Woody Landscape Plant Germplasm Repository

UNITED STATES NATIONAL ARBORETUM
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WLPGR - Objective

- Conserve a broad spectrum of woody landscape plant genetic resources and associated information for use in research and crop improvement.

- Collect and conserve genetic resources, evaluate genetic resources for horticultural merit, and characterize them genetically, and transfer technology in the form of the preceding genetic resources and associated information to researchers and breeders' world wide.
Woody Landscape Plant Germplasm Repository

- Beltsville, Maryland
- United States National Arboretum
- Woody landscape plants
- Polyhouse – cutting / seed production
- 3 greenhouses
- Equipment building
- WLPGR or South Farm
South Farm
Daily Task

- Greenhouse work
  - Cuttings
  - Transplanting
  - Watering
  - Weeding
- Inventory
- Mowing
  - ~60 acres
- Pruning
  - 2,800+ plants
South Farm
Daily Tasks
Greenhouse Work
Greenhouse Work
Inventory

- Greenhouse plants
  - Update
  - Move
  - Organize
  - Tag

- Field plants
  - Update
  - Prune
  - Tag

Mowing / Pruning
Supporting the Internship Experience 100%

- South Farm – Horticulture
- Research Facility – Lab Work
- Research Project
- Field Trips
Lab Work
Research Project

- Work together with supervisor to develop a research project that is worked on and completed by the end of the internship
- Present final project at the United States National Arboretum
- Conservation of native Quercus species
Goal of the National Arboretum's genetic resource conservation program to conserve genera like Quercus in order to prevent the loss of this great plant and its genetic diversity

Preserving Quercus is a challenge due to the fact that acorns lose viability in storage

My project focused on locating natural populations of various species of Quercus with the intent of establishing seed orchards in situ
Quercus

- Oak is a tree or shrub in the genus Quercus of the beech family Fagaceae
- Approximately 600 extant species
- Flowering plant
- Great strength and hardiness
- Resistance to insect and fungal attacks
  - High tannin content
- Wildlife and livestock feeding
- Ornamental for its shade and urban stress tolerance
Research Project Outline

- Classify key *Quercus* species
- Research species for identification purposes
- Locate native *Quercus* species
- Visit location and survey the stability of the site
  - GPS Tour (coordinates)
  - Geography
  - Habitat
  - Associated taxa (hybridization)
- Compile coordinates and site information
  - Develop GIS of coordinates
Quercus Species

- Quercus alba
- Quercus coccinea
- Quercus lyrata
- Quercus marilandica
- Quercus michauxii
- Quercus pagoda
- Quercus shumardii
Quercus alba (White Oak)

- **Growth Form**
  - Popular and long-lived shade trade, which grows to 100 feet, with a wide-spread rounded crown and numerous horizontal branches

- **Bark**
  - Light gray, shallow furrows forming scaly ridges or plates

- **Twigs/Buds**
  - Slender to stout, gray to reddish-green twigs with star-shaped pith; Buds are reddish-brown and broadly oval and hairless

- **Leaves**
  - Petiole 3/8 - 1 inch in length; obovate to elliptical leaves, 4 – 8 inches long, 2 ¼ - 4 ¾ inches wide, margin with 5-9 lobes that are widest beyond middle
  - Dull or shiny grayish green above, light green with slight pubescence which becomes smooth beneath as they mature

- **Acorns**
  - Annual; 1-3 acorns on peduncle up to 1 ¼ inches long, light gray pubescent cup, enclosing ¼ of the nut, up to 1 inch long
  - Germinates in the fall after dropping to the ground

- **Habitat**
  - Dry upland slopes to well-drained loam in bottomlands; Grows as a tree or shrub depending on elevation
Quercus alba
Quercus coccinea (Scarlet Oak)

- **Growth Form**
  - Fast growing large tree that can obtain a height of 120 ft; Downward arching branches; Trunk usually enlarged at the base

- **Bark**
  - Brown with fine fissures and scaly ridges, inner bark is red to orangish-pink

