Forest Stewardship Field Day:

Forest Plant Identification

October 6, 2016; 9:00 am – 3:00 pm, ET
Morningside Nature Center
3540 East University Avenue, Gainesville, FL 32641

Today you will learn some strategies to help you identify trees, shrubs and herbaceous species. We will cover some basic skills and put them to work in woods, identifying a sample of sandhill, flatwoods and swamp species in the field. You will also learn about how some of these plants are used by wildlife and/or the role they play within the larger plant community and habitat.

Agenda:

9:00 am	**Sign-in, meet and greet** at Morningside Nature Center, picnic area pavilion
9:15	**Welcome and Introduction: Plant ID Primer**, *Chris Demers, Dr. Michael Andreu, UF/IFAS School of Forest Resources and Conservation (SFRC) and Geoff Parks, City of Gainesville, Nature Operations*
10:00	**Forest Plant ID Hike in the Field**, *Geoff Parks and Dr. Michael Andreu*
12:00 pm	**Lunch**
1:00	**Forest Plant ID Hike in the Field**, *Geoff Parks and Dr. Michael Andreu*
3:00	Wrap up, Evaluations

Funding for Florida's Forest Stewardship Program is provided by the USDA Forest Service through the Florida Department of Agriculture and Consumer Services Florida Forest Service and the Florida Sustainable Forestry Initiative Implementation Committee.

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Questions about this or other Forest Stewardship Program activities can be directed to Chris Demers at (352) 846-2375, cdemers@ufl.edu. More information and events at:

http://www.sfrc.ufl.edu/forest_stewardship

Got Invasives?

Invasive exotic plant problem? Find a program to help by using FloridaInvasives.org.

The Florida Invasive Species Partnership has collected, evaluated and categorized assistance programs into a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners to prevent or control invasive exotic species problems. FloridaInvasives.org has an online resource of management assistance programs to help in your fight against problematic plant species. This resource takes the guesswork out of finding the agencies or organizations offering assistance and will direct you to available programs. The Landowner's Incentives Database will also provide the requirements for each program, to help you decide if they are a good match for your needs.

Why was FloridaInvasives.org developed?

Invasive species have been identified as being costly ecologically and economically statewide in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of public and private entities in Florida, formed to link efforts at preventing and controlling invasive exotic plants across agency and property boundaries. FISP has developed an on-line tool of available financial and technical assistance sources to make it easier for landowners and land managers to find them.

How does FloridaInvasives.org help you?

FISP has created a searchable database, the Florida landowner incentives database, accessible at FloridaInvasives.org that allows you to find an assistance program for your needs. Search by your county, target species or other pertinent information into the online tool, and you will retrieve a current list of available programs. Floridainvasives.org will help provide focus to your search so that you can get the right person at the right program.

FloridaInvasives.org:

- Builds community awareness,
- Leverages limited resources through cooperation and
- May reduce individual land management costs.

This resource will be regularly updated with the most current program information to provide you the most up-to-date opportunities.

Go to FloridaInvasives.org to find out more.

Species Shown from top to bottom:
Mexican Petunia, Boston Fern, Mimosa, Cogongrass, Camphor

FISP
Florida Invasive Species Partnership

Think Locally, Act Neighborly

invasive species know no boundaries!

Florida's Forest Stewardship Program

Forest Stewardship is active management of forests and related resources to keep these lands in a productive and healthy condition for present and future generations, and to increase the economic, environmental and social benefits of these lands. Forest Stewards are landowners who manage their forestlands on a long-term basis by following a multiple resource management plan.

The Forest Stewardship Program addresses the improvement and maintenance of timber, wildlife, soil and water, recreation, aesthetics, as well as forage resources.

Eligibility

Private forest landowners with at least 20 acres of forest land and have a desire to manage their ownerships according to Stewardship principles can participate in the Forest Stewardship Program. Also, adjacent landowners, with similar management objectives, may combine their holdings to meet this acreage limitation.

Benefits to Landowners

- A customized management plan that is based on the landowner's objectives. The plan will include forest stand characteristics, property maps, management recommendations, and a five-year time line for future planning. This plan also serves as documentation of active management on the property that may help reduce tax liability.
- An opportunity for future public recognition as a certified "Forest Steward".
- Educational workshops, tours and a quarterly Stewardship newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service.

Getting into the Program

Contact your local Florida Forest Service County Forester and tell them that you would like to have a Forest Stewardship Plan prepared for your property. More information and application here:

http://FreshFromFlorida.com/ForestStewardship

Tree Farm Program

The American Tree Farm System® is a program of the American Forest Foundation and was founded in 1941 to promote the sustainable management of forests through education and outreach to family forest landowners. Nearly 26 million acres of privately owned forestland and 80,000 family forest landowners in 46 states are enrolled in this program and committed to excellence in forest stewardship. About half of all Tree Farms are located in the South.

Eligibility

Private forest landowners with at least 10 acres of forest land and have a desire to manage their ownerships according to sustainable forestry guidelines can participate in Tree Farm.

Benefits to Landowners

Tree Farmers are good stewards of their forestland committed to protecting watersheds and wildlife habitat and conserving soil. They manage their forestland for various reasons, including timber production, wildlife, recreation, aesthetics, and education/outreach. Tree Farmers receive many benefits:

- Representation on local, state, and federal issues affecting forestland owners.
- Exposure to a network of forestry professionals and landowners committed to sustainable forestry.
- Access to seminars, field days, and workshops to help manage their Tree Farm even better.
- Certification that meets international standards of sustainable forest management.
- Participation in local, state, regional, and national Outstanding Tree Farmer of the Year awards and recognition.

Getting into the Program

Contact your local Florida Forest Service County Forester and tell them that you would like to join the Tree Farm program. More information here:

https://www.treefarmsystem.org/florida

UF IFAS Extension UNIVERSITY of FLORIDA

FOR234

How to Identify a Tree[1]

Michael G. Andreu, Erin M. Givens, and Melissa H. Friedman[2]

Introduction

Trees benefit people economically, socially, and ecologically. They provide shade on hot days, the paper and wood products that we use every day, and food and clean water for wildlife and humans alike. Trees also make up a large portion of the foliage in our yards and landscapes, creating a beautiful mosaic of colors, shapes, and sizes.

There are many reasons people want to learn how to identify trees. You might be a naturalist who would like to know what tree species comprise a nearby natural area, a vacationer interested in identifying a beautiful tree you saw along a trail, or an aspiring dendrologist (a scientist who specializes in tree identification). Whoever you are and whatever your level of experience, if you're interested in identifying a tree, this publication will help.

Tree identification may seem daunting, especially when you find yourself confronted with a forest full of trees you don't recognize. In fact, it is actually a logical and easily learnable process. It starts with gathering a set of clues. These clues can then be used to make an informed decision about the tree you are attempting to identify. The more clues you have, the more likely you will be able to reach the best conclusion about the tree you are trying to name. Like a detective, to be successful at tree identification, you will need to sharpen your observational skills. As with most newly acquired skills, it may seem overwhelming at first, but with practice you will begin to find that it is simply a matter of paying attention to a few details about the tree and the environment in which it is found.

This publication is designed to guide you through the process of identifying a tree.

Identifying Characteristics

When you approach a tree with the intention of accurately identifying it, it is best to focus on the following set of characteristics:

- Range
- Habitat
- Bark
- Leaves
- Twigs
- Flowers
- Fruits and Seeds

Think of this list as a set of filters that will reduce the number of potential species a particular tree might be. As you observe each characteristic you will be able to filter or eliminate trees that do not possess the same characteristic. This will allow you to narrow your list of potential trees and ultimately determine the tree species of interest. Remember, in most cases you will need to use more than one characteristic to properly identify a tree. For additional information about each tree characteristic, a list of references has been provided at the end of this document.

1. This document is FOR234, one of a series of the School of Forest Resources and Conservation Department, UF/IFAS Extension. Original publication date April 2010. Revised October 2013. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Michael G. Andreu, assistant professor and Extension specialist of forest systems, School of Forest Resources and Conservation, Gulf Coast Research and Education Center, Plant City, FL; Erin M. Givens, research assistant; and Melissa H. Friedman, biological scientist, School of Forest Resources and Conservation, Gulf Coast Research and Education Center, Wimauma, FL 33598; UF/IFAS Extension, Gainesville, FL 32611.

Range

The first characteristic to consider is where the tree is located geographically. Each tree species is generally restricted to a particular geographical area where conditions are suitable for its growth and reproduction. Determining the natural range and potential locations of where a tree might occur can be helpful for eliminating and reducing the number of species it is likely to be. For example, if you are in the Florida panhandle, it is not likely that you're going to see an aspen tree (*Populus* sp.), since the range of the aspen is primarily limited to the western portion of the United States. Maps or descriptions of a tree species natural range can be found in most field guides.

Habitat

The next clue or characteristic to use when attempting to identify a tree in a forest or natural area is to observe the type of habitat the tree is growing in. Different trees compete well in different growing conditions. For example, bald cypress (*Taxodium distichum*) is typically found in wet sites such as floodplain forests or swamps (Figure 1A). This is because it is better suited than other species to occupy areas where there is standing water for extended periods of time. In contrast, other trees such as sand live oak (*Quercus geminata*) do not deal with standing water well and you will not find them on such sites. Similarly, sand pine (*Pinus clausa*) grows on dry sites and more specifically in habitats known as scrub (Figure 1B) that typically have well-drained, sandy soils. Therefore, the physical and environmental conditions not only help you determine what type of tree you are looking at, but also what type of habitat you are in. However, there are species that can grow within a wide range of physical and environmental conditions, and consequently can be found in a variety of habitats. For example, red maple (*Acer rubrum*) can commonly be found growing in wet swampy areas and woodlands, but can also occur on drier sites such as upland slopes. Other factors

Figure 1. Cypress trees in a floodplain swamp (A) and sand pine in scrub habitat (B).
Credits: A: Melissa H. Friedman, B: Michael G. Andreu

such as how often the site burns or is affected by storms can also influence the species composition on a particular site. Determining what type of habitat you are in will help narrow down your list of potential tree species.

Some of the more common habitats in Florida are bottomlands, flatwoods, hammocks, marsh, scrub, sandhill, and swamp. The suite of tree and plant species that are commonly found in a given habitat are called plant communities. In Florida, eighty-one native plant communities have been described by the Florida Natural Areas Inventory (FNAI) non-profit organization.

Caution: These habitat characteristics are helpful in identifying trees that grow in natural settings such as parks or natural areas that have minimal human disturbance. Habitat characteristics are not as helpful in urban environments, as trees are often planted in spots where they would not naturally occur. However, older remnant trees (native and existing prior to development) are often good indicators of what type of habitat existed before development.

