The University of Georgia

College of Agricultural & Environmental Sciences
A Brief History of the Garden

- Landscape Architect Clay Adamson made the original plant selection in 1967.
  - 1,600 trees
  - 2,500 shrubs
  - 12,000 groundcovers
- In 1995 the decision was made to use the college campus as the botanical garden.
- 2003, the gardens are named in Dr. Barnes’ honor
- Robert & Co. designed our first master plan in 2000 which incorporated the entire campus.
- Southern Living published an article their April 2008 issue.
• Fall Garden Lecture
• Spring Garden Symposium
• Cherry Blossom Tunes & Balloons
• The Library’s Special Collection Room
  – Ask for assistance at the front desk, the room remains locked.
  – Greater than 400 books

• 1 ½ mile natural walking trail
• Visitor Parking
  – East Parking @ tennis courts – Cherry Groove
  – Front Student Life
  – Administration Parking

• Please visit our Warner Robins Campus
  – 72 acres with 3 buildings
  – The property has many mature trees 36-54 inch DBH

www.mga.edu/botanical
  – Tree Inventory, Photos, Master Plans…
Learning for Life

www.ugaextension.com
Urban Trees

Developed by:
Sheldon Hammond, Northwest District ANR
Program Development Coordinator

In Cooperation with
The University of Georgia
Cooperative Extension Service
Urban Forestry Issue Team
Learning Objectives

- Value of urban trees
- Site factors in tree selection
- Importance of selection
- Identifying trees
- Proper planting & soil amendments
- Tree maintenance: staking, watering, fertilization & pruning
- Tree care professionals
Asking the Right Questions

- What is the purpose of the tree?
- What are the characteristics of the planting site?
- What are the characteristics of the tree?
Why Plant a Tree?

- Provide shade
- Provide aesthetics in the landscape
- Improve air quality
- Reduce storm-water runoff and improve water quality
- Create wildlife habitat
- Reduce noise levels
- Provide screening and privacy
Planting Summary 1800+ Trees

- 2008 Professional Sciences Center
  - 195
- 2009 April
  - 230
- 2010 January
  - 113
- 2011 February
  - 81
- 2011 Education Building
  - 180
- 2012 January Cherry Groove
  - 100
- 2012 February
  - 98
- 2012 January-March
  - 234
- 2011 October Long Leaf Pine 40+ acres
  - 22,000
Longleaf donation dig at Georgia Power
Native oaks in the gardens

1. *Quercus alba* - White Oak
2. *Quercus austrina* - Bluff Oak
3. *Quercus bicolor* - Swamp White Oak
4. *Quercus coccinea* - Scarlet Oak
5. *Quercus falcata* - Southern Red Oak
6. *Quercus falcata var. pagodifolia* - Cherrybark Oak
7. *Quercus geminata* - Sand Live Oak
8. *Quercus georgiana* - Georgia Oak
9. *Quercus hemispaerica* - Darlington Oak
   • *Quercus hemispaerica* ‘Moon’s’
10. *Quercus imbricaria* - Shingle Oak
11. *Quercus laevis* - Turkey Oak
12. *Quercus laurifolia* - Laurel Oak
13. *Quercus lyrata* - Overcup Oak
14. *Quercus marilandica* - Blackjack Oak
15. *Quercus michauxii* - Swamp Chestnut Oak
16. *Quercus muehlenbergii*, chinkapin oak
17. *Quercus nigra* - Water Oak
18. *Quercus nuttallii* - Nuttall Oak
19. *Quercus palustris* - Pin Oak
20. *Quercus prinoides*, dwarf chinkapin oak
21. *Quercus prinus* - Chestnut Oak
22. *Quercus phellos* - Willow Oak
   • *Quercus phellos* ‘Wynstar’
   • *Quercus phellos* ‘Hightower’
23. *Quercus rubra* - Northern Red Oak
24. *Quercus shumardii* - Shumard Oak
25. *Quercus stellata* - Post Oak
   • *Quercus stellata var. margaretta* - Sand Post Oak
26. *Quercus velutina* - Black Oak
27. *Quercus virginiana* - Live Oak
   • *Quercus virginiana* ‘Cathedral’ - Live Oak
   • *Quercus virginiana* ‘Highrise’ - Live Oak

