

TREES

OF JAMES MADISON UNIVERSITY



A walking tour of the diversity of
trees on the JMU campus

2016

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Foreword

In May and June 2016 a campus tree inventory project was initiated. The goal of the project was to census as many trees on campus as possible, and geo-locate trees using Global Positioning System (GPS) instrumentation. All trees with diameter at breast height (DBH) \geq 2.5 cm were identified, geo-located, and measured for their DBH and total tree height (H). A spatial database was created to manage inventory data and facilitate the creation of user friendly maps in ArcGIS.

Preliminary work resulted in the inventory of 463 individual trees. Forty-nine trees were selected for inclusion in a walking tour of campus. The goal of this tour is to highlight the diversity of trees on campus, and provide information about each tree species. Three walking trails are featured here, each varying in length and starting location on campus.

- The Campus Trail begins in the Skyline area between the Bioscience and Physics / Chemistry buildings (3.26 miles)
- The East Campus Trail starts in the Skyline area in front of Bioscience (1.06 miles)
- The West Campus Trail starts in the Bluestone area on The Quad (1.93 miles)

This booklet contains the walking tour maps, and information about each tree species. All images and maps were taken and created, respectively, by the authors. Tree-specific information was collected from a number of scholarly works, as noted in the Resources section on page 37.

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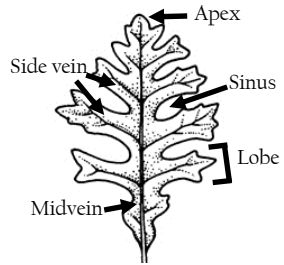
This project was supported by a JMU Provost Research Award. Special thanks to Billy Flint in the JMU Biology Department for his time and assistance with this project.

For questions or comments about the inventory data, contact Dr. Mikaela Schmitt-Harsh, schmi2ml@jmu.edu.

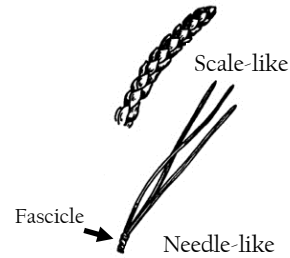
Quick Guide to Tree Terminology

Leaf Type

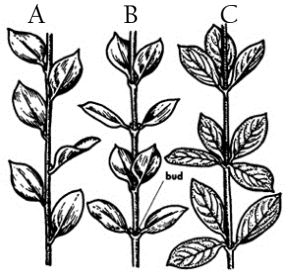
Broadleaf



Conifer

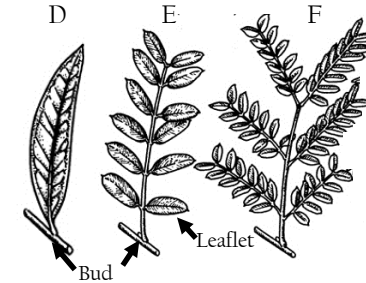


Leaf Arrangement

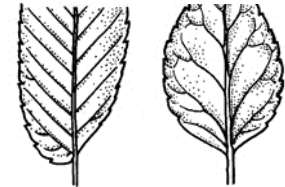


- A. Alternate
- B. Opposite
- C. Whorled
- D. Simple
- E. Once Compound
- F. Twice Compound