Bark

Although this may sound odd, one of the first tree characteristics you'll want to examine is the bark. This is because the bark of a tree is readily observable and almost always accessible. Leaves, on the other hand, can be 30 feet above your head and difficult to view or even absent, especially during the winter months.

When observing a tree's bark, focus on such features as its texture, color, and the presence of lenticels (or pores). Tree bark may be smooth (Figure 2A), furrowed (Figure 2B), flaky (Figure 2C), or warty (Figure 2D). Furrowed bark has cracks and fissures, flaky bark tends to peel or flake off easily into thin layers, and warty bark has small nodules that look like warts. People typically think of bark as brown, but it comes in many colors. Depending on where you go and how closely you look, you may see trees with bark in many shades of white, gray, brown, red, purple, green, and yellow. Some trees contain several colors of bark all at once. For example, sycamore (*Platanus* sp.) bark often has a tan exterior and flakes off to reveal a lighter colored interior bark (Figure 2C). It is this mottled pattern that distinguishes sycamores from most other trees and thus one can usually identify this tree from a distance by simply looking at the bark. In some cases the tree bark will have a readily identifiable texture or pattern from the lenticels (Figure 2E), which can be vertical, horizontal, or spot-like. The presence of lenticels can help you in the identification process by allowing you to filter out the trees that do not have them. For

example, black cherry (*Prunus serotina*) trees have distinct lenticels (Figure 2E), while oaks (*Quercus* spp.) (Figure 2B), maples (*Acer* spp.), and sycamores (Figure 2C) do not.

Figure 2. Some different bark textures include: A) the smooth bark of a beech (*Fagus* sp.) tree, B) vertically furrowed bark of a live oak (*Quercus virginiana*), C) flaky bark of a sycamore tree, D) warty bark of the sugarberry tree (*Celtis laevigata*), and E) lenticels on the bark of a black cherry (*Prunus serotina*) tree.
Credits: A, B, D, and E: Michael G. Andreu, C: Erin M. Givens

It is important to remember that the bark of a tree can change in color and texture with age. For example, the lenticels of a black cherry tree (*Prunus serotina*) look like dots covering the surface of brown bark and twigs when the tree is young (Figure 3A). As this tree matures the lenticels elongate and become horizontal striations (or parallel lines) on the bark's exterior (Figure 3B).

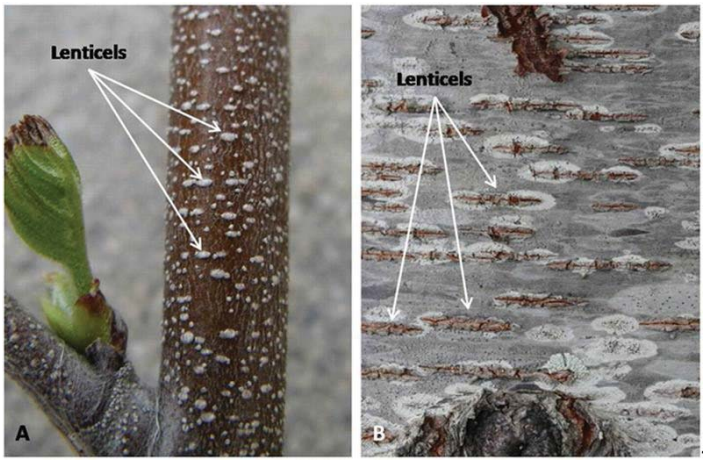

Figure 3. On these black cherry trees you can see lenticels, a distinguishing characteristic for this tree. A) shows young black cherry bark containing dot lenticels, and B) shows an older black cherry bark with horizontal lenticels.
Credits: Walter Givens

Leaves

Leaves can be a determining factor when trying to identify a tree. In fact, there are many trees that can be identified by the leaf alone. Leaves are highly variable ranging from the needlelike leaves you see on pine trees (*Pinus* spp.) (Figure 4A) to the broad leaves of sycamore trees (Figure 4B). Leaf characteristics such as their persistence, structure, complexity, shape, venation, surface, smell, taste, and arrangement on the branch, all help to determine what species a tree is. Take your time when reviewing the diagrams and pictures below, as they will help you learn how to recognize some of these leaf characteristics.

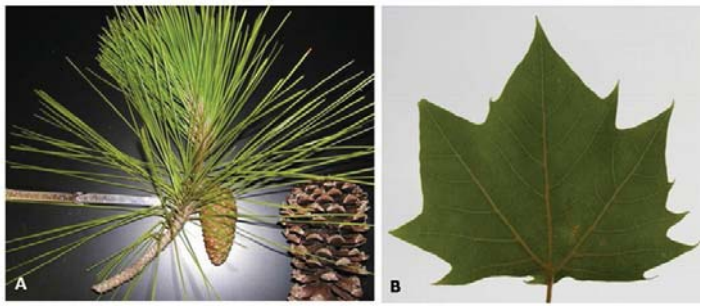

Figure 4. The difference between A) needlelike pine tree leaves, and B) the broad leaf of a sycamore.
Credits: A: Michael G. Andreu, B: Erin M. Givens

Leaf Persistence

Leaf persistence refers to trees that are evergreen and maintain their leaves year-round or deciduous and shed their leaves during cold and/or excessively dry times of the year. While it may be challenging to know whether a tree is evergreen or deciduous during the warmer months of the year, leaf persistence is a useful filter when you're trying to identify a tree. For example, laurel cherry (*Prunus caroliniana*) and black cherry may appear similar, but you can distinguish between the two during the colder months of the year if you know that laurel cherry is evergreen and black cherry is deciduous.

One way to determine leaf persistence is to look at older twig growth (previous seasons) vs. new twig growth (current season). On many plants, you can identify where new growth began by locating the terminal bud scar nearest the end of the twig (Figure 5). All growth between the end of the twig and its nearest terminal bud scar is new growth. If you only see leaves on this portion of the twig, you are probably looking at a deciduous species. This is because deciduous plants shed these leaves after the season is over. When the next season comes around, the plant puts out leaves on new twig growth. However, if you see leaves present (i.e. "persisting") on an older portion of the twig, that plant is an evergreen species.

Figure 5. A terminal bud scar on the deciduous species sweetgum (*Liquidambar styraciflua*) indicates where new twig growth begins each season.
Credits: Lynn Proenza

While you can be fairly certain that species with leaves on older sections of a twig are evergreen, more care must be taken to declare a tree deciduous. This is because the absence of leaves on old growth twigs can also be due to leaves dying or falling off for a variety of reasons other than seasonal shedding. Therefore, it is always a good idea to look at multiple twigs, and multiple specimens, when trying to determine leaf persistence.

Leaf Structure

Leaf structure refers to the parts that make up a leaf. Generally, a leaf has a blade, a petiole, and sometimes stipules (Figure 6). The leaf blade is the expanded portion of the leaf, the petiole is the supporting stalk that connects the leaf blade to the branch, and stipules are small vegetative structures that form at the base of the petiole or on the twig.

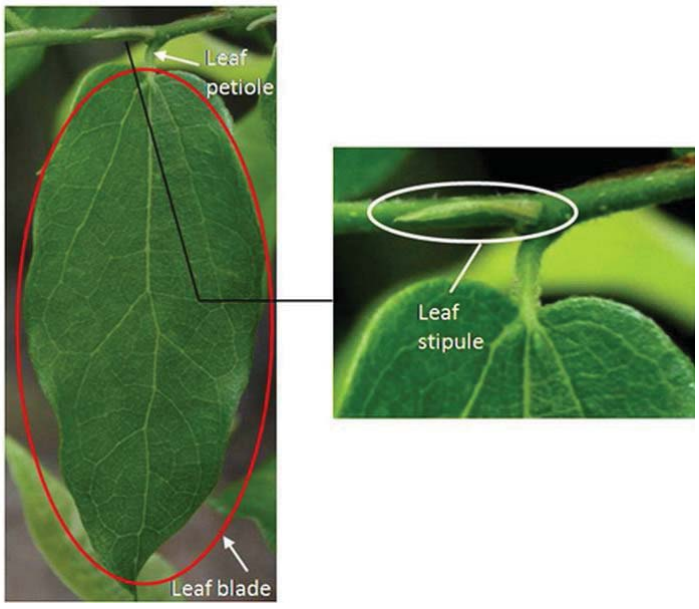

Figure 6. Components of a simple leaf.
Credits: Michael G. Andreu

Some trees have stipules that are persistent and others have stipules that drop off shortly after leaves emerge. In some cases the scar left by the stipule is distinctive and can help identify the tree. For example, tree species in the Magnolia family (Magnoliaceae) have a stipule scar completely surrounding the twig (Figure 7). Knowing this can help to distinguish between a sweetbay magnolia (*Magnolia virginiana*) and a swamp bay (*Persea palustris*), both of which can look similar and grow on similar sites. Learning which trees do and do not have these leaf parts can be helpful for identifying trees.

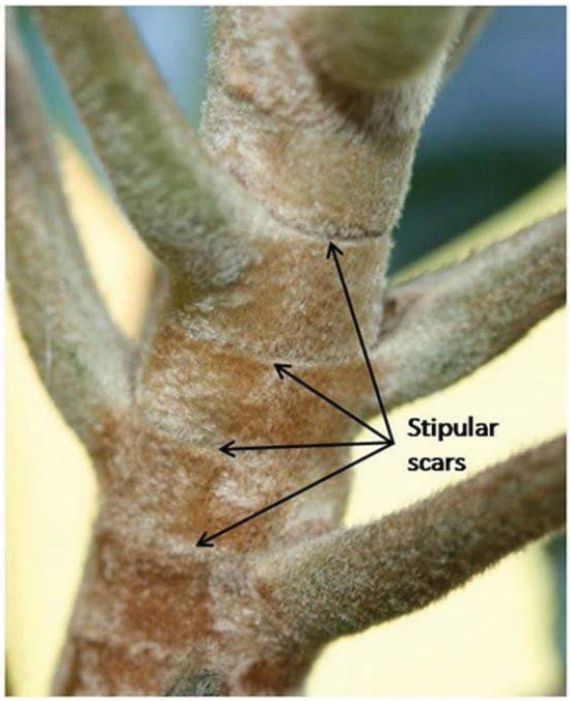

Figure 7. Stipular scars encircling a magnolia twig.
Credits: Walter Givens

Leaf Complexity

Leaf complexity refers to whether the leaf is simple or compound. If a leaf has a single blade, it is simple (Figure 6); usually you can see a bud where the leaf meets the stem or branch. If the leaf has multiple blades attached to a common stalk or petiole, then it is compound and the individual blades are called leaflets. Compound leaves can be pinnately, bi-pinnately, trifoliolately, or palmately compound (Figure 8). You can determine if a leaf is simple or compound by looking for a bud at the base of the leaf. If you cannot find a bud below a leaf, you may be looking at a leaflet which is part of a compound leaf. Leaf complexity is a great filter because most tree species have simple leaves. If your tree has compound leaves, then you can eliminate

a large number of tree species that have simple leaves and consequently get closer to determining which species you're observing.