- **Twigs/Buds**
  - Twigs are smooth reddish-brown; clustered terminal buds are ovoid and reddish-brown with pubescence near the apex

- **Leaves**
  - Smooth petiole ¾ - 2 3/8 inches in length
  - Elliptic to obovate, 2 ¾ - 6 ¼ inches long, 3 – 5 1/8 inches wide
  - Margins with 5-9 lobes extending more the ½ the distance to the midrib
  - Upper surface glossy light green, secondary veins raised on both surfaces

- **Acorns**
  - Biennial; cup is a glossy reddish-brown, inner surface is smooth and light brown, covering 1/3 – ½ the nut
Quercus coccinea
Quercus lyrata (Overcup Oak)

- **Growth Form**
  - Medium sized tree with generally poor, twisted form. Crown is pyramidal/oval and later rounded

- **Leaf**
  - Alternate, simple, 6-10 inches long, roughly oblong in shape with a highly variable margin that has 5-9 lobes with irregular sinuses
  - Underside is white and pubescent

- **Flower**
  - Monoecious; male flowers are green, born in catkins, 2-4 inches long
  - Female flowers reddish single spikes, appearing with the leaves

- **Fruit**
  - Acorns are 1/2 -1 inch long, round and almost entirely covered by the warty and unfringed cap, maturing in 1 year, ripening in fall

- **Twig**
  - Slender and gray, glabrous-very closely resembling white oak. Buds are small. Ovoid and light chestnut brown in color; end buds are clustered

- **Bark**
  - Gray-brown and scaly, often with irregular plates, again resembling white oak
Quercus lyrata
Quercus marilandica (Blackjack Oak)

- **Growth Form**
  - Small sized tree, generally with poor form. Typically has a short trunk with a round crown made up of twisted limbs

- **Leaf**
  - Alternate, simple, 5-8 inches long, thickened, with 3 shallow, bristle-tipped lobes near the end of the leaf
  - Upper surface lustrous green, lower surface paler with orange-brown pubescence

- **Flower**
  - Monoecious; males 2-4 inches long hanging catkin; females small, single or paired

- **Fruit**
  - Acorn, nut ¾ inch long often striated, light brown, cap covers about half of the nut and is covered with loose, hairy scales

- **Twig**
  - Stout, dark brown and scruffy-hairy, reddish brown buds are ¼ inch long, sharp, angled and fuzzy

- **Bark**
  - Very dark (almost black), rough, with blocky plates and splits
Quercus marilandica
Quercus michauxii (Swamp Chestnut Oak)

- **Growth Form**
  - Well-formed tree becoming quite large with a narrow crown

- **Leaf**
  - Alternate, simple, obovate, 4-8 inches long, 3-5 inches wide, margin with large round blunt teeth
  - Dark green and shiny above, pale and downy below

- **Flower**
  - Monoecious; male flowers are yellow-green catkins
  - Female flowers are green to reddish, very small in leaf axils, appearing in mid-spring with the leaves

- **Fruit**
  - Acorn, 1 to 1 ½ inches long, chestnut brown, bowl-shaped cup covers about 1/3 of nut, cap is rough scaly, stalk is short

- **Twig**
  - Moderately stout, smooth or quite fuzzy, orangish brown, terminal bud ¼ inch long, reddish brown, buds cluster near ends of twig

- **Bark**
  - Similar to white oak, ashy gray, scaly, with age developing irregular furrows and becoming darker
Quercus michauxii
Quercus pagoda (cherrybark oak)

- **Growth Form**
  - Large tree, with good, straight form, often well over 100 feet tall and over 3 feet in diameter

- **Leaf**
  - Alternate, simple, 5-8 inches long, 5-9, bristle tipped lobes which are shallower than Quercus falcate, margins of lobes are nearly at right angles to midribs, bright green above, duller and may be scruffy-hairy beneath and on petiole

- **Flower**
  - Monoecious; staminate yellow-green flowers borne on elongated clusters of catkins; pistilate flowers are very small, green and borne on a short stalk, appear with the leaves