Leaf Composition



Leaf Bases



Asymmetrical Symmetrical

Seed Type



Cone

Samaras

Stem Parts



Spines

Thorns

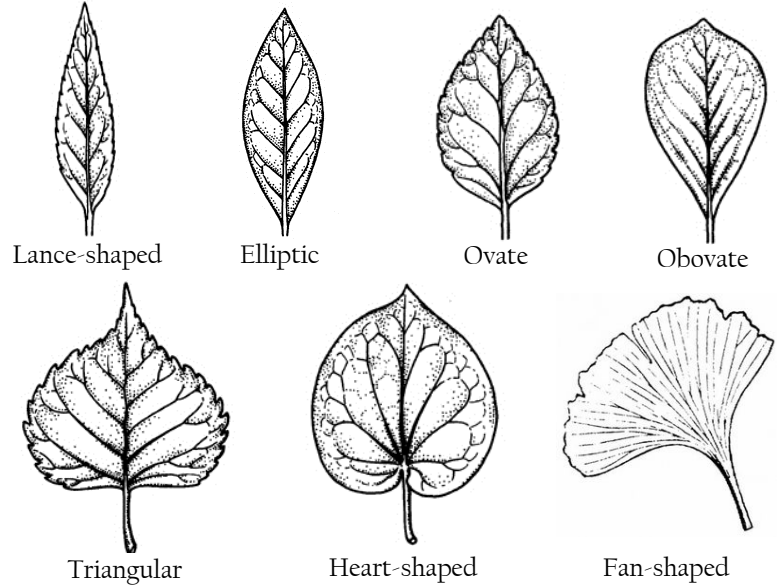


Legume Pods

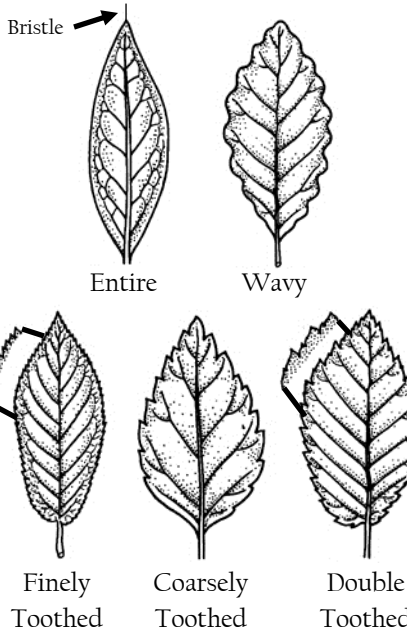


Acorn

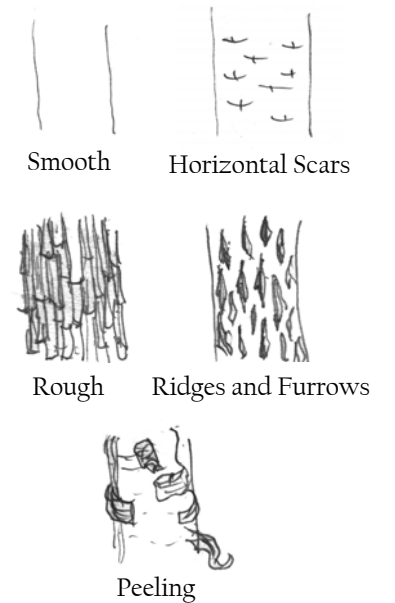
Leaf Shape



Margins

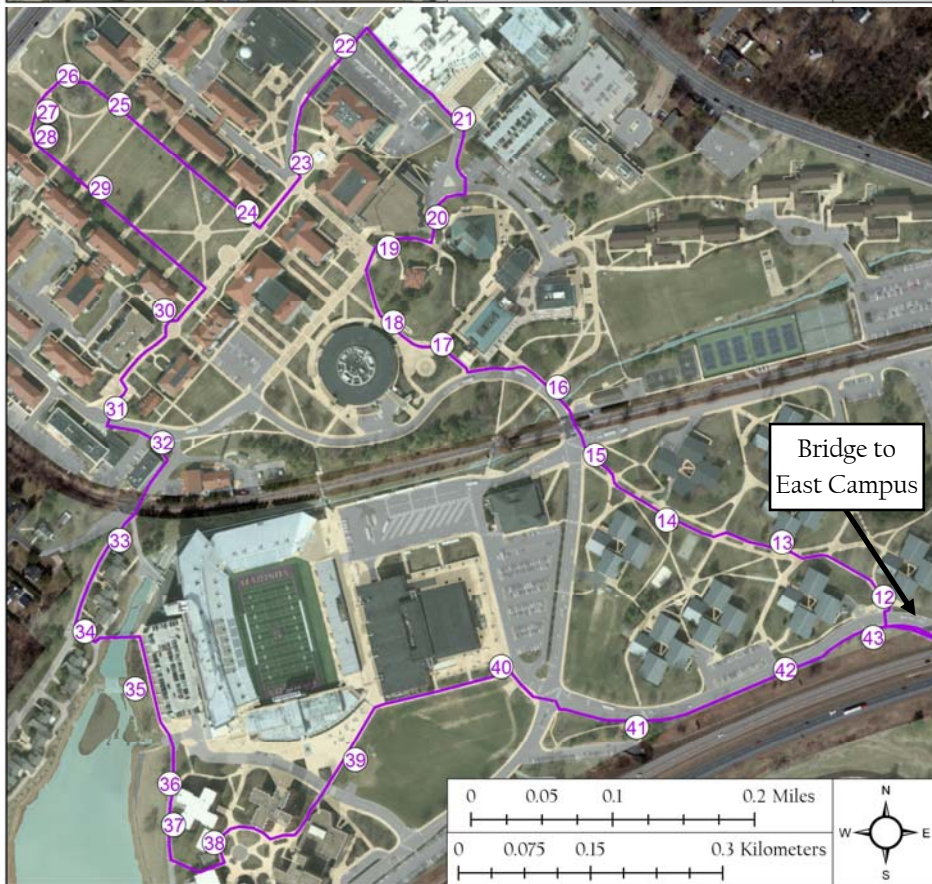
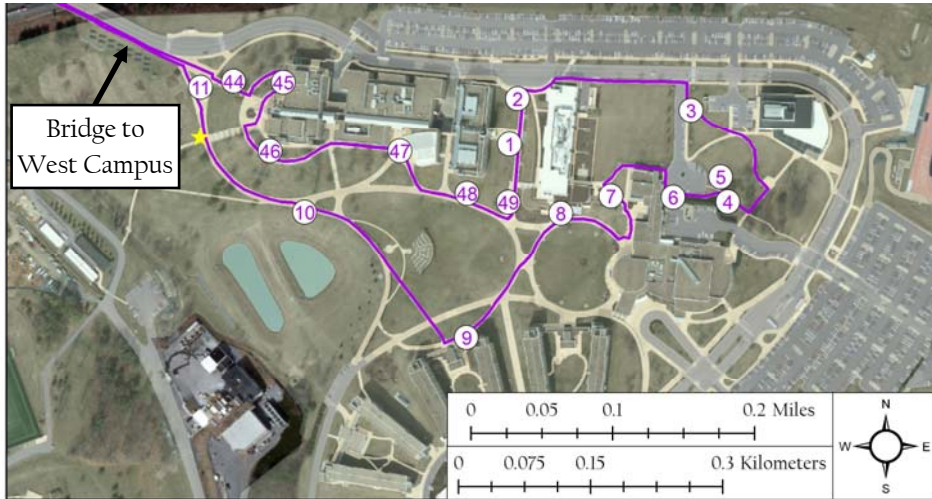


Bark Types



*Images from Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region*. 4th ed. Indianapolis: Indiana Academy of Science.