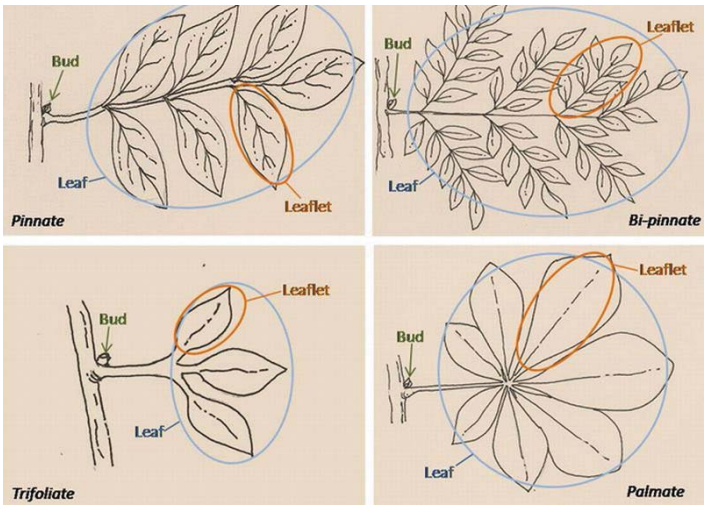

Figure 8. Compound leaf types.
Credits: Line drawings by Becky Brown

Leaf Arrangement

Leaves can be arranged along a twig in one of three ways: alternate, opposite, or whorled. Alternate arrangement is when one leaf is attached at each node and the leaves emerge in an alternating pattern on the twig (Figure 9A). Opposite arrangement is when leaves emerge paired on each side of the twig (Figure 9B). Whorled arrangement is when more than two leaves are found at the same node (Figure 9C). Leaf arrangement is another great filter because while many trees species have an alternate leaf arrangement, fewer species exhibit opposite or whorled leaf arrangement. Therefore, you can narrow your list of potential trees when you see a particular type of leaf arrangement. Examples of trees with opposite leaf arrangements include the various species of maple (*Acer* spp.) and ash (*Fraxinus* spp.).

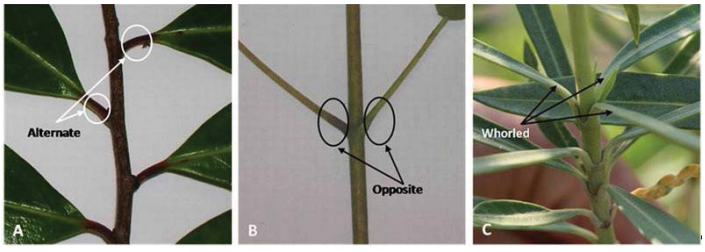

Figure 9. The three main types of leaf arrangement are: A) alternate leaf arrangement, B) opposite leaf arrangement, and C) whorled leaf arrangement.
Credits: A and B: Mary E. Thornhill, C: Walter Givens

Leaf Shape

The overall shape of the leaf or leaflet blade can often help you to identify the tree. Botanists have developed names and descriptions for all of the leaf shapes in nature. For example, a long, slender pine needle is described as acicular (Figure 4A and Figure 10). Additional common leaf shapes are: deltate, elliptical, lanceolate, linear, obovate, and reniform (Figure 10).

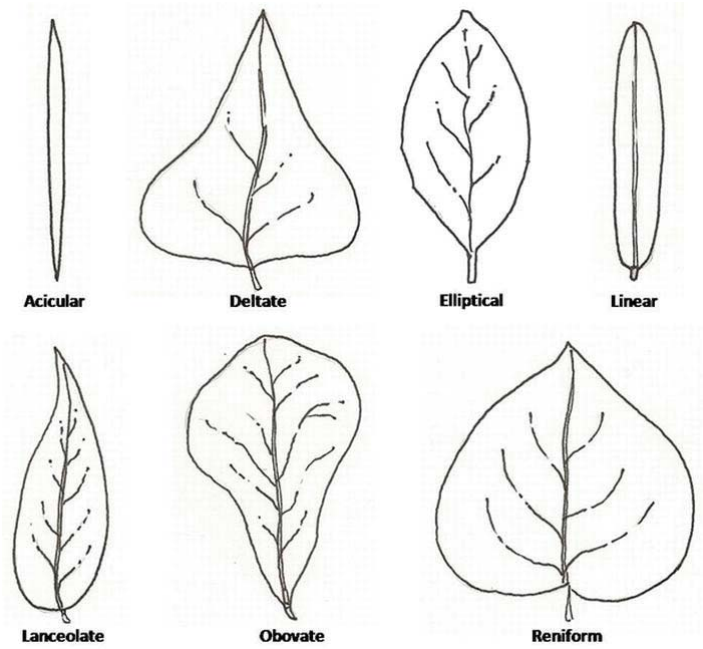

Figure 10. Seven different leaf shapes.
Credits: Line drawings by Becky Brown

Leaf size and shape may vary due to environmental conditions or due to a tree's physical growth habits. For example, if a tree is shaded by other trees growing near it, the leaves found near the top of the shaded tree may be very different from those found near the base of the same tree. In the shaded areas, larger leaves maximize the amount of surface area exposed to sunlight. Leaves that are exposed to full sunlight and wind (usually near the top of the tree) are usually smaller. One might think that the shapes of leaves for a given tree species would be constant but in fact the leaves of some tree species can vary considerably (Figure 11). This natural variation can be confusing and frustrating for beginners, but it is also fascinating when you begin to speculate why the variation occurred. The key is to use *all* of the tree's characteristics rather than focusing on one particular trait to determine what kind of tree it is.

In addition to naming and describing leaf shapes, botanists have also classified the many different types of leaf margins (Figure 12A), leaf tips or apices (Figure 12B), and leaf bases (Figure 12C). Figure 12 illustrates these three characteristics on an eastern redbud (*Cercis canadensis*) leaf. The

Figure 11. A water oak (*Quercus nigra*) tree showing variability in its leaf shapes with its most characteristic one in the upper right corner.
Credits: Michael G. Andreu

leaf margin or edge of this redbud leaf is smooth (with no serrations or dentations) and is called *entire*. This leaf also has a *short-acuminate* apex and its base is *cordate* or heart shaped.

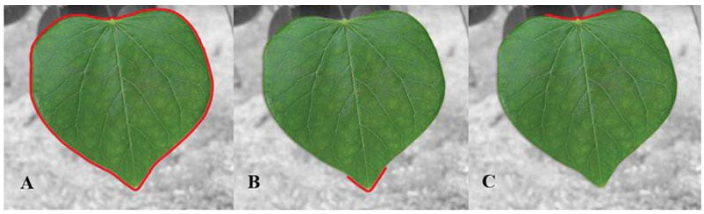

Figure 12. Components of a leaf consist of the margin (A), apex (B), and base (C).
Credits: Walter Givens

Leaf Venation

Leaf venation refers to the branching pattern of the leaf's veins. Two common types of leaf venation are pinnate (having veins emerging on either side of the mid-vein) and palmate (primary veins emerging from a single point like fingers from the palm of a hand) (Figure 13). While venation may seem like a subtle characteristic to observe for identification purposes, it can be a very distinct characteristic for some tree species and is therefore useful in the tree identification process.

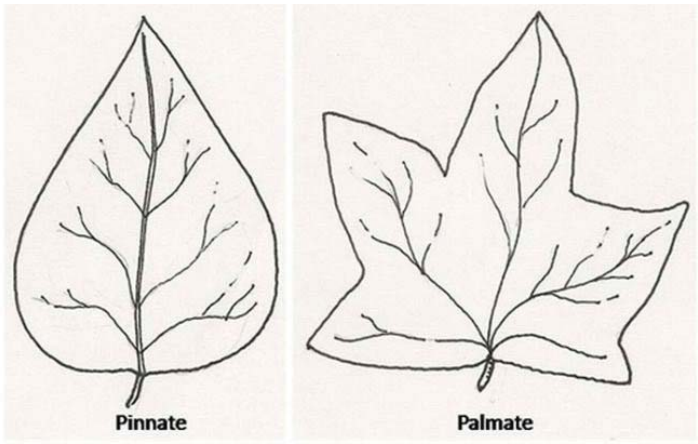

Figure 13. Two different kinds of leaf venation.
Credits: Line drawings by Becky Brown

Leaf Surface

The leaf surface can be characterized by its texture, thickness, and color, and by the presence or absence of hairs (pubescence). Leaves with hairs are called "pubescent," and those without are called "glabrous." Many leaf surface characteristics can be determined by looking at or feeling the leaf, but some may require a hand lens or some kind of magnification to view, such as the presence of very small hairs or small glands. Be sure to look at the top and bottom surfaces of the leaf to evaluate all of its characteristics.

Trees have various leaf textures; some leaves are smooth to the touch while others are rough. Leaf texture can be a useful characteristic to distinguish two species that are similar in appearance, for instance, American elm *(Ulmus americana*) and slippery elm (*Ulmus rubra*). American elm has a smooth upper leaf surface while slippery elm has a rough upper leaf surface. In some cases leaves have glands on their surfaces, which causes the leaf to feel slightly bumpy or to appear to glisten while other leaves feel or look waxy. Leaf thickness also varies; some leaves are thick and leathery and some are thin and light. In Florida, some find it difficult to distinguish a live oak leaf from a laurel oak (*Quercus laurifolia*) leaf. However, the live oak leaf is typically thicker than a laurel oak leaf, and knowing this can help to distinguish these two species from one another. The presence or absence of hairs on the leaf surface will also help distinguish the many different tree species you observe. Finally, it is important to observe the colors of the upper and lower surfaces of a leaf. Leaves can be dark green, light green, bluish-green, or rust colored. This may also help distinguish between live oak, which is lighter green on the underside of the leaf than on the top, while laurel oak is the same green color on both surfaces. Another example is southern magnolia (*Magnolia grandiflora*), which has a rusty-orange pubescent underside (Figure 14B). This characteristic in combination with its thick leathery leaves and smooth bark makes this species very easy to identify.