• More to come...
Nurseries Caroliniana
- *C. sinensis* ‘Gold Splash’
- *C. sinensis* ‘Rosea’
- *C. sinensis* ‘Silver Dust’
- *C. sinensis* ‘Tea Breeze’
- *C. sinensis* ‘Yellow Tea’

Camellia Forest Nursery
- *C. sinensis* ‘China’
- *C. sinensis* ‘Guangzhou’
- *C. sinensis* ‘Korean’
- *C. sinensis* var. *assamica*
- *C. sinensis* ‘Large Leaf Tea’
- *C. sinensis* ‘Sochi Tea’
- *C. sinensis* var. *sinensis*
- *C. sinensis* ‘Darjeling’
- *C. sinensis* var. *ptilophylla*
- *C. sinensis* var. *quinquebracteata*
Wellness Center
What are the Site Factors?

- Soil characteristics
- Environmental conditions
- Planting space
- Site location
- Maintenance requirements
Site Factors

- Soil characteristics
  - Texture
  - Compaction
  - Moisture & drainage
  - Fertility and pH
  - Temperature
  - Contamination
  - Salt
Site Factors

- Environmental Conditions
  - Light patterns
  - Temperature extremes
  - Precipitation
  - Wind patterns
  - Air quality
Site Factors

- Planting Space
Site Factors

- Site location
  - Paved areas
  - Structures
  - Utility lines
  - Site activities
Site Factors

- Maintenance Requirements
What is the Right Tree?

- Growth factors
- Soil requirements
- Other
  - Environmental requirements
- Maintenance requirements
Right Tree

- Growth Factors
  - Mature size and shape
  - Growth rate
  - Branching pattern
  - Leaves
  - Flowers, fruit, seeds and bark
Right Tree

- Soil requirements
Right Tree

- Other environmental factors
  - Hardiness zone
  - Wind and storm damage
  - Light requirements
  - Pollution tolerance
  - Insect and disease tolerance
Right Tree

- Maintenance requirements
Types of Tree Stock

- Bare-Root
- Ball and Burlap (B&B)
- Container
Selecting a Tree

Qualities to look for:

- Healthy, well balanced crown with dark green foliage
- Straight trunk with evenly distributed branches with wide angles
- Healthy white roots with good lateral distribution
- No insect or disease problems
Urban Tree
Dendrology (Tree I.D.)
What is a Tree?

- Often reaches 15 feet or more in height at maturity
- Has a single trunk or dominant multiple trunks
- Has no normal branches on the lower trunk
- Has at least a partially defined crown
- Usually larger than other plants and tend to be long-lived
Classes of Trees In the South

- Gymnosperms
  - Softwoods
- Angiosperms
  - Hardwoods
  - Broadleaf
  - Palms and yuccas
Softwoods

- Foliage
  - Needles, scales
- Reproduction
  - Cones
- Examples
  - Pines, hemlocks, cedars, cypresses
Hardwoods

- Foliage
  - Broadleaf
- Reproduction
  - Flowers
- Examples
  - maple, oak, pecan, walnut
Tree Identification Features

- Leaves
- Twigs and stems
- Bark
- Flowers
- Fruit and seeds
- Cones
SUMMER KEY FOR TREES

1. Leaves needle-like, linear or scale-like, not over 3 mm wide; all evergreen except Taxodium; seeds naked; GYMNOSPERMS
2. Leaves broad, not needle-like, linear or scale-like, over 3 mm wide; seeds covered; ANGIOSPERMS
3. Leaves parallel-veined, very large, the petioles 4 feet or more long; unbranched - Sabal palmetto, Cabbage MONOCOTYLEDON
4. Leaves not-veined and not as above, stems ANGIOSPERMS - DICOTYLEDON

GYMNOSPERMS

3. Leaves and branches deciduous, leaves on fine deciduous twigs - Taxodium, Baldcypress, Cypress
4. Leaves evergreen and branches persistent, not leafy
5. Leaves needle-like, borne in clusters of 2-5 with a girdle at the base - Pinus, Pine
6. Leaves needle-like and not in clusters
7. Leaves square in cross section - Picea, Spruce
8. Leaves flattened
Tree Identification