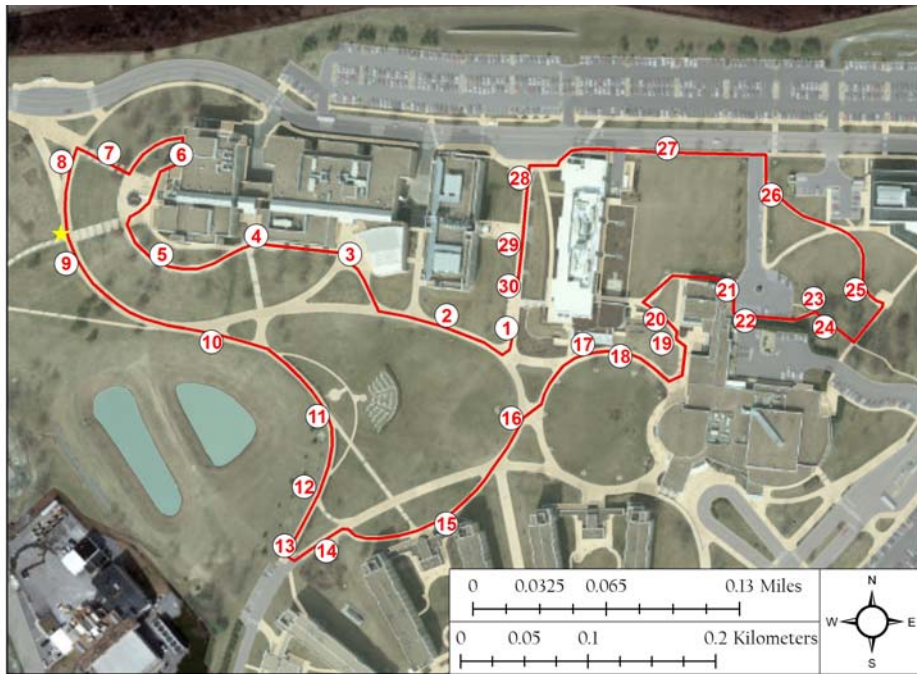
Campus Trail (3.26 miles)



- | | |
|----------------------|-------------------------|
| 1 Pignut Hickory* | 26 Red Oak* |
| 2 Virginia Pine* | 27 Siberian Elm |
| 3 American Hornbeam* | 28 American Elm* |
| 4 Mockernut Hickory* | 29 Ginkgo |
| 5 Black Locust* | 30 Silver Birch |
| 6 Leyland Cypress | 31 Red Maple* |
| 7 Bald Cypress | 32 Kentucky Yellowwood |
| 8 Eastern Red Cedar* | 33 Blue Atlas Cedar |
| 9 Tulip Poplar* | 34 Japanese Pagoda Tree |
| 10 Swamp White Oak* | 35 Weeping Willow |
| 11 River Birch* | 36 Loblolly Pine |
| 12 Scarlet Oak* | 37 Black Oak* |
| 13 Southern Magnolia | 38 Paperbark Maple |
| 14 American Beech* | 39 Pin Oak* |
| 15 Sycamore* | 40 Crabapple |
| 16 Austrian Pine | 41 Eastern White Pine* |
| 17 Honey Locust* | 42 Sugar Maple* |
| 18 Kousa Dogwood | 43 Golden Rain Tree |
| 19 Norway Maple | 44 Green Ash* |
| 20 Cherry | 45 Balsam Fir |
| 21 Eastern Redbud* | 46 White Oak* |
| 22 Sweetgum | 47 Japanese Maple |
| 23 Willow Oak* | 48 Sawtooth Oak |
| 24 Norway Spruce | 49 Silver Maple* |
| 25 Black Walnut* | ★ Hillside |

*Native tree species

East Campus Trail (1.06 miles)



- | | | | |
|----|---------------------|----|--------------------|
| 1 | Silver Maple* | 26 | American Hornbeam* |
| 2 | Sawtooth Oak | 27 | Red Oak* |
| 3 | Japanese Maple | 28 | Virginia Pine* |
| 4 | Kentucky Yellowwood | 29 | Pignut Hickory* |
| 5 | White Oak* | 30 | Pin Oak* |
| 6 | Balsam Fir | ★ | Hillside |
| 7 | Green Ash* | | |
| 8 | River Birch* | | |
| 9 | Loblolly Pine | | |
| 10 | Swamp White Oak* | | |
| 11 | Eastern Redbud* | | |
| 12 | Cherry | | |
| 13 | Crabapple | | |
| 14 | Red Maple* | | |
| 15 | Tulip Poplar* | | |
| 16 | Willow Oak* | | |
| 17 | Eastern Red Cedar* | | |
| 18 | Sycamore* | | |
| 19 | Southern Magnolia | | |
| 20 | Bald Cypress | | |
| 21 | Kousa Dogwood | | |
| 22 | Leyland Cypress | | |
| 23 | Black Locust* | | |
| 24 | Mockernut Hickory* | | |
| 25 | Black Oak* | | |

West Campus Trail (1.93 miles)



- ① Red Oak*
- ② Black Walnut*
- ③ Norway Spruce
- ④ Willow Oak*
- ⑤ Sweetgum
- ⑥ Eastern Redbud*
- ⑦ Cherry
- ⑧ Norway Maple
- ⑨ White Oak*
- ⑩ Kousa Dogwood
- ⑪ Honey Locust*
- ⑫ Austrian Pine
- ⑬ Sycamore*
- ⑭ American Beech*
- ⑮ Southern Magnolia
- ⑯ Scarlet Oak*
- ⑰ Golden Rain Tree
- ⑱ Sugar Maple*
- ⑲ Eastern White Pine*
- ⑳ Crabapple
- ㉑ Pin Oak*
- ㉒ River Birch*
- ㉓ Paperbark Maple
- ㉔ Black Oak*
- ㉕ Loblolly Pine
- ㉖ Weeping Willow
- ㉗ Japanese Pagoda Tree
- ㉘ Blue Atlas Cedar
- ㉙ Kentucky Yellowwood
- ㉚ Red Maple*
- ㉛ Silver Birch
- ㉜ Green Ash*
- ㉝ Ginkgo
- ㉞ Tulip Poplar*
- ㉟ American Elm*
- ㊱ Siberian Elm

Balsam Fir (*Abies balsamea*)

45 6

Identification: Balsam fir is a small to medium sized evergreen species. Needles are half to one inch in length and are glossy, dark green on top with white lines on the underside. Cones are 2-4" long and start out purple, maturing to a blue-brown. Most cones are erect but some varieties are pendulous.

Noteworthy Characteristics: The balsam fir is the most widespread and common fir in North America,



however, it is not native to our area. It is used primarily ornamentally, both living and cut as Christmas trees, though some lumber is produced from it.