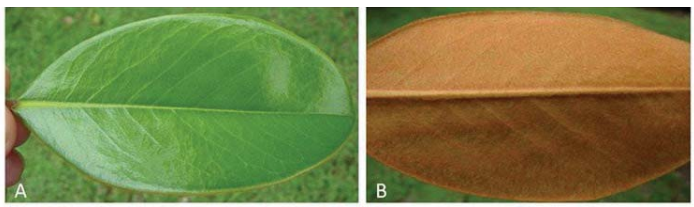

Figure 14. Magnolia leaves are glabrous on their top surfaces (A) and often have a rusty-orange pubescence on their bottom surfaces (B).
Credits: Melissa H. Friedman

Leaf Smell or Taste

When examining the tree, you should use all of your senses. What does the leaf smell like when crushed in your hand? Is the odor strong or barely noticeable? Distinguishing sweetgum (*Liquidambar styraciflua*) from red maple is not always easy (Figure 15), but if you crush a leaf of both species you will be able to *smell* the difference. Sweetgum has a very distinct (not unpleasant) aroma while red maple does not smell at all. You can also taste leaves, but use caution, because ***some tree leaves are toxic***! For those non-toxic species, you can taste whether they are bitter or sweet. For example, if you taste the black cherry tree leaves, you will find they taste bitter, and sourwoods (*Oxydendrum arboreum*) are named for their sour-tasting leaves.

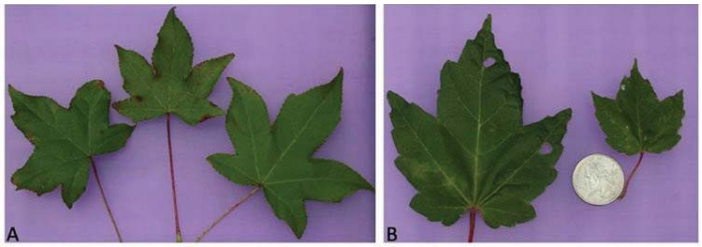

Figure 15. Sweetgum (A) and red maple (B) leaves side by side.
Credits: Michael G. Andreu

Twigs

The next tree characteristic that will help you identify what species you have is the twig. It is best to focus on the most recent twig growth because the older branches lose some of their key features. Usually the new growth of a twig is green, but in some cases it may be brown (Figure 16). The most important features of the twig are its buds, scars, lenticels, pith, and thorns, all of which are discussed further in the following sections.

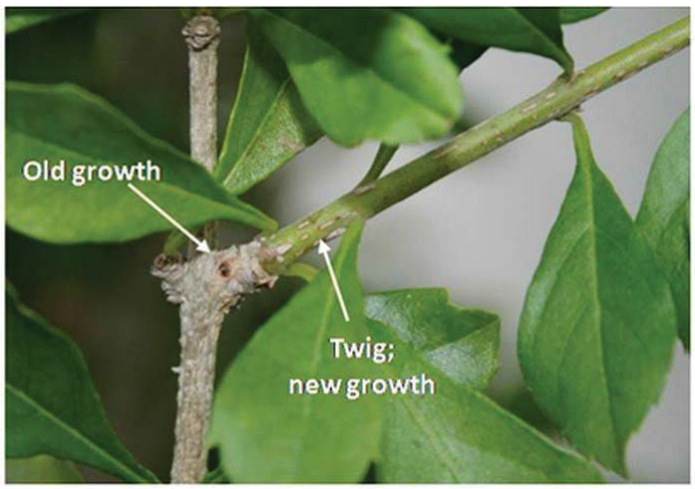

Figure 16. Old and new growth on a tree.
Credits: Walter Givens

Buds

Buds are growth or potential growth points on a twig. There are two types of buds: axillary and terminal buds (Figure 17). Axillary buds are the buds located at the point where the leaf meets with the twig. The terminal buds are located at the tip or apex of the twig; they are usually larger than the axillary buds.

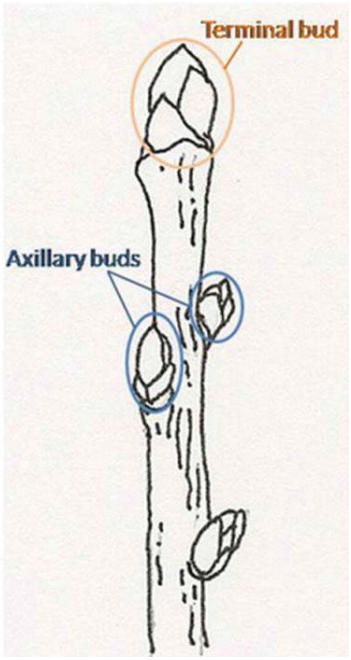

Figure 17. Location of terminal and axillary buds, as they appear on a twig.
Credits: Line drawing by Becky Brown

Buds are either scaly or naked (Figure 18A and B). Bud scales are modified leaves or stipules that protect the growing portion of the twig. Naked buds lack scales and are common in trees that originate in tropical climates.

Figure 18. Scaly buds (A) and naked buds (B).
Credits: Michael G. Andreu

Scars

A leaf scar is found on the branch or twig at the point where a leaf was once attached. The shape and size of leaf scars can be distinguishing features that will help you identify a tree species. If you look closely at the leaf scar (you may need a hand lens), you may see one or more dots

known as vascular bundle scars. This is where the strands of the plant's vascular tissue (equivalent to veins and arteries) pass from the twig to the leaf. The leaf scar's size and shape and the number of vascular bundles are unique features that are very useful for tree identification, especially in the winter when there are no leaves to observe. For example, Figure 19 illustrates a leaf scar on a sweetgum tree that has three vascular bundles.

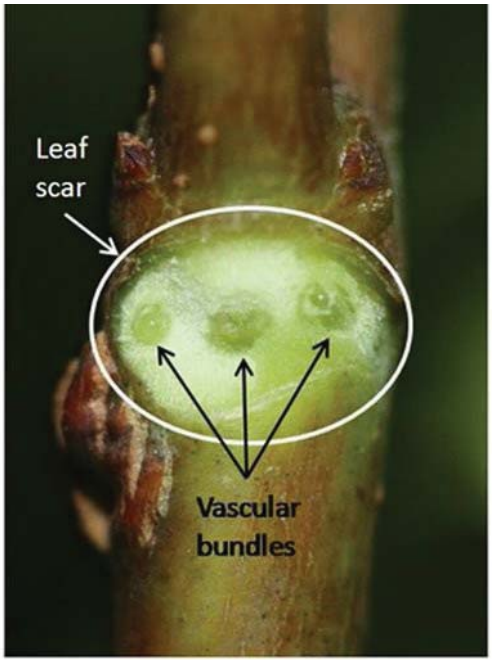

Figure 19. A sweetgum leaf scar showing three vascular bundles.
Credits: Walter Givens

Another type of scar that may be present on the twig is the stipular scar. Remember, stipules are the small, leaf-like structures that form at the petiole base or on the twig (see Figure 6). When the stipules fall off they leave stipular scars. Generally, if the tree has stipules they occur in pairs. The stipular scars for each stipule would occur on the top of the leaf scar. In a few species, the stipular scars are fused together and encircle the twig. For example, magnolias have stipular scars that encircle the twig (Figure 7). If you see this, there is a good chance that the tree you're examining is a type of magnolia or tulip poplar (family Magnoliaceae) or sycamore (family Platanaceae).

Lenticels

As stated earlier in the "bark" section, lenticels are raised, cork-like areas on tree bark that expose the underlying tissue to air. Lenticels vary in shape and size from species to species, and on the same tree. The shape and size of the lenticels may also change as the tree ages. Lenticels can be horizontal (Figure 3B) or vertical striations, or dots (Figure 3A).

Pith

The center portion of the twig is called the pith. The pith usually has a different color and texture than the wood around it. If you take a cross-section of the twig (cut the twig in half longitudinally) (Figure 20), you will be able to observe the pattern of the pith.

Figure 20. Example of how to cut a twig in order to view the pith.
Credits: Erin M. Givens

The pith can be diaphragmed; partitions or bars exist across the pith (Figure 21A), chambered; divided into empty chambers (Figure 21B), or continuous with no partitions (Figure 21C).

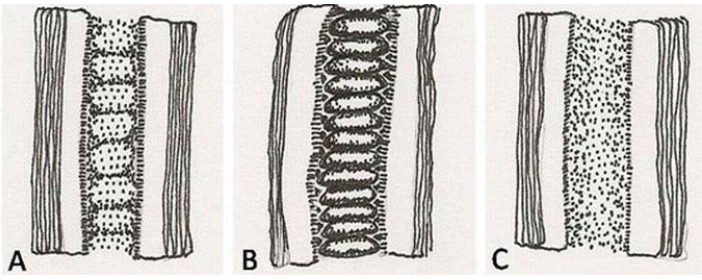

Figure 21. Solid diaphragmed pith (A), chambered pith (B), and solid homogeneous pith (C).
Credits: Line drawings by Becky Brown

Thorns

Pointed structures known as thorns, spines, and prickles are important characteristics for identifying some species because most tree species do not have them. Thorns can be located along the branches and twigs of a tree or they can be found along the main trunk (e.g. honey locust, *Gleditsia triacanthos*). Thorns are modified stems, spines are modified leaves, and prickles can occur anywhere on the twig or leaf (Figure 22).

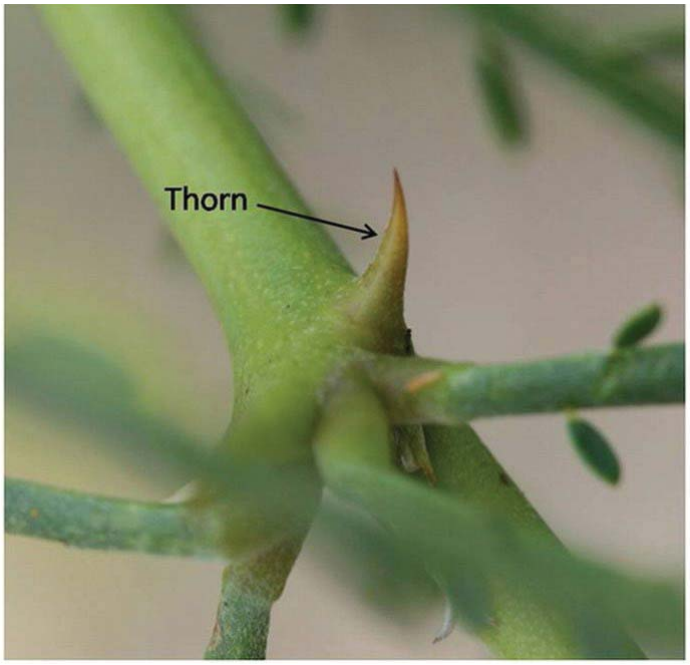

Figure 22. Thorn on a Jerusalem thorn (*Parkinsonia aculeate*) tree.
Credits: Walter Givens

Flowers

Reproductive features, such as the flower, can sometimes be very distinctive for tree identification. While some flowers of trees are showy (flowering dogwood, *Cornus florida*) other tree flowers are inconspicuous and small (oaks). Therefore, the flowers (if visible) must often be used in conjunction with other characteristics for identification.