- **Fruit**
  - Acorns are ½ inch long, orange-brown, pubescent when young; scaly, somewhat pubescent cap covers about 1/3 of the nut; mature in fall after two years

- **Twig**
  - Orange to reddish brown, often very pubescent with older twigs becoming glabrous; multiple terminal buds (1/8-1/4 inch) are pointed, reddish brown and have some pubescence on the upper half

- **Bark**
  - Initially smooth, but quickly developing small scaly ridges, later becoming dark, scaly and quite rough.
Quercus pagoda
Quercus shumardii (Shumard Oak)

- **Growth Form**
  - Large southern oak, often over 100 feet tall and several feet in diameter, with a spreading crown

- **Leaf**
  - Alternate, 4-7 inches long, 5-9 lobes with coarse bristle tips, sinuses extend more than halfway to midrib, shiny dark green above, and pale green below

- **Flower**
  - Monoecious; males are long hanging catkins in clusters, light green
  - Females single or paired on a short stalk, appearing with the leaves

- **Fruit**
  - Acorn, single or paired, ¾-1 1/14 inches long, oblong-ovoid; shallow, bowl-shaped, scaly cap covering less than 1/3 of acorn

- **Twig**
  - Moderately stout, grayish brown, glabrous, clustered terminal buds are ¼ inch long, grayish brown, smooth or slightly fuzzy

- **Bark**
  - Grayish brown, developing dark, deep furrows, with light gray to white scaly ridge tops
Quercus shumardii
Quercus Locations / Site Information
Quercus coccinea Location
Quercus coccinea – Location #1

- SERC field
- 25ft-30ft tall
- Great health

- Acer rubrum
- Multiflora rose
- Sweet gum
- Lonicera japonica
Quercus coccinea – Herbarium sample
Quercus alba Locations

1. Quercus alba - Boxwood...
   N 38.912216°  E -76.975668°

2. Quercus alba - 66340*P
   N 38.907939°  E -76.969108°

3. Quercus alba - 66340*L
   N 38.907973°  E -76.968895°

4. Quercus alba - 66340*J
   N 38.908075°  E -76.968856°

5. Quercus alba - 66333*L
   N 38.907550°  E -76.968452°

6. Quercus alba - 66333*J
   N 38.907444°  E -76.968477°

7. Quercus alba - 66333*H
   N 38.907348°  E -76.968726°
Quercus alba – Location #2

- National Boxwood Collection
- 70ft-90ft tall
- Good Health
- 70247*L3

- Buxux wallichiana
- Buxus microphylla
- Buxus microphylla var. japonica
Quercus alba – Herbarium Sample
Quercus alba – Location #3

- National Grove of State Trees
- Good Health
- ~20ft-30ft tall
- 66340*P

- Ulmus Americana
- Picea glauca
- Cornus florida
Quercus alba – Location #4

- National Grove of State Trees
- Good Health
- ~25ft-30ft tall
- 66340*L

- Ulmus Americana
- Picea glauca
- Cornus florida
Quercus alba – Location #5

- National Grove of State Trees
- Good Health
- ~25ft-30ft tall
- 66340*J

- Ulmus Americana
- Picea glauca
- Cornus florida
Quercus alba - #3,#4,#5
Quercus alba – Location #6

- National Grove of State Trees
- Great Health
- ~35ft-45ft tall
- 66333*L

- Cercis canadensis
- Ilex opaca
- Cornus florida
Quercus alba – Location #7

- National Grove of State Trees
- Great health
- ~30ft-40ft
- 66333*J

- Cercis canadensis
- Ilex opaca
- Cornus florida
Quercus alba – Location #8

- National Grove of State Trees
- Great health
- ~25ft-35ft
- 66333*H

- Cercis canadensis
- Ilex opaca
- Cornus florida
Quercus alba - #6,#7,#8
Future Work

- Continue locating and identifying key native Quercus species
  - Quercus lyrata
  - Quercus marilandica
  - Quercus michauxii
  - Quercus pagoda
  - Quercus shumardii
- GPS Tour - coordinates
- Survey site stability
- Map coordinates
Field Trips
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