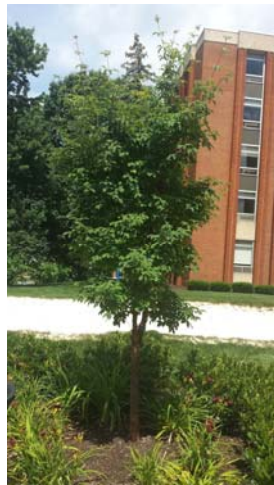


Paperbark Maple (*Acer griseum*)

38 23

Identification: The most prominent characteristic is the orange/red flaky bark. Leaves are simple and opposite. The leaves are trifoliate with 3 coarsely toothed leaflets. The leaves are green above and lighter green with soft hairs beneath.

Noteworthy Characteristics: Paperbark maple is a small tree, native to China. It was brought to the US for use as an ornamental due to its showy bark.

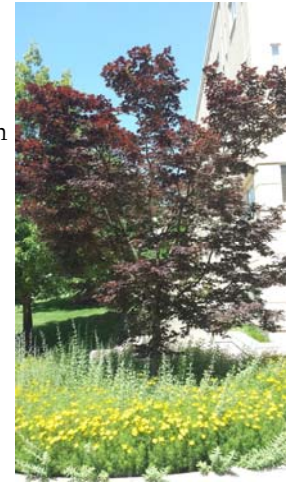
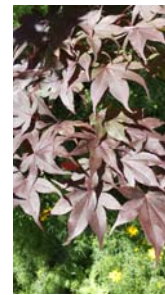


Japanese Maple (*Acer palmatum*)

47 3

Identification: Leaves are simple, opposite and often palmately lobed. With over 1000 varieties of Japanese maple, leaves are highly variable in color and shape but most have 7-11 distinct lobes with double-toothed margins. They produce the typical maple paired samara, usually with reddish wings.

Noteworthy Characteristics: Japanese maple is a non-native small tree (or large shrub) often planted as an ornamental due to its striking foliage. In the US, Japanese maple has escaped cultivation in some areas and is threatening native species.

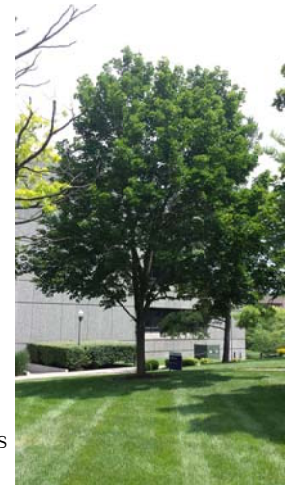


Norway Maple (*Acer platanoides*)

19 8

Identification: Very similar to sugar maple. Leaves are opposite and simple with 5 deep lobes and pointed leaf apices. Very few teeth compared to other maples. Samaras are larger than sugar maple samaras and form an obtuse angle. Leaves contain a milky sap.

Noteworthy Characteristics: Norway maple is an invasive species to the US. Once established, the dense canopy of Norway maple shades out native seedlings and saplings. It may also contain toxins that inhibit the growth of other species.



Red Maple (*Acer rubrum*)*

31 14 30

Identification: Leaves are simple and opposite. They have 3 primary lobes that are toothed and end in points. Leaf stems can be red and the samaras are initially red in color, darkening with maturity.

Noteworthy Characteristics: Red maple is a medium-sized, native tree. As natural fire regimes have been repressed, non-fire tolerant species such as maples, have become more common in natural forests, outcompeting the dominant oak and hickory species.

Red maples grow rapidly and are planted ornamentally for their brilliant fall foliage.



Sugar Maple (*Acer saccharum*)*

18 8

Identification: Leaves are opposite and simple with 5 deep lobes and long, pointed leaf apices. Very few teeth compared to other maples. The leaves are a dull green above and pale beneath. Easily confused with Norway maple, however, it lacks milky sap and the samaras form an acute angle.

Noteworthy Characteristics: Sugar maples have brilliant coloration in the fall.

However, the most important contribution of sugar maples is its sweet sap which is harvested and made into syrup. Sugar maples are not tolerant of pollution which limits its survival in urban areas.



Silver Maple (*Acer saccharinum*)*

49 1

Identification: Leaves are opposite and simple with 5 deep lobes and pointed leaf apices. Margins are coarsely toothed. The leaves are a dull yellow-green above and silvery beneath. Samaras are green and are the largest of all the maples.

Noteworthy Characteristics: Silver maple is a large and fast-growing native species. It is tolerant of poorly-drained soils and is therefore important in riparian areas. It was once heavily planted in urban areas; however, brittle limbs and shallow roots make it susceptible to winter and wind storms.



River Birch (*Betula nigra*)*

11 8 22

Identification: Easily distinguished by its papery, peeling outer bark with pinkish inner bark. Leaves are alternate, simple and triangular in shape with coarsely, double-toothed margins. The leaves are glossy green above and hairy beneath.

Noteworthy Characteristics: River birch is a fast-growing, medium-sized, native species. It is well-adapted to wetland areas but is also more heat-, drought-, and disease-resistant than many other birch species.



Silver Birch (*Betula pendula*)

30 31

Identification: The bark is white. Leaves are light-green, alternate, simple and triangular in shape. Margins are toothed. This species of birch has pendulous branches characteristic of 'weeping' trees.

Noteworthy Characteristics: Silver birch is non-native to the US and was brought here as an ornamental species for its unique bark and weeping appearance. In Europe, birch wood is harvested for furniture making. The bark can also be used for tanning leather.

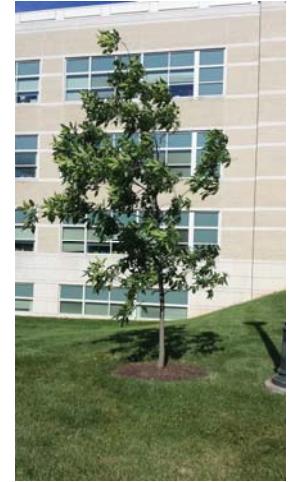


Pignut Hickory (*Carya glabra*)*

1 29

Identification: Leaves are alternate and compound with 5 to 7 leaflets. The leaflets are elliptical with a pointed apex and toothed margins. Terminal leaflet is generally the largest. Twigs are smooth and hairless.