Trees that have flowers are called angiosperms. Flowers generally have four parts: sepals, petals, stamens, and pistils (Figure 23). If a flower has all of these parts it is called complete. If it is missing any of these parts it is called incomplete. When a tree is flowering, it has reached the point when the flower is mature and pollination is possible.

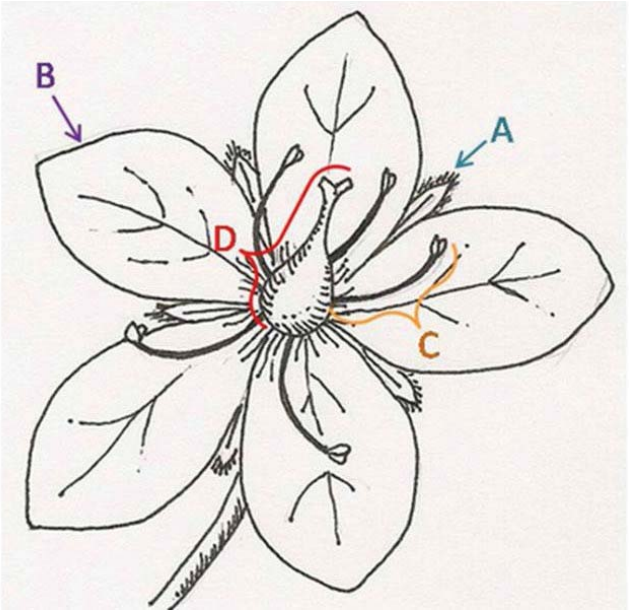

Figure 23. Basic flower anatomy: sepal (A), petal (B), stamen (C), and pistil (D).
Credits: Line drawing by Becky Brown

Flowers may be single or in clusters. The arrangement of several flowers on a branch system is called inflorescence. Some of the more common inflorescence types are spike, catkin, raceme, panicle, cyme, umbel, and head (Figure 24).

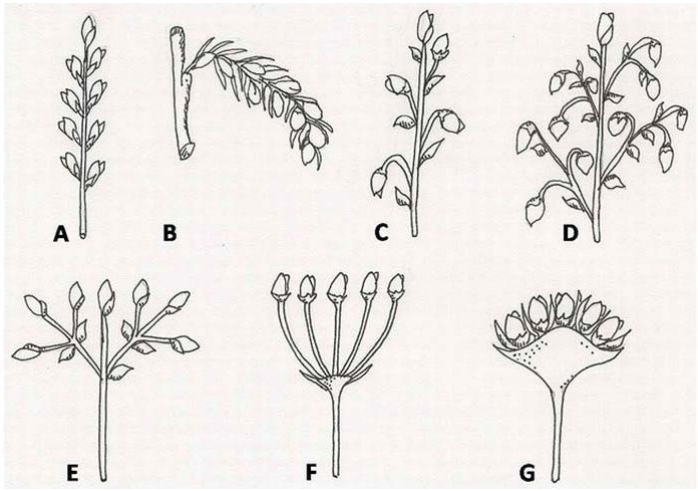

Figure 24. Flower inflorescence types: spike (A), catkin (B), raceme (C), panicle (D), cyme (E), umbel (F), and head (G).
Credits: Line drawing by Becky Brown

It is important to remember that some trees lack "flowers" and instead bear their seeds in cones (Figure 25A) or berry-like structures (Figure 25B). These types of trees are called gymnosperms. Examples of gymnosperms commonly found in Florida are pines (*Pinus* spp.), eastern redcedar (*Juniperus virginiana*), and cypress (*Taxodium* spp.). Florida is also home to two other gymnosperm tree species that are considered uncommon or rare, the Florida yew (*Taxus floridana*) and the Florida Torreya tree (*Torreya taxifolia*).

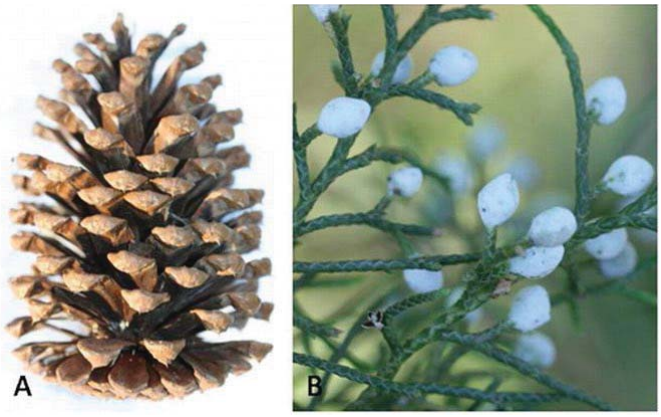

Figure 25. Cone of slash pine (*Pinus elliottii*) (A) and berry-like structures of eastern redcedar (B).
Credits: Walter Givens

Fruits and Seeds

Fruit structure is often very unique and can be a great way to identify the tree. You often find the fruit of a tree lying on the ground below it, which is ideal because it allows you to examine it closely; just make sure the fruit comes from the tree you are trying to identify. Binoculars can be very helpful for examining tree leaves and fruits that are out of reach.

When the ovary inside of the flower is pollinated, a "ripened" ovary or fruit is produced. An apple (Figure 26) is a delicious example of the fruit produced after the ovary of the flower has been pollinated.

Figure 26. Apple pome or fruit.
Credits: Walter Givens

The fruit or ovary houses the seed(s) and the ripened seed(s) house an embryo inside. As a seedling begins to develop, the fruit provides nourishment for it. Figure 27 shows examples of various tree fruit types.

Conclusion

Learning how to identify a tree is not easy, especially in the beginning! It requires patience and perseverance. Take notes on any and all of the characteristics you can observe that have been discussed in this publication. The Tree Identification Sheet provided in Appendix A at the end of this publication will remind you of those characteristics that will help you identify a tree. If you cannot observe a certain characteristic listed on the sheet, leave it blank. Then use your field guides and try to determine what tree species you have based on your field observations. After you have identified the tree, it's good practice to use your reference material to fill in the characteristics you were not able to observe. This "filling in what you missed" will help you learn more about the tree and become more familiar with the characteristics that can be used to identify this tree. It will be a great resource, too, if you should choose to build your own database. Most importantly, highlight the characteristics that you found easy to observe and unique to the tree. These key characteristics will help you identify the tree in the future. Remember, sometimes there are variations in a tree's characteristics (e.g., leaf characteristics). Expect to encounter these variations, which show trees adjusting to changes in their environments. Variation can be a challenge, but it also keeps tree identification fun and exciting!

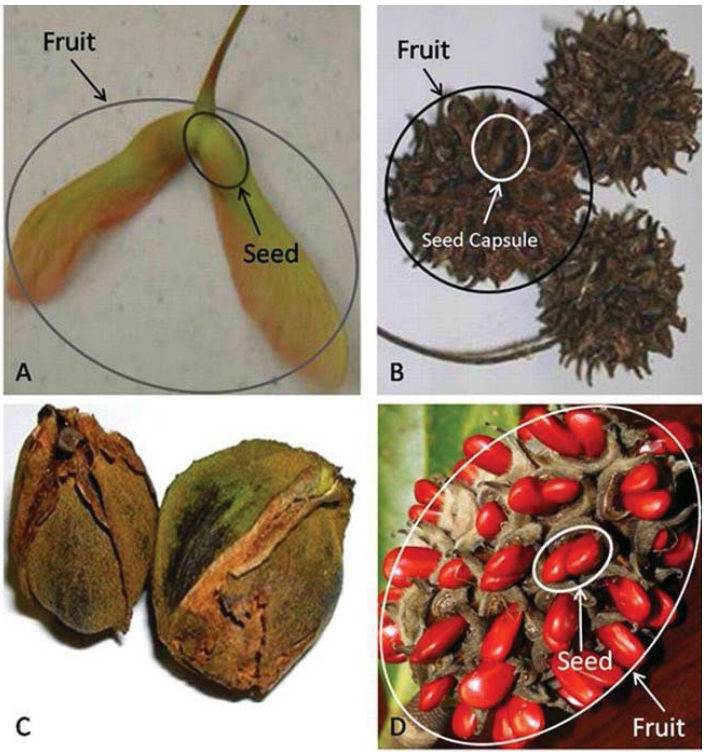

Figure 27. Four different kinds of fruit: red maple samaras (A), sweetgum capsule (B), bitter pecan (*Carya aquatica*) nut (C), and magnolia follicle (D).
Credits: A–C: Mary E. Thornhill, D: Michael G. Andreu

Acknowledgements

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Reference List

Legend: Range: §, Habitat: #, Bark: †, Leaf Shape: ×, Flowering Trees: +, Seed Structure: *

Beentje, H. 2010. *The Kew Plant Glossary: An illustrated dictionary of plant terms*. Kew Publishing. (×)

Brown, Claud L. and L. Katherine Kirkman. 1990. *Trees of Georgia and Adjacent States*. Timber Press. (†)

Duncan, Wilbur H. and Marion B. Duncan. 1988. *Trees of the Southeastern United States*. The University of Georgia Press. (×)

Florida Natural Areas Training (NFAI): http://www.fnai.org/ (#)

Floridata: http://www.floridata.com/ (+)

Godfrey, Robert K. 1988. *Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama.* University of Georgia Press.(+,*)

Hardin, James W., Donald Joseph Leopold, and Fred M. White. 2001. *Harlow & Harrar's Textbook of Dendrology, ninth edition*. McGraw-Hill. (×)

Kirkman, L. Katherine, Claud Brown, and Donald J. Leopold. 2007. *Native Trees of the Southeast.* Timber Press, Inc. (×)

Kurz, Herman and Robert K. Godfrey. 1993. *Trees of Northern Florida*. University of Florida Press. (×)

Meyers, Ronald L and John J. Ewel, editors. 1990. *Ecosystems of Florida.* University Presses of Florida. (#)

National Audubon Society Field Guide to North American Trees – Eastern Region. 1980. Knopf Doubleday Publishing Group. (§,†,+,*)

Nelson, Gil. 1994. *Trees of Florida: A reference and field guide.* Pineapple Press. (×)

Stebbins, Mark. 1999. *Flowering Trees of Florida*. Pineapple Press. (+)

Stein, John, Denise Binion, and Robert Acciavatti. 2003. *Field Guide to Native Oak Species of Eastern North America*. USDA Forest Service. *

USDA Forest Service website for *Silvics in North America:* http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm (§)

USDA Natural Resource Conservation Service Plants Database: http://plants.usda.gov/ (§)

Whitney, Ellie, D. Bruce Means, and Anne Rudloe. 2004. *Priceless Florida: Natural Ecosystems and Native Species.* Pineapple Press. (#)