Leaf Characteristics

- Part
- Type
- Shape
- Arrangement on the stem
- Venation
- Shape of apex and base
- Margin
- Surface
Tree Identification
Leaf Characteristics

- Parts

- Petiole
- Bud
- Stipule
- Lamina blade
Tree Identification

Leaf Characteristics

- **Type**
  - Hardwood

- Simple Leaf
  - Petiole
  - Leaflet
  - Stipule

- Compound Leaf
  - Rachis
  - Leaflet
Tree Identification
Leaf Characteristics

- **Type**
  - Hardwood - Compound

- **Diagrams**
  - Pinnate
  - Bipinnate
  - Palmate
Tree Identification

Leaf Characteristics

- Type
  - Softwood

- Awl-like
- Scale-like
- Needle-like
Tree Identification
Leaf Characteristics

- **Shape**

  - Ovate
  - Lanceolate
  - Cordate
  - Spatulate
  - Elliptical
  - Obovate
  - Oblanceolate
  - Obcordate
  - Oblong
  - Reniform
  - Linear
  - Cuneate
  - Peltate
  - Hastate
Tree Identification

Leaf Characteristics

- Arrangement on the stem

- Opposite
- Whorled
- Alternate
Tree Identification
Leaf Characteristics

- Venation

- Pinnate
- Palmate
- Parallel
- Dichotomous
Tree Identification

Leaf Characteristics

- Shape of apex and base

**Apices**
- Acute
- Acuminate
- Obtuse
- Truncate
- Emarginate
- Cuspidate

**Bases**
- Obtuse
- Acute
- Cuneate
- Oblique
- Cordate
Tree Identification

Leaf Characteristics

- Margin
  - Entire
  - Serrate
  - Serrulate
  - Doubly-serrate
  - Dentate
  - Crenate
  - Incised (lobed)
  - Sinuate
Tree Identification

Leaf Characteristics

- Surface
Tree Identification

Twigs And Stem

- Terminal bud
- Leaf scar
- Lateral bud
- Lenticel
- Pith
Tree Identification
Bark

- Shape or general appearance.
- Texture
- Thickness
- Color

Smooth         Furrowed         Scaly         Warty         Shaggy
Tree Identification

Flowers

- Complete & Incomplete
- Perfect and Imperfect
Tree Identification
Fruits and Seeds

- Simple Fruits
  - Dry Fruit (indehiscent, dehiscent)
  - Fleshy Fruit

- Compound Fruits
  - Aggregate Fruits

- Cones
  - Pollen Cones
  - Female Cones
  - Seritinious Cones

- Hickory – Dehiscent husk
- Oak Acorn – Indehiscent
- Persimmon-Berry
- Cherry – Drupe
- Apple – Pome
- Sweetgum – Multiple head of nutlets
Urban Trees: Selection
The Good, The Bad and the Ugly
The Good