Noteworthy Characteristics: Hickories are large, dominant trees native to our forests. They are primarily used for timber but also produce edible nuts, however, pignut hickory nuts are very bitter. Many local mammals, including squirrels, raccoons and black bears rely upon hickory nuts for food. In Appalachian forests, the large, dominant hickory trees are being replaced by smaller, less valuable species due to fire suppression.



American Hornbeam (*Carpinus caroliniana*)*

3 26

Identification: Hornbeam can be found as a small tree or large shrub. The bark is smooth, gray, and may appear slightly twisted. The leaves are elliptical with pointed apexes and double-toothed margins.

Noteworthy Characteristics: American hornbeam wood is extremely hard, however, this tree is not commonly harvested due to its small, slow-growing and short-lived nature. In the wild, hornbeam is readily utilized by beavers.

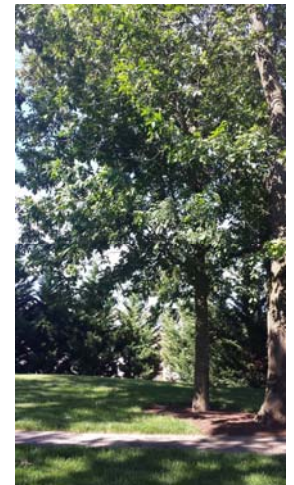


Mockernut Hickory (*Carya tomentosa*)*

4 24

Identification: Leaves are alternate and compound with 7 to 9 leaflets. The leaflets are elliptical with a pointed apex and toothed margins. The undersides of leaves and twigs are densely hairy.

Noteworthy Characteristics: Hickories are large, dominant trees native to our forests. They are primarily used for timber but also produce edible nuts. The mockernut hickory nut is the hardest to crack of all the hickory species, however, it is utilized by many native mammal species. In Appalachian forests, the large, dominant hickory trees are being replaced by smaller, less valuable species due to fire suppression.



Blue Atlas Cedar (*Cedrus atlantica*)

33 28

Identification: An evergreen species with short, stiff needles that arise in tufts of 30-40. The blue atlas cedar is a variety of atlas cedar with needles that appear blue rather than green.

Noteworthy Characteristics: Atlas cedar is a true cedar, unlike our native red cedar which is actually a juniper species. It was brought to the US from northern Africa for use as an ornamental species.



Kentucky Yellowwood (*Cladrastis kentukea*)

32 4 29

Identification: Compound, alternate leaves. Leaflets may be arranged opposite or alternate and are usually in sets of 7-9. The terminal leaflet is ovate while the other leaflets are more elliptic in shape. Bark is smooth and gray with distinctive white horizontal stripes near the base in older trees.

Noteworthy Characteristics: Kentucky yellowwood has a limited natural range in the southeastern US



but is often planted as an ornamental because of its dense leaf canopy and its unique bark and flowers. The name yellowwood comes from the yellow dye contained in the wood.



Eastern Redbud (*Cercis canadensis*)*

21 11 6

Identification: Leaves are simple and alternate and have a distinctive heart shape. Typically a small, short-lived tree. Flowers are pink/purple and bloom directly off the branches. Bark becomes rough and progressively more lumpy with age.

Noteworthy Characteristics: Eastern redbud is a native understory species to our forests. It is often one of the first trees to bloom in the spring and has noteworthy flowers. It is commonly planted as an ornamental in urban areas.



Kousa Dogwood (*Cornus kousa*)

18 21 10

Identification: Leaves are simple and oppositely arranged. Secondary veins run from the midvein to the apex of the leaf in a curve. Margins are slightly wavy but entire. A very small tree, often shrub like. White flowers have pointed petal tips.

Noteworthy Characteristics: Kousa dogwood is a non-native species often planted as an ornamental for its showy flowers. Its bark is also distinctive, with a patchy pattern of tan and brown due to exfoliation.



Leyland Cypress (*Cupressus x leylandii*)

6 22

Identification: Evergreen species that closely resembles the northern white cedar, however, the bark is a dark brown. The scale-like needles are soft and may appear twice compound on some branches.

Noteworthy Characteristics: The Leyland cypress is a hybrid cross of the Monterey cypress and the nootka false cypress that was bred to have a dense needle structure and be cold tolerant. It is most commonly planted as an ornamental.



Green Ash (*Fraxinus pennsylvanica*)*

44 7 32

Identification: Can be difficult to distinguish from white ash. Both species have opposite, compound leaves with 7 leaflets. The leaflets are elliptic with a pointed apex. Green ash leaflets are bright green above and paler green below, whereas white ash is pale white below. Samaras of green ash are much more narrow than those of white ash.

Noteworthy Characteristics: All native ash species are valued for its timber and natural habitat provided to native species. All ash species are also severely threatened by the emerald ash borer which was accidentally introduced into the US in 2002. The ash borer is very difficult to kill. Once an ash tree is infested it will die within 3-5 years.



American Beech (*Fagus grandifolia*)*

14 14

Identification: Light gray and smooth bark. Leaves are dark green and elliptic in shape with pointed apices. The side veins branching off the midvein are parallel and end at the margin with a sharp tooth.

Noteworthy Characteristics: American beech trees are notable for its smooth gray bark and spreading crown. They are capable of producing large crops of nuts that are important to many bird and small mammal species. In the Northeastern US, many beech trees are threatened by beech bark disease.

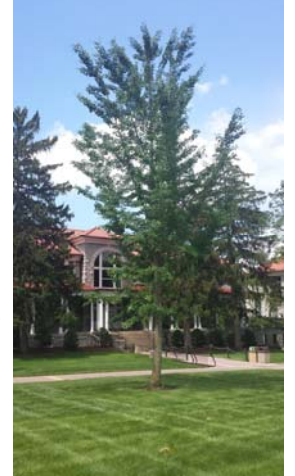


Ginkgo (*Ginkgo biloba*)

29 33

Identification: Ginkgo are small trees that are easily identified by its unique fan-shape leaves. Margins tend to be wavy.