Table 1. Appendix A: Tree Identification Sheet

	Tree Identification Process	Tree Characteristics
Habitat	Type (e.g., bottomland, sandhill, scrub)	
	Soil composition (e.g., sand, muck)	
	Soil color	
	Site wet or dry (e.g., wetland or upland)	
	Wet site description (e.g., freshwater or saltwater)	
Range	Location of tree (e.g., city, portion of state)	
	Range of tree (use reference material)	
Bark	Bark texture (e.g., smooth, fissured)	
	Bark color	
	Lenticels present (yes or no)	
	Lenticel description (e.g., horizontal, dots)	
Leaf	Leaf petiolate or sessile	
	Stipules present (yes or no)	
	Simple or compound leaf (include # of leaflets)	
	Leaf arrangement (e.g., alternate, opposite)	
	Overall leaf shape (e.g., lanceolate)	
	Shape of leaf apex (e.g., acuminate)	
	Shape of leaf base (e.g., cordate)	
	Leaf margin (e.g., serrulate)	
	Leaf venation (e.g., pinnate, parallel)	
	Leaf surface texture (e.g., smooth, bumpy, scaly)	
	Leaf thickness (e.g., thick and leathery)	
	Leaf color (upper surface)	
	Leaf color (lower surface)	
	Leaf pubescence (hairs) present (yes or no)	
	Leaf smell	
	Leaf taste (use caution)	
Twigs	Bud type (naked or scaly)	
	Leaf scar description (e.g., shape, size)	
	Leaf scar # of vascular bundles	
	Stipular scars present (yes or no)	
	Lenticels present (yes or no)	
	Lenticel description (e.g. horizontal, dots)	
	Pith description (e.g. continuous, diaphragmed)	
	Thorns present (yes or no)	
Flowers	Flowers present (yes or no)	
	Cones present (yes or no)	
	Single flower or multiple flowers	
	Flower description (e.g. shape and color)	
Fruits/Seeds	Fruits present (yes or no)	
	Fruit description (e.g. shape, color, size)	
Additional Notes		
Common Name:		Scientific Name:

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ENH1249

How to Use a Dichotomous Key: A Tutorial Featuring 10 Common Shade Trees of the Tampa Bay Area[1]

Andrew K. Koeser, Gitta Hasing, Michael G. Andreu, and Melissa H. Friedman[2]

Introduction

A dichotomous key is a tool used to help identify an unknown organism. As the prefix di- in its name implies, a dichotomous key leads the user through a sequence of paired, either-or choices (e.g., Does the tree have simple or compound leaves?). Accurately navigating this series of options will lead the user to identify the correct organism if it is included among the list of possible outcomes.

When used properly, a well-designed key can be a very effective identification tool. That said, most dichotomous keys draw on very specific taxonomic terminology to describe identifiable characteristics associated with a tree's leaves, bark, twigs, flowers, and/or fruits. While this makes the key more precise and concise, it can create a barrier for users who lack the experience to comprehend the specific terminology used. For the key included below, all taxonomic terminology is defined in a key-specific glossary. More information and images of these leaf characteristics are offered in the EDIS publication "How to Identify a Tree" by Andreu et al. (2013).

This tutorial features a key of leaf characteristics for ten common broadleaf trees in the Tampa Bay Area. The species selected were included because of their prevalence in both urban and rural landscapes, and because they highlight a wide range of leaf morphological features (e.g., simple vs compound; lobed vs entire). Users of this tutorial should be able to readily find most of these species with minimal effort. Once located, samples can be brought indoors for a hands-on laboratory activity. Even if all ten species are not available, trees not included in the key below can be incorporated into the lab activity to show participants the limitations of this particular key's scope.

Following the key are additional photographs and descriptions of the trees highlighted in this guide. Many field guides use a key to direct the user toward pages with similar descriptive text and figures. While leaf characteristics were the focus of the key used in this tutorial, tree form, bark, flowers, and fruit can all be used in identification. Any or all of these features may be used to confirm whether or not an unknown tree was keyed out correctly.

Tutorial—Using a Key to Identify an Unknown Tree

In the tutorial that follows the key, we start with an unidentified tree and progress step by step through the identification process. At each decision, a photograph will highlight the leaf and twig features of interest on the unidentified specimen.

1. This document is ENH1249, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date June 2016. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Andrew K. Koeser, assistant professor, Department of Environmental Horticulture, CLCE, Gulf Coast Research and Education Center; Gitta Hasing, senior biological scientist, Department of Environmental Horticulture, CLCE, Gulf Coast Research and Education Center; Michael G. Andreu, associate professor, School of Forest Resources and Conservation; and Melissa H. Friedman research and extension writer; Department of Environmental Horticulture, CLCE, Gulf Coast Research and Education Center, UF/IFAS Extension Gainesville, FL 32611.

Once you have successfully navigated this key to identify our example tree, you can use the same process to distinguish the remaining nine trees from one another. Given the broad scope of this key (broadleaf trees of North and Central Florida) and somewhat limited coverage (ten trees), this key is most effective when used as a tree-identification classroom activity where twig samples of the species have been procured ahead of time. A comprehensive key and tree identification field guide, *Trees: North and Central Florida* (Koeser et al. 2015), produced through the University of Florida, is more suitable for field identification of a broader range of trees found in North and Central Florida's urban and natural areas. Additionally, a list of field guides that incorporate keys into their navigation is included in the References section.

Figure 1. *Trees included in this key: A.)* Laurel Oak (*Quercus laurifolia*); *B.)* Pignut Hickory (*Carya glabra*); *C.)* Winged Elm (*Ulmus alata*); *D.)* Live Oak (*Quercus virginiana*); *E.)* American Sycamore (*Platanus occidentalis*); *F.)* Camphor Tree (*Cinnamomum camphora*); *G.)* Florida Maple (*Acer floridanum*); *H.)* Carolina Laurel Cherry (*Prunus caroliniana*); *I.)* Earpod Tree (*Enterolobium contortisiliquum*); *J.)* Red Maple (*Acer rubrum*)

Key to 10 Common Shade Trees in the Tampa Bay Area

1. Leaves and buds are opposite. (Go to 2)

1'. Leaves and buds are alternate. (Go to 3)

2. Leaves are simple, lobed, and have entire margins. (Florida Maple, *Acer floridanum*)

2.' Leaves are simple, lobed, and have serrated margins. Leaf petiole and new twig growth are light red in color. (Red Maple, *Acer rubrum*)

3. Leaves are simple. (Go to 4)

3'. Leaves are compound. (Go to 9)

4. Leaves are entire. (Go to 5)

4.' Leaves are serrated or lobed. (Go to 7)

5. Leaf undersides appear silvery or white and are highly aromatic when crushed. (Camphor Tree, *Cinnamomum camphora*)

5'. Leaf undersides are not silvery or white. (Go to 6)

6. Leaves are leathery and revolute. (Live Oak, *Quercus virginiana*)

6'. Leaves are not leathery and are relatively flat. (Laurel Oak, *Quercus laurifolia*)

7. Leaf has 3 to 5 broad triangular lobes. (American Sycamore, *Platanus occidentalis*)

7'. Leaf is serrated, but is lacking lobes. (Go to 8)

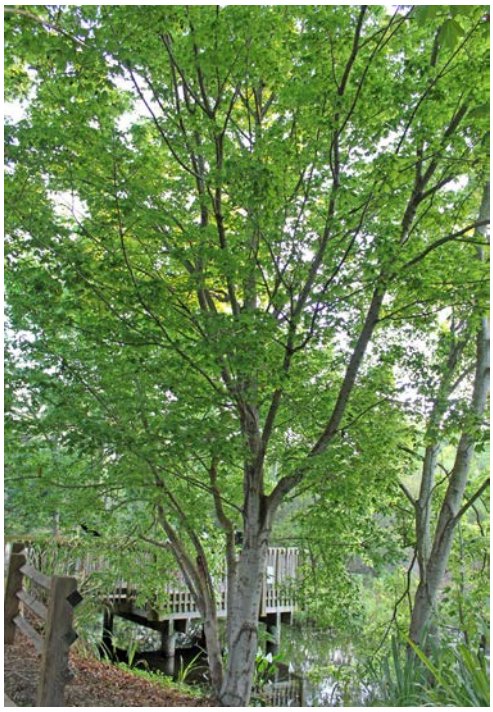
8. Leaf base is asymmetric. Corky wings are present on twigs and branches. (Winged Elm, *Ulmus alata*)

8'. Leaf base is symmetric. Leaf margins range from entire to sharply toothed. Leaf petiole is red. Leaf is glossy and aromatic when crushed. (Carolina Laurel Cherry, *Prunus caroliniana*)

9. Leaves are once-compound. (Pignut Hickory, *Carya glabra*)

9'. Leaves are twice-compound. (Earpod Tree, *Enterolobium contortisiliquum*)

Florida Maple (*Acer floridanum*)



Family: Sapindaceae, soapberry family

Florida Hardiness: 8a–9a

Height: 20–60’

Width: 25–40’

Leaf: 1 1/2–3 1/2” long, simple, opposite, star-shaped with 3–5 lobes, and has entire margins. Leaves are green on top, paler green and pubescent underneath, turn orange and yellow in the fall, and are deciduous.

Bark: Light gray and smooth, becoming irregularly ridged and breaking into plates with age

Flower: Small, yellow-green, and emerges in clusters on 1–2” long stalks

Flowering: Early spring, with new leaves

Fruit: 1/2–1 1/2” long, 2-winged samara with a rounded, bulbous seed cavity

Fruiting: Mid summer

Native Range: Southeastern United States

Habitat: Full sun to partial shade, well-drained to occasionally wet soil, high drought tolerance, and no aerosol salt tolerance

Red Maple (*Acer rubrum*)

Family: Sapindaceae, soapberry family

Florida Hardiness: 8a–9b

Height: 60–75’

Width: 25–35’

Leaf: 2–5” long, simple, opposite, ovate, 3–5 lobed, with serrated margins, and a red petiole. Leaves are medium to dark green on top; grayish to silvery underneath; turn yellow, red, and purple in the fall; and are deciduous.

Bark: Light gray and smooth when young, becoming dark gray, rough, ridged, and furrowed with age

Flower: Tiny, red or pink, and emerges in clusters

Flowering: Late winter to early spring, before new leaves emerge

Fruit: 3/4–1" long, pinkish to reddish, 2-winged samara

Fruiting: Spring

Native Range: Eastern United States and neighboring Canadian provinces, in addition to Newfoundland

Habitat: Full sun to partial shade, wet to well-drained soil, moderate drought tolerance, and low aerosol salt tolerance

Pignut Hickory (*Carya glabra*)

Family: Juglandaceae, hickory or walnut family

Florida Hardiness: 8a–9b

Height: 50–65'

Width: 30–40'

Leaf: 8–12" long, odd-pinnately compound, alternate, and made up of 5–7 leaflets. Leaflets are 3–6" long, ovate to lanceolate, have serrated margins, are dark green on top, paler green and pubescent in the vein axils underneath, turn yellow in the fall, and are deciduous.