Trees for Moist Shady Sites

Red Maple

*Acer rubrum*

**Attributes:**

- 60’ x 40’ w
- Fall Color
- Shade tree

**Cultivars:**

- Red Sunset
- October Glory
- Autumn Blaze
Flowering Dogwood

*Cornus florida*

**Attributes:**
- Spring Flowering
- Native

**Cultivars:**
- Cherokee Chief
- Cherokee Princess
- First Lady
The Good Trees for Moist Shady Sites

Carolina Silverbell

*Halesia carolina*

**Attributes:**
- Native
- Clusters of Bell-shaped Flowers in Spring

**Cultivars:**
- Meehanii
- Rosea
Japanese Stewartia

*Stewartia pseudocamellia*

**Attributes:**
- 30’ x 25’ w
- Fall color
- Great winter form
- Camellia-like flowers—July
Kousa Dogwood

*Cornus kousa*

**Attributes:**
- Later flowering
- Sun tolerant

**Cultivars:**
- ‘Milky Way’ series
Red Buckeye

*Aesculus pavia*

**Attributes:**
- 20’ x 25’ w
- Bright red upright flowers in spring
- Dark green leaves
Japanese Snowbell

*Styrax japonicus*

**Attributes:**
- 25’ x 25’ w
- Graceful shape
- Bell flowers May-June

**Cultivars:**
- ‘Emerald Pagoda’
The Good

Trees for Partly Sunny Sites

Apple Serviceberry

*Amelanchier x grandiflora*

**Attributes:**
- 20’x 20’ W
- White Flowers
- Edible fruit
- Fall Color

**Cultivars:**
- ‘Autumn Brilliance’
Eastern Redbud

*Cercis canadensis*

**Attributes:**
Native
20’ x 25’ w
Early spring bloomer
Interesting gray bark

**Cultivars:**
- Forest Pansy
- Alba

*Photos Courtesy Ohio Division of Forestry*
The Good
Trees for Moist Sunny Sites

White Fringetree
*Chionanthus virginicus*

**Attributes:**
Native
a.k.a. Grancy
Graybeard
Small tree 20’ T.
Fuzzy white blooms
spring
Pollution tolerant
The Good
Trees for Moist Sunny Sites

Southern magnolia
Magnolia grandiflora

Attributes:
Stately large tree
Evergreen
Creamy summer flowers

Cultivars:
‘Little Gem’
‘Bracken’s Brown Beauty’
‘Alta’
The Good

Trees for Moist Sunny Sites

Willow Oak
Quercus phellos

Attributes:
Best overall oak
Great street tree
Fine texture
50’ x 40’ w
Baldcypress

*Taxodium distichum*

**Attributes:**
- Perfect Form
- Red-bronze Fall Color
- Tolerant of wet or dry sites

**Cultivars:**
- Pendens
- Monarch of Illinois
- Shawnee Brave

Trees for Moist Sunny Sites
The Good
Trees for Sunny Sites

Persian Parrotia
Parrotia persica

Attributes:
Foliage-opens reddish, turns deep green and turns 3 brilliant colors in fall

Interesting winter form
Lacebark Pine

*Pinus bungeana*

**Attributes:**
30’ x 30’ w
Beautiful bark
The Good

Trees for Sunny Sites

Chinese Pistache

*Pistacia chinensis*

**Attributes:**
- 30 x 30’ w
- Drought resistant
- Beautiful bark
- Excellent fall color
American Yellowwood
*Cladastris kentuckeae*

**Attributes:**
- 50’ x 55’ W
- Nice shade tree
- Floral show every 2-3 years
- Yellow-copper fall color

**Cultivars:**
- ‘Rosea’
Japanese Zelkova

*Zelkova serrata*

**Attributes:**
- Vase shape
- Fall Color
- Exfoliating bark

**Cultivars:**
- ‘Green Vase’
- ‘Village Green’
- ‘Spring Grove’
American Smoketree

*Cotinus obovatus*

Attributes:
- Shrubby small tree
- Wonderful gray bark
- Smoky-fuzzy
- Fantastic fall color
The Good
Trees for Dry Sunny Sites

Ginkgo

*Ginkgo biloba*

**Attributes:**
- Upright form
- Brilliant Yellow Fall Color
- Beautiful Green-Blue-green Foliage

**Cultivars:**
- Princeton Sentry
- Saratoga
Chalkbark Maple

*Acer leucoderme*

**Attributes:**
- 30’ x 30’ w
- Drought tolerant
- Nice bark
- Wonderful fall color
Lacebark Elm

*Ulmus parvifolia*

**Attributes:**
- Dutch Elm Disease-Resistant
- Ornamental bark
- Good Street-tree

**Cultivars:**
- Athena

**The Good**

**Trees for Dry Sunny Sites**
The Good

Trees for Sunny Sites

Sourwood

*Oxydendron arboreum*

**Attributes:**
Native
Columnar form
Great fall color
Bell-flowers
The Bad & Ugly
Trees Not to Recommend

Bradford Pear

Pyrus calleryana
‘Bradford’

Reasons:
- Weak limb structure
- Fire Blight
- Better varieties
- Odor

Silver Maple

_Acer saccharinum_

**Reasons:**
- Weak limb structure
- Root Sprouts
- Better varieties
The Bad & Ugly
Trees Not to Recommend

Box Elder

*Acer negundo*

Reasons:
- Insects
- Poor Limbing
- Weak Structure
The Bad & Ugly

Trees Not to Recommend

Northern Catalpa

*Catalpa speciosa*

**Reasons:**

- Insects
- Poor Structure
- Weak Limbing

Paul Wray, Iowa State University, www.insectimages.org
Empress Tree

*Paulownia tomentosa*

**Reasons:**
- Root Sprouts
- Prolific seeder
- Weak
The Bad & Ugly
Trees Not to Recommend

Siberian Elm

_Ulmus pumila_

Reasons:
- Disease
- Poor form

Patrick Breen, Oregon State University, www.insectimages.org
Urban Trees
Installation and Maintenance
Installation Guidelines