Noteworthy Characteristics: Ginkgo is considered a deciduous conifer and is the most primitive woody tree. It is the only living member of a family of plants that existed 150 million years ago and is extinct in the wild. It was brought to the US as an ornamental species because of its ancient heritage and unique characteristics. Ginkgo is dioecious meaning there are separate male and female trees. Typically, only male trees are planted because female trees produce a foul-smelling seed. In addition, touching the seeds can cause a skin reaction similar to poison ivy.



Honey Locust (*Gleditsia triacanthos*)*

17 11

Identification: Leaves are **alternate** and may be **once compound** or often **twice compound** with 8-15 pairs of **elliptic leaflets**. Produces seeds in large **legume pods** that are dark brown and twisted. Bark is very rough and contains large **thorns**. Some varieties of honey locust have been bred to not have **thorns**.

Noteworthy Characteristics: Honey locust is valued for its rapid growth and overall hardiness, making it

an ideal candidate for reclaimed mining lands. It is somewhat valued as a timber species. The large seed pods provide a high-protein meal for many mammal and bird species.



Black Walnut (*Juglens nigra*)*

25 2

Identification: Leaves are **alternate** and **compound** with 15-19 leaflets. Leaflets are **lance-shaped** with **finely toothed margins** and a **pointed apex**.

Terminal leaflet is often absent. Produces a large, spherical, light green fruit that contains the walnut.

Noteworthy Characteristics: Black walnuts are an important food source for many native species and is also harvested for commercial sale. The wood is very valuable for furniture. Interestingly, black walnut trees produce a toxin that prevents other plants and trees from growing nearby.



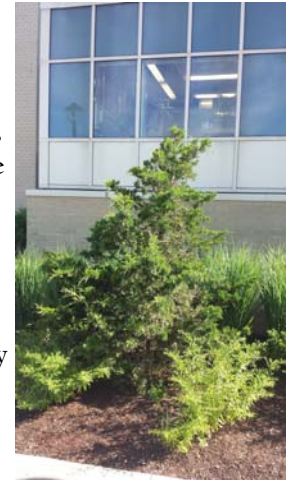
Eastern Red Cedar (*Juniperus virginiana*)*

8 17

Identification: A small to medium tree with **peeling, brown bark**. Evergreen foliage is **scale-like to needle-like** and **prickly to the touch**. The cone resembles a **blueberry**.

Noteworthy Characteristics: Red cedar is very hardy and well-adapted to poor growing conditions as long as there is ample sunlight. It is often a primary successional species in abandoned farmland. Once

established, red cedar improves soil conditions allowing for native, secondary successional species to grow. Red cedar is primarily utilized as an ornamental species but it is also valued for its fragrant wood. The berry-like cones are edible and are an essential food source for many birds and small mammals.



Golden Rain Tree (*Koelreuteria paniculata*)

43 17

Identification: Typically a small tree. Leaves are **alternate** and **compound** with 7-15 leaflets. Leaflets are **coarsely toothed** and individual leaflets may be **unique**.

Noteworthy Characteristics: Golden rain tree was introduced to the US as an ornamental species for its showy flowers, seed pods and leaves. The name comes from falling yellow flower blossoms which resembles a golden rain.



Sweetgum (*Liquidambar styraciflua*)

22 5

Identification: Leaves are simple and alternate and have a unique star shape. Margins are finely toothed and apex are pointed. Fruits are brown, spherical and spikey. Branches often have corky growths.

Noteworthy Characteristics: Sweetgum trees produce an aromatic gum that has been used in chewing gum, incense, perfumes and flavorings.

Sweetgum has also been harvested for timber.



Southern Magnolia (*Magnolia grandiflora*)

13 19 13

Identification: Medium to large evergreen tree with simple and alternate large, elliptic leaves. The leaves feel thick and leathery. Shiny and dark green above and yellow/brown below. Produces large white flowers that are lemon citronella-scented.

Noteworthy Characteristics: Southern magnolia is native to the southeastern US, but has been cultivated in more northerly states as an ornamental species due to its fragrant flowers.



Tulip Poplar (*Liriodendron tulipifera*)*

9 15 34

Identification: Leaves are simple and alternate and have a unique shape with four triangular lobes. Shiny and green above, pale below. Margins are entire. Produces a yellow to green tulip-shaped flower.

Noteworthy Characteristics: Tulip poplars are rapidly growing trees with some value as a timber species due to its straight wood. The fruits provide food for squirrels and deer.



Crabapple (*Malus* spp.)

40 13 20

Identification: Crabapple trees are distinguishable by its gray scaly and flaky bark. Leaves are simple and alternate with a generally elliptic shape and toothed margins. They may or may not have lobes. Their fruit is much smaller than a grocery store apple.

Noteworthy Characteristics: There are two native varieties of crabapple - southern crabapple (*Malus angustifolia*) and sweet crabapple (*Malus coronaria*) - both of which produce edible fruits.

However, there are also over 800 cultivated species of crabapple. These species are bred for their flowers and individual species are only distinguishable by these flowers. Some varieties seen on campus have purple or red leaves.



Norway Spruce (*Picea abies*)

24 3

Identification: Large evergreen species with dark green, stiff and sharply pointed needles. Branchlets often drape from main branch giving the tree a “weeping” appearance. Cones are longer than wide, light brown and pendulous.

Noteworthy Characteristics: Norway spruce is typically used ornamentally as privacy hedges and windbreaks in large open spaces because of its rapid growth. It also attracts many bird species.



Austrian Pine (*Pinus nigra*)

16 12

Identification: Needles are 4-7 inches long, very thick, dark green and two per fascicle. Very similar to red pine, however, Austrian pine needles will flex when bent rather than break.

Noteworthy Characteristics: Austrian pine was introduced to the US as an ornamental evergreen species. In our area, Austrian pine is particularly susceptible to a fungal disease, diploidia tip blight, which disfigures the trees.



