.1
Supplemental web materials	1.0
<u>Other</u>	<u>0.9</u>
<b>Total</b>	<b>11.5</b>

### **Study Hints:**

- Learn plants as we go
- Review lecture slides
- Review plant picture pages
  - <http://landscapeplants.tamu.edu>
- Review plants from past labs as seasons change
- Make flash cards
- Make lists
- Organize a study group
- Study specimens in timely manner

### **HORT 306 Attendance 2008**



### **Lecture Plans, First 5 days**

- Introduction
- Definitions & taxonomy
- Plant adaptation & hardiness
- Ecological regions of Texas
- Genetic variation
- Characterization of other U.S. regions
- Key pest and disease concerns
- Implications of cultural practices

### **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
- Bring in guest lectures on specialized application topics or current issues in plant materials utilization
- More discussion for graduate HORT 608 students on Friday

### **Laboratory Plans**

- Introductory / review lab on morphology & scientific names for quizzes
- Introduction to monocots & dicots, key exercise, 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*



## Woody versus Herbaceous (somewhat arbitrary)

### Woody

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

### Herbaceous

- Above ground portions die to ground each year
- 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 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

## 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?



## Scientific Names

- Latin Names, Binomial system, or Linnean system
  - Started by Carl von Linné, known as Linnaeus
    - *Species Plantarum*, 1753
    - Previously named descriptively, very cumbersome
  - System extended to families by A.L. de Jussieu
    - *Genera Plantarum* in 1789.
  - Rules for naming plant taxa standardized
    - *The International Code of Botanical Nomenclature* (1972, 1995, periodic updates)
    - *International Code for Nomenclature of Cultivated Plants* (1980, periodic updates)

## Scientific Names

- **Not perfect system**
  - Rules can create frustration in gardening public when they dictate the revision of commonly accepted names
    - Changes may be 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

## 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 species identification

### 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:



Taxonomic category	Scientific name of the taxa	Common name of the taxa
Kingdom	Plantae	Plant kingdom
Phylum (Division)	Angiospermophyta (Magnoliophyta)	Fruit bearing plants
Class	Angiospermae (Magnoliopsida)	Flowering plants
Subclass	Dicotyledoneae	Dicotyledonous plants
Superorder	Rosidae	Rose superorder
Order	Fabales	Legume order
Family	Fabaceae (Leguminosae)	Legume family
Subfamily	Mimosoideae	Mimosa subfamily
Genus	Acacia	Acacia genus
Species	<i>Acacia farnesiana</i>	Sweet Acacia

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!!!**
  - 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

- **Geography plays a larger role**
  - Old world *Cassia* versus new world *Senna*
- **Taxonomy has evolved from morphology based to newer techniques in molecular genetics and systematics (gene analysis)**
  - Look at proportion of genes / DNA in common
    - Phylogeny or phylogenetic systematics
  - Can help with evolutionary studies / ancestor species determination
    - Cladistics → classify based on evolutionary ancestry
    - Centers of development, example Mexico with *Pinus*

## Superspecific Taxa

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

**Genera** = plural

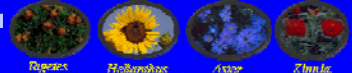
Examples of plants in the genus *Tagetes*



- **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)



## Intraspecific 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.”
  - *Chilopsis linearis* subsp. *arcuata*
  - *Acer tataricum* subsp. *ginnala*
  - Similar to variety, easy prey for over zealous taxonomists

## Intraspecific 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 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. *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

## 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."
- *Ilex verticillata* f. *aurantiaca*



## 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 reproduce itself "true-to-type" unaided by man

Designated by enclosing the cultivar name in single quotes or abbreviation cv., it is placed 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 line

- *Zea mays* var. *rugosa* 'Golden Bantam'
- Can have a cultivar from the species type 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 "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

*Helianthus annuus* 'Dakota Gold'  
PVP 20060009



## 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 intragenetic interspecific hybrids) or two distinct inbred lines (example intraspecific hybrid corn or F<sub>1</sub> bedding plants)
- **Intragenetic 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

**Intergenic 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

## Textural Considerations: Coarse

Coarse textured plants grab your attention = focal points



## Textural Considerations: Fine

- Fine textures can be used to soften harsh lines & highlight coarser textured plants by contrast



## Changing 3-Dimensionality With Color

- Bright colors draw the eye, bring plants to the foreground
- Darker colors (blues, purples, violets) provide illusion of depth



## Creating Space Illusion: Horizontal Lines



*Creating Space Illusion:  
Vertical Lines*



*Questions / Comments?*

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