- Choose a planting season
- Prepare the site
- Prepare the tree stock
- Plant the tree
Choose a Planting Season

- Bare root – fall/spring
- B&B – fall/winter/spring
- Fabric Bag – fall/winter/spring
- Container – all year (water in summer)
Preparing the site

- Determine size of planting area
  - 10 X the root ball
- Determine the planting hole size.
  - 3 X the root ball
- Hole shape/depth
Prepare the Tree Stock

- Inspection
- Handling
- Storage
- Removal of wrapping, cords, ties and labels
Identify and Expose Root Collar

• Determines hole depth
• Root Collar must be 1-3” above existing grade outside the planting hole
• See first structure root
• Old screw driver or ice pick works great for gentle soil removal.

Root collar should be one to three inches above ground level.
Plant the tree

- Place root ball at ground level
- Spread out roots
- Soil amendments
- Backfilling
Planting

- Water plants thoroughly before planting to saturate the root ball with water.
- NEVER use plant trunk to move plant material, always lift and transport plant material by root ball, root ball straps or handles on container.
- Dig hole 3x diameter of root ball with sloped sides
- Remove container

- Place material in the hole
  - Check root collar height and get it straight!
  - Remove excess soil on top of structure roots
  - Remove all tags, wires, strapping and Trash

- Backfill with native soil
  - Use a modified planting hole in compacted, poor soils, and areas lacking drainage.
  - Top 10-6” must be topsoil.
  - In sandy or clay topsoils incorporate <5% by volume organic amendment. Must go Large!
Post-Planting Guidelines

- Watering
- Mulching
- Pruning
- Fertilizing
- Staking and Guying
After Planting Maintenance

- Mulching
- Watering
- Pruning
- Fertilizing
- Disease and Pest Control
- Removal
Mulching

- **Benefits**
  - Improves appearance,
  - stimulates root growth,
  - weed control,
  - reduces soil erosion,
  - conserves soil moisture,
  - insulates soil,
  - protects from mechanical damage

- **Types**
- **Guidelines**: Area, depth, method
Mulching Tricks of the Trade

- Don’t mulch the day of planting.
  - wait 2 days, hand water.
  - Check for air pockets
  - Then mulch
- no mulch directly to plant root flare
- Mulch annually
- Thicker than 4” induces shallow roots on plants
- Why haul old mulch off site?
  - Expand mulch area, rake out and top off with a fresh coat!
Moisture Management

- **Mulch!**
- Mulch helps retain moisture and buffer soil temperatures.
- Apply 3 to 4 inches deep, from the root collar to the drip line.
Watering

- How: soaker hoses
- How much: 1-3 in./wk
- Where: Dripline
- When: night
  10 p.m. – 8 a.m.
Pruning

When?
- Winter – best time to prune
- Spring – to maximize flowering
- Summer – corrective pruning to remove hazards and diseases
- Fall – no pruning
Pruning

- Pruning cuts
  - Prune branches leaving branch collar intact
  - Three Step Method
Pruning

- Improper pruning techniques
  - Topping
  - Flush cuts
  - Pruning more than 25% of crown
  - Wound dressings
Fertilizing

- Soil test
- Application:
  - Surface
  - Soil injection
  - Trunk injection

Other Guidelines

- Use slow release
- Fertilize at dripline
- Fertilize early and late spring; mid summer; avoid bud break
Disease and Pest Control

- Pruning – Sanitation
- Biological Controls
- Chemicals
Removal

- Reasons for removal:
  - Poor condition and in decline
  - Is a hazard or in a hazard location
  - Diseased or the host to a pest that may spread
Selecting a Tree Care Professional

- Professional reputation
- Customers
- Liability insurance
- Worker’s Comp. Insurance
- Review contracts
- Education and experience
- Get several bids
Acknowledgements

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