Eastern White Pine (*Pinus strobus*)*

41 19

Identification: Large evergreen species with soft, green needles. Generally has five needles per fascicle. Very tall trees that are unlikely to have low branches.

Noteworthy Characteristics: Eastern white pine is a valuable timber species because of its light weight and straight wood. White pine is intolerant to air pollution and is susceptible to white pine blister rust which is often fatal.



Loblolly Pine (*Pinus taeda*)

36 9 25

Identification: Needles are relatively long, 6-9 inches, and are usually three per fascicle. Cones have short, sharp prickles.

Noteworthy Characteristics: In its native range (Southeastern US), loblolly pines are often found in swamps. It has straight wood which is valued for pulp and plywood.



Virginia Pine (*Pinus virginiana*)*

2 28

Identification: Short needles that are twisted and appear in two per fascicle. It is generally a small evergreen and often appears shrub-like.

Noteworthy Characteristics: Virginia pine has played a crucial role on reclaimed, mountain-top removal sites due to its fast growth. This species is valued for its wood, even though it does not grow to be very large. Often used as a Christmas tree.



Cherry (*Prunus* spp.)

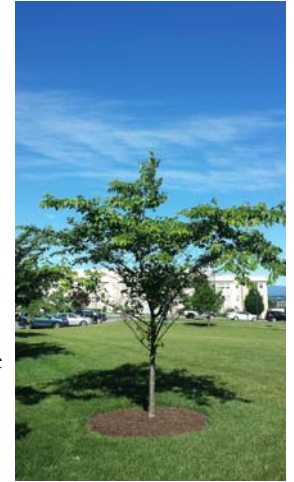
20 12 7

Identification: Cherry trees are distinguishable by their smooth brown bark with horizontal scars. Leaves are generally elliptic with toothed margins. All cherry trees have visible glands at the bottom of the leaves.

Noteworthy Characteristics: Black cherry (*Prunus serotina*) and chokecherry (*Prunus virginiana*) are native to our area and can be found in natural forests. They



are a valuable food source for native animal species. However, on campus, most of the cherry trees are cultivated species for ornamental uses due to their fragrant and showy flowers. There are hundreds of species of these ornamental cherry trees that can only be distinguished by their flowers. Often these cherries are bred to not produce fruit.



Sycamore (*Platanus occidentalis*)*

15 18 13

Identification: Leaves are simple and alternate. Very large and wide leaves with 3-5 lobes that look similar to a maple. Bark flakes off in irregular masses, leaving greenish-white, gray and brown patches. Fruits are spherical and fuzzy.

Noteworthy Characteristics: The sycamore is a large and fast-growing native tree species. Its multi-colored flaking bark is noteworthy. It is commonly found in riparian areas and is important in maintaining streams banks. Can be a valuable timber species.



Sawtooth Oak (*Quercus acutissima*)

48 2

Identification: Leaves are alternate and simple, lance-shaped with bristle-tipped teeth. Often mistaken for a chestnut, however, like all oaks, the sawtooth oak produces acorns.

Noteworthy Characteristics: The sawtooth oak is native to Asia and was introduced to the eastern US around 1920. It has the potential to become weedy or invasive, and may outcompete and displace native species. Native mammals are able to utilize the acorns as food.



White Oak (*Quercus alba*)*

46 5 9

Identification: Leaves are **alternate** and **simple** with 7-9 rounded lobes. Green above and whitish below, however, not as white as swamp white oak. Bark is whitish or light gray

Noteworthy Characteristics: White oaks are large and stately trees. They grow in many soil types, but do best on coarse, moist, well-drained soils. Acorns are eaten by many animal species; wood is strong and



durable for lumber, flooring, and interior woodwork. Some white oaks on campus appear to be infected with wool sower galls which look like toasted marshmallows and contain developing wasps.

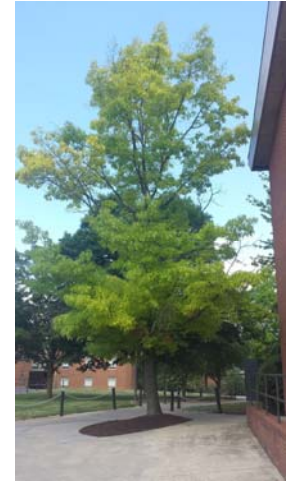


Scarlet Oak (*Quercus coccinea*)*

12 16

Identification: Leaves are **alternate** and **simple**. Typically 7 lobes ending in bristle tips. Sinuses are deeper than those of the northern red oak. Leaves turn a brilliant scarlet color in the Fall.

Noteworthy Characteristics: Scarlet oaks are most known for their red autumn color. It grows in a variety of soils, including sandy soils. A few scarlet oak trees on campus appear to have chlorosis (yellowing of the leaves).



Swamp White Oak (*Quercus bicolor*)*

10 10

Identification: Leaves are **alternate** and **simple**. They are **obovate** with 5-10 shallow lobes that appear wavy. Dark green above and pale whitish green below.

Noteworthy Characteristics: Swamp oaks tend to be more tolerant of dry, poorly drained soils than other oaks. Acorns are eaten by many animal species; wood is strong and durable, like the white oak.



Pin Oak (*Quercus palustris*)*

39 30 21

Identification: Leaves are **alternate** and **simple**. Typically have 5 to 7 lobes with deep sinuses and bristle tips. Resembles scarlet oak, but pin oak lobes point straight out rather than slightly forward. Pin oak trees are generally larger than scarlet oak, however, the leaves are generally smaller.

Noteworthy Characteristics: Pin oaks are commonly planted in urban landscapes. Acorns are eaten by many animal species; wood tends to warp but is used for fuelwood and wood pulp. Pin oaks tend to be vulnerable to chlorosis (yellowing of the leaves), among other insect pests and diseases.



Willow Oak (*Quercus phellos*)*

23 16 4

Identification: Leaves are **alternate** and **simple**. They resemble willow leaves with an **elliptic shape** and **bristle tips**. Light green above and pale green below.

Noteworthy Characteristics: Willow oaks do well in moist, well-drained soils. Annual acorn production is high which provides food for many native animal species. It is also a source of lumber and wood pulp.