Bark: Gray-brown and smooth when young, developing scaly ridges that are interwoven in a diamond-like pattern with age

Flower: Male: 2–3" long, yellow-green catkin, often in pairs of 3. Female: small, green spike that emerges in clusters at branch tips.

Flowering: Spring

Fruit: 1–2 1/2" long, ellipsoid or obovoid, dry, hard nut that is enclosed in a 4-valved husk that turns from green to brown and splits halfway down to the base with maturity.

Fruiting: Matures in early fall

Native Range: Eastern half of the United States and extreme southern Ontario

Habitat: Full sun to partial shade, well-drained to occasionally wet soil, high drought tolerance, and moderate aerosol salt tolerance

Camphor Tree (*Cinnamomum camphora*)

Family: Lauraceae, laurel family

Florida Hardiness: 8b–11

Height: 40–50’

Width: 50–70’

Leaf: 2–4” long, simple, alternate, ovate to obovate, with entire and wavy margins. Leaves are dark green and shiny on top, glaucous or silvery underneath, fragrant when crushed, and are evergreen.

Bark: Brown to gray, becoming increasingly furrowed and ridged with age

Flower: Small, greenish-white, and emerges in clusters on 2–3” long panicles

Flowering: Spring

Fruit: 1/3”, round, shiny drupe that turns from green to black when ripe

Native Range: Eastern Asia. *Invasive*—not recommended in the north and central regions of the state by UF/IFAS faculty, except for specified and limited use that has been approved by the UF/IFAS Invasive Plants Working Group. *Caution*—may be recommended in the southern region of the state by UF/IFAS faculty, but should be managed to prevent its escape (UF/IFAS IPWG 2015).

Habitat: Full sun to partial shade, well-drained soil, high drought tolerance, and low aerosol salt tolerance

Earpod Tree (*Enterolobium contortisiliquum*)

Family: Fabaceae or Leguminosae, legume family

Florida Hardiness: 10–11

Height: 60–90’

Width: Up to 80’

Leaf: Bipinnately compound and alternate, with primary and secondary leaflets having opposite arrangement. Primary leaflets are in pairs of 3–14 and are made up of 10–15 pairs of oblong, secondary leaflets that are up to 3/4” long. Secondary leaflets are dark green on top, lighter green underneath, asymmetrical along the midvein, have entire margins, and are deciduous.

Bark: Light gray, becoming textured with vertical striations with age

Flower: Small, greenish-white, and emerges in clusters on axillary umbels

Flowering: Spring

Fruit: 2 1/2–3” long, kidney-shaped seed pod that turns from green to oxblood or almost black when mature

Fruiting: Summer

Native Range: Argentina, Bolivia, Brazil, Paraguay, and Uruguay

Habitat: Full sun to partial shade and well-drained soils

American Sycamore (*Platanus occidentalis*)

Family: Platanaceae, planetree family

Florida Hardiness: 8a–9a

Height: 75–90’

Width: 50–70’

Leaf: 4–9” long, simple, alternate, ovate, with 3–5 broad-

triangular lobes, and coarsely toothed margins. Leaves are bright green and smooth on top, paler green and pubescent underneath with pubescence remaining only on veins with maturity, turn yellow in the fall, and are deciduous.

Bark: White and sloughing off in thin, irregular plates to reveal green, tan, cream, and brown inner bark

Flower: Small and borne in compact, dense clusters on a spherical head

Flowering: Spring

Fruit: 1/2–1”, brown, globulose cluster of achenes

Fruiting: Ripens in late fall to early winter

Native Range: Eastern half of the United States and southern Ontario

Habitat: Full sun, wet to well-drained soil, high drought tolerance, and moderate aerosol salt tolerance

Carolina Laurel Cherry (*Prunus caroliniana*)

Family: Rosaceae, rose family

Florida Hardiness: 8a–10a

Height: 25–40’ and thicket-forming

Width: 15–25’

Leaf: 2–4” long, simple, alternate, elliptic, with entire to sharply toothed margins. Leaves are dark green and shiny on top, dull green underneath, fragrant when crushed, attached to a red petiole, and are evergreen.

Bark: Reddish-brown, smooth, and flecked with lenticels when young, then darkens to gray or almost black, and splits and fissures with age

Flower: Small, white, fragrant, and emerges on 2–3” long racemes

Flowering: Winter

Fruit: 1/3–1/2”, black, oval, shiny drupe

Fruiting: Spring and summer

Native Range: Southeastern United States and eastern Texas

Habitat: Full sun to full shade, well-drained soil, high drought tolerance, and moderate aerosol salt tolerance

Laurel Oak (*Quercus laurifolia*)

Family: Fagaceae, beech or oak family

Florida Hardiness: 8a–10a

Height: 60–70’

Width: 35–45’

Leaf: 3–5” long, simple, alternate, ovate to oblanceolate or appearing diamond-shaped, with entire margins. Leaves are green and glossy on top, somewhat lighter green and smooth underneath, turn yellow in the fall, and are deciduous in the north and semi-evergreen in the south.

Bark: Dark gray and smooth when young, developing shallow fissures with flat ridges, and sometimes has a fluted or buttressed base with age

Flower: Male: 1 1/2–3" long, yellow-green catkin. Female: tiny, green to reddish spike that emerges from leaf axils.

Flowering: Early spring

Fruit: 1/2" long, nearly round, brown acorn. The cap has tight, reddish-brown scales and covers the top 1/4 of the shiny nut.

Fruiting: Fall

Native Range: Southeastern United States and east Texas

Habitat: Full sun to partial shade, well-drained to occasionally wet soil, moderate drought tolerance, and low aerosol salt tolerance

Live Oak (*Quercus virginiana*)

Family: Fagaceae, beech or oak family

Florida Hardiness: 8a–10b

Height: 60–80'

Width: 60–120'

Leaf: 2–5" long, simple, alternate, oblong or elliptic, and with revolute margins but new growth may be toothed or shallowly lobed. Leaves are dark green and glossy on top, paler green and may or may not have pubescence underneath, stiff, leathery, and are evergreen to semi-evergreen.

Bark: Reddish-brown and furrowed when young, turning gray to almost black, and becoming rough, deeply furrowed, and blocky with age

Flower: Male: 2–3" long, yellow-green catkin. Female: Tiny, reddish spike that emerges from leaf axils.

Flowering: Early spring

Fruit: 3/4" long, oblong, dark brown acorn. The cap is bowl-shaped, warty, and covers the top 1/3 of the shiny nut.

Fruiting: Matures in fall

Native Range: Atlantic and Gulf Coastal states of the southeastern United States, in addition to south central Texas, and northeastern Mexico

Habitat: Full sun to partial shade, well-drained to occasionally wet soil, and high drought and aerosol salt tolerance

Winged Elm (*Ulmus alata*)

Family: Ulmaceae, elm family

Florida Hardiness: 8a–9b

Height: 45–70'

Width: 30–40'

Leaf: 2–4" long, simple, alternate, narrowly ovate, with stiff, doubly serrated margins. Leaves have uneven bases, are dark green on top, paler green underneath with pubescence in the leaf axils, turn yellow in the fall, and are deciduous.

Bark: Red-brown to ashy-gray, shallowly fissured, with flat-topped ridges, and corky, wing-like appendages on opposite sides of twigs and branches, although the latter may be lacking in older specimens

Flower: Small, reddish, bell-shaped, and emerges in clusters at leaf axils

Flowering: Early spring

Fruit: 3/8–1/2" across, brown, flat, elliptic samara, with pubescence around the margin

Fruiting: Shortly after flowering

Native Range: Southern two-thirds of the eastern half of the United States

Habitat: Full sun to partial shade, wet to well-drained soil, high drought tolerance, and moderate aerosol salt tolerance

Using the Key to Identify an Unknown Species

In the tutorial that follows, we will start with an unidentified tree and progress step by step through the identification process. At each decision, a photograph will highlight the leaf and twig features of interest on the unidentified specimen.

1. Leaves and buds are opposite. (Go to 2)

1'. Leaves and buds are alternate. (Go to 3)

As seen in Figure 2, the leaves and buds are not directly opposite from one another. Instead, as you move from the base of the twig to its tip (top to bottom as shown in Figure 2), you will note that the leaves **alternate** from one side of the twig to the other. Because of this we follow the instructions included with the second option and move on to the third set of choices.

Figure 2. Twig from an unidentified shade tree featured in this key.

3. Leaves are simple. (Go to 4)

3'. Leaves are compound. (Go to 9)

Looking at our specimen we can see that a single leaf (blade) is directly attached to the twig (Figure 3; note the presence of a bud at the point of attachment). When this occurs a leaf is considered simple (see glossary), so we choose the first option and go to the fourth set of choices.

Figure 3. Twig and bud from an unidentified shade tree featured in this key.

4. Leaves are entire. (Go to 5)

4'. Leaves are serrated or lobed. (Go to 7)

Looking closer at the leaf margins (Figure 4) we can see they are devoid of any serrations, teeth, or lobes. Following the instructions for the first option, we move on to the fifth set of choices.

5. Leaf undersides appear silvery or white and are highly aromatic when crushed. (Camphor Tree, *Cinnamomum camphora*)

5'. Leaf undersides are not silvery or white. (Go to 6)

Flipping the leaf over (Figure 5) we observe that, while it is a lighter green than the top of the leaf, the underside of the leaf is neither silvery nor white. Noting this, we continue on to the sixth and final set of choices.

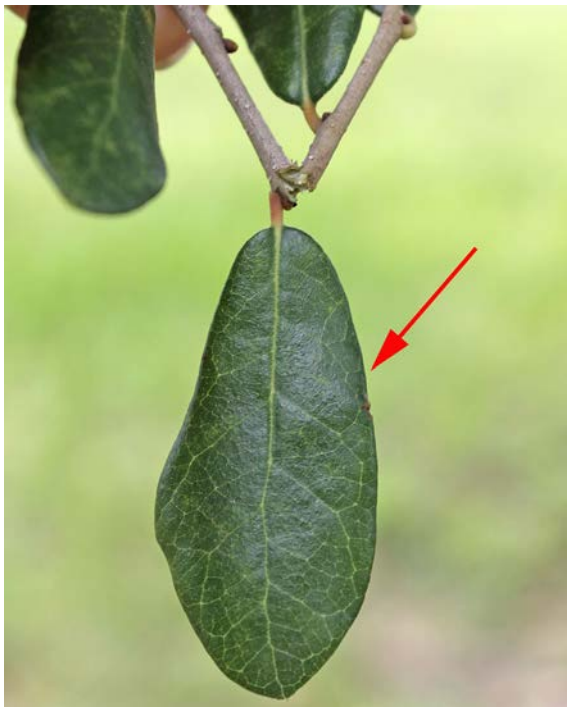


Figure 4. A close-up of a single leaf.