Willow oak's primary enemy is fire, as seedlings and saplings are killed by even light burns.



Black Oak (*Quercus velutina*)*

37 25 24

Identification: Leaves are **alternate** and **simple** with 5-9 lobes ending in **bristle tips**. Black oak leaves are wider than red oak with shallow **sinuses**. They are also thicker, almost leather-like, and tend to be asymmetrical.

Noteworthy Characteristics: Black oaks are medium- to large-sized trees. They provide a good crop of acorns for native animals, and the wood is commercially used for furniture and flooring.



Northern Red Oak (*Quercus rubra*)*

26 27 1

Identification: Leaves are **alternate** and **simple** with 7-11 lobes ending in **bristle tips**. The leaves are symmetrical across the **midvein**. **Sinuses** are deeper than the black oak, but shallower than the scarlet oak.

Noteworthy Characteristics: Northern red oaks are important sources of hardwood lumber. They provide habitat and food for wildlife, and are commonly planted as a landscape tree in urban areas due to their rapid growth, tolerance of dry and acidic soils, and ability to be transplanted easily.

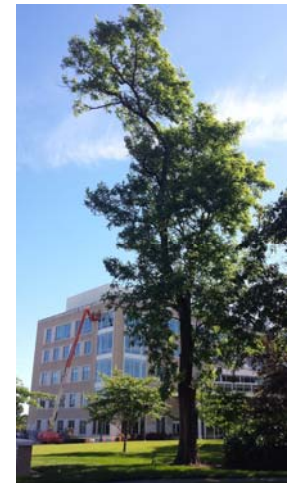


Black Locust (*Robinia pseudoacacia*)*

5 23

Identification: Leaves are **alternate** and **compound** with 7-19 **elliptic leaflets**. Produces seeds in **legume pods** that are dark brown and flattened. Bark is very rough with many ridges and deep furrows. Wild black locust have **spines** but many nursery varieties are spineless.

Noteworthy Characteristics: Black locust is native to a relatively small range of the US, however, it has spread and is considered invasive in many areas. It readily colonizes abandoned fields and disturbed sites with poor soil nutrition. This tolerance and its rapid growth rate make black locust an ideal candidate to repopulate mountain-top removal mines.



Weeping Willow (*Salix babylonica*)

35 26

Identification: Alternate and simple leaves. Leaves are long and lance-shaped with smooth or finely toothed margins.

Noteworthy Characteristics: Weeping willows are hybrids of white willows and crack willows that were bred for their unique weeping appearance and then introduced into the US. These trees provide habitat for native birds and small mammals,



however, it is primarily planted for ornamental value. It thrives on freshwater banks.



Japanese Pagoda Tree (*Styphnolobium japonicum*)

34 27

Identification: Leaves are alternate and compound with 7-17 leaflets. Can be confused with native locust trees, however, the leaflets are much larger. Also, the bark is not blocky like locust trees. In Spring, it has large clusters of whitish flowers on the ends of branches.

Noteworthy Characteristics: Japanese pagoda tree is native to China and Korea, not Japan. It was brought to the US as an ornamental species because of its fragrant flowers.



Bald Cypress (*Taxodium distichum*)

7 20

Identification: Bald cypress is a deciduous conifer that drops its needles every fall. The needles are light yellow-green and soft. Cones are brown and do not resemble traditional cones.

Noteworthy Characteristics: While not native to our area, the bald cypress is very important in the southeastern states of the US. Its native habitat includes swamps and wetlands where it plays a role



in flood and erosion control. Its rot-resistant wood makes it a valuable timber species. It is slow-growing and long-lived, with trees on record of over 1000 years old and 17 feet in diameter!



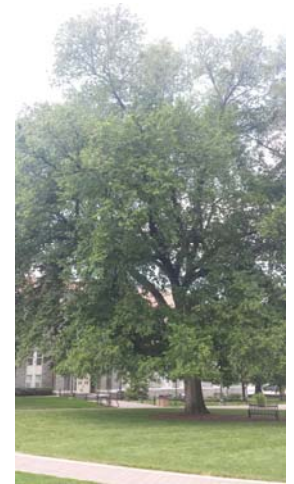
American Elm (*Ulmus americana*)*

28 35

Identification: Leaves are simple and alternate. They are elliptic with coarsely double-toothed margins and abruptly pointed apices. American elm has relatively smooth leaves compared to the other native and similar elm—the slippery elm. Leaf base is typically asymmetrical. The bark is dark gray and has many ridges.

Noteworthy Characteristics: Native elm trees are very large and once dominated our landscape. They provided food and shelter for many native animal species.

The wood is valuable for timber. American elms are susceptible to Dutch elm disease, which is a fungal pathogen spread by bark beetles. It was accidentally brought to the US around 1930 and has since decimated natural elm populations.



Siberian Elm (*Ulmus pumila*)

27 36

Identification: Leaves are **simple** and **alternate**. They are **elliptic** and **toothed**. Siberian elm leaves are much smaller than the native American and slippery elms. They also have nearly **symmetrical leaf bases**.

Noteworthy Characteristics: Siberian elm is an introduced, fast-growing tree. It is a hardy species and has become weedy or invasive in some regions. Unlike our native elms, Siberian elm is resistant to



Dutch elm disease. There have been several attempts to hybridize American and slippery elm with Siberian elm to breed for disease resistance. So far, the hybrids have not been successful.



Hillside



The east campus hillside is an environmental stewardship project to transform traditional campus lawn space into a natural meadow. This meadow serves many purposes including prevention of hillside erosion, reduction in pollutant runoff into the campus stream, and enhancement of native biodiversity.

Twenty-five tree species were selected to accompany the meadow including bitternut hickory, shagbark hickory, witch hazel, yellow birch, blackjack oak, Carolina ash, buckeye, eastern hemlock, hophornbeam, horse chestnut, and persimmon which are not found anywhere else on campus. Research on the hillside is incorporated into a number of course offerings at JMU.



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