6. Leaves are leathery and revolute. (Live Oak, *Quercus virginiana*)

6'. Leaves are not leathery and are relatively flat. (Laurel Oak, *Quercus laurifolia*)

We have now come to the point where we may be able to make an identification. Neither of the two options listed above directs the user to go further into the key. Both terminate on one of two species of oak: live oak (*Quercus virginiana*) or laurel oak (*Quercus laurifolia*).

Figure 5. Underside of leaf.

If the tree we are identifying is a live oak (first option), the leaves should be leathery and revolute. Leathery is best assessed by touch; however, Figure 6 does show some distinct curling of the leaf margins, which means that the leaves are revolute (see glossary). As such, we have good evidence to make a final determination. The tree keyed out for this tutorial is a live oak (*Quercus virginiana*).

Figure 6. Curling of leaf margins.

As one nears the end of a key, the characteristics compared become more and more similar. Had we not been completely convinced by the live oak description at this stage (e.g., not been able to assess if it was truly leathery), we could have compared the sample to the description for the alternative, laurel oak. If, based on the descriptions, the tree clearly was not a laurel oak, we could assume the tree in question was either a live oak or not included as a possibility in the key, depending on how strongly the leaves in question deviated from the stated characteristics in the key. When faced with this situation, it may be helpful to re-key the tree in question from a different side of the tree (using a different twig and leaf sample), as there can be morphological differences in another location of the tree.

Conclusion

Once you have successfully navigated this key to identify our example tree, you can use the same process to distinguish the remaining nine trees from one another. Given the broad scope of the key (broadleaf shade trees in the Tampa Bay Area) and its limited coverage (ten trees), this key is most effective when used as a tree-identification classroom activity where twig samples of the species have been procured ahead of time. The ten tree species included in this article were selected to introduce the user to the various leaf attributes that can be used for identification (leaf attachment, simple vs. compound, leaf margins, and other defining features). A comprehensive key and tree identification field guide, *Trees: North and Central Florida* (Koeser et al. 2015), produced through the University of Florida, is more suitable for field identification of trees found in North and Central Florida's urban and natural areas. Additionally, a list of field guides that incorporate keys into their navigation is included in the references section.

Additional References and Field Guides with Keys

Anderson, P. J. 2014. *A Resource for Pests and Diseases of Cultivated Palms: Identifying Commonly Cultivated Palms.* http://idtools.org/id/palms/palmid/index.php. Accessed March 3, 2015.

Andreu, M. G., E. M. Givens, and M. H. Friedman. 2013. *How to Identify a Tree*. For234. Gainesville, FL: University of Florida Institute of Food and Agricultural Sciences. http://edis.ifas.ufl.edu/fr296.

Godfrey, R. K. 1988. *Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama.* Athens, GA: University of Georgia press.

Harlow, W. M. 1954. *Fruit Key & Twig Key to Trees & Shrubs.* New York: Dover Publications, Inc.

Harrar, E. and J. G. Harrar. 1962. *Guide to Southern Trees.* New York: Dover Publications, Inc.

Koeser, A. K., G. Hasing, M. H. Friedman, and R. B. Irving. 2015. *Trees: North and Central Florida.* Gainesville, FL: University of Florida Institute of Food and Agricultural Sciences.

Nelson, G. 2011. *The Trees of Florida.* Sarasota, FL: Pineapple Press, Inc.

Rushforth, K. and C. Hollis. 2006. *Field Guide to the Trees of North America.* Washington, D.C.: National Geographic Society.

University of Florida - IFAS Invasive Plants Working Group (UF/IFAS IPWG). 2015. UF/IFAS Assessment of Non-Native Plants in Florida's Natural Areas. http://assessment.ifas.ufl.edu

Glossary

Alternate—pertaining to bud or leaf arrangement, one leaf or bud at each node, situated at alternating positions along the stem. In this arrangement, the leaves are not directly across from each other.

Compound—leaf with two or more leaflets.

Entire—term describing a leaf margin without teeth.

Leaf base—bottom part of the leaf

Lobed—having leaf segments that project outward, creating voids between the segments.

Margin—the outer edge of a leaf

Once-compound leaves—a compound leaf that has leaflets attached directly to an extended petiole (rachis).

Opposite—pertaining to leaf or branch arrangement, leaves or branches situated two at each node, across from each other on the stem.

Petiole—stalk connecting the leaf blade to that of the main stem.

Revolute—rolled backward or underneath

Serrated—sawtooth margin of a leaf, with the teeth pointed forward.

Simple—single-bladed leaf, not composed of leaflets.

Twice-compound leaves—a compound leaf that has leaflets arranged on side branches off the main extended petiole (rachis).

Recommended Forest Plant Texts:

Godfrey, R. K. 1988. Trees, Shrubs and Woody Vines of Northern Florida and Adjacent Georgia and Alabama. The University of Georgia Press, Athens. 734 p.

Taylor, W. K. 2013. Florida Wildflowers: A Comprehensive Guide. University Press of Florida, Gainesville. 576 p.

Harris, J.G. and Harris, M. W. 2000. Plant Identification Terminology: An Illustrated Glossary Spring Lake Publishing, Spring Lake UT. 206 p.

Miller H. J. and Miller K. V. 1999. Forest Plants of the Southeast and Their Wildlife Uses. University of Georgia Press. 454 p.

Castner, James L. 2005. Photographic Atlas of Botany and Guide to Plant Identification. Feline Press. 310 p.

Other sources:

Beentje, H.J. 2010. The Kew Plant Glossary: An Illustrated Dictionary of Plant of Identification Terms. Royal Botanical Gardens, Kew UK. 220 p.

Burns, R.M. and B.H. Honkala. 1990. Silvics of North America, Volumes 1 (conifers) and 2 (hardwoods). U.S.D.A. For. Ser. Agr. Handbook No. 654. Washington, D.C. 675 & 877 p. http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

Clewell, A. G. 1985. Guide to the Vascular Plants of the Florida Panhandle. University Press of Florida, Gainesville. 605 p.

Duncan, W.H. and M.B. Duncan. 1988. Trees of the southeastern United States. The University of Georgia Press, Athens. 322 p.

Hardin J.W., Leopold D. J. and White, F. M. 2000 Harlow and Harrar's Textbook of Dendrology 9th ed., McGraw Hill. 544 p.

Harlow, W. M. 1941 Fruit Key & Twig Key to Trees & Shrubs Dover Publications, New York.

Kirkman, L.K., C.L. Brown & D.J. Leopold. 2007. Native trees of the Southeast: An identification guide. Timber Press, Portland, OR. 370 p.

Lakela, O. and Wunderlin, R. P. 1980. Trees of Central Florida. Banyan Books, Miami. 208 p.

Lance, R. 2004. Woody Plants of the SE United States: A Winter Guide University of Georgia Press, Athens. 441p.

Langeland, K. A. and Burks K. C. 1998. Identification & Biology of Non-native Plants in Florida's Natural Areas. University of Florida IFAS. Gainesville. 165 p.

Myers, R. L. and Ewel, J. J. 1990. Ecosystems of Florida. University of Central Florida Press. Orlando. 765 p.

Nelson G. 1996. The Shrubs & Woody Vines of Florida, Pineapple Press Inc. Sarasota, FL. 391 p.

Nelson G. 1994. The Trees of Florida. Pineapple Press Inc. Sarasota, FL. 338 p.

Riffle, R. L. and Craft, P. 2003. An Encyclopedia of Cultivated Palms. Timber Press. 528 p.

Wilson, B.F. 1970. The Growing Tree. The University of Massachussetts Press, Amherst. 152 p.

Wunderlin, R. P. and Hansen, B. F. 2003. Guide to the Vascular Plants of Florida, 2nd Ed. University Press of Florida, Gainesville. 787 p.

Tree & Plant Online Resources:

Plant databases:
http://plants.usda.gov/ - list of plants and characteristics
http://www.floridata.com/ - database of Florida trees and plants
http://www.plantatlas.usf.edu/ - plant atlas (USF)
http://oregonstate.edu/trees -Trees of the Pacific Northwest
http://plants.ifas.ufl.edu/node/22 - Aquatic plants
http://efloras.org/ - Harvard's Flora of the world (see Flora of North America)
http://www.npwrc.usgs.gov/resource/plants/floraso/species.htm#contents–Southern wetland flora
http://www.hort.uconn.edu/plants/index.html - NE US
http://www.sfrc.ufl.edu/Extension/ffws/tof.htm - Trees of Florida
http://plant-materials.nrcs.usda.gov/ - NRCS flora information
http://esp.cr.usgs.gov/data/atlas/little/ - Tree species range maps
http://www.shirleydenton.com/plants/plantindex.php - Fl plant photographs by Shirley Denton
http://centerforplantconservation.org/ - endangered plants
http://www.cnr.vt.edu/dendro/wwwmain.html - Virginia Tech dendrology page
http://www.flmnh.ufl.edu/herbarium/cat/ - UF herbarium

Invasive plants:
http://plants.ifas.ufl.edu/identif.html - Non-native plants in Florida
http://www.fleppc.org/ - Florida Exotic Pest Plant Council
http://www.invasiveplantatlas.org/ - Invasive Plant Atlas
http://www.invasivespeciesinfo.gov/plants/databases.shtml - invasive species

Publications and forest information:
http://edis.ifas.ufl.edu/index.jsp - EDIS Documents
http://www.forestencyclopedia.net/ - Forest Encyclopedia
http://www.sfrc.ufl.edu/Extension/florida_forestry_information/forest_resources/ - FL
http://www.fs.fed.us/database/feis/ - fire effects on plants
http://davesgarden.com/guides/botanary/ - botanical terminology
http://www.flmnh.ufl.edu/herbarium/voucher.htm - how to produce a pressed specimen

Many other valuable online resources are available. A Google search can help you find endless amounts of information.

UF/IFAS Forest Management and Stewardship Extension Publications on EDIS:

http://edis.ifas.ufl.edu/TOPIC_Forest_Management_and_Stewardship

- Assessing the Economic Feasibility of Short-Rotation Woody Crops in Florida
- Assessment and Management of Hurricane Damaged Timberland
- Beyond the Trees: A Systems Approach to Understanding Forest Health in the Southeastern United States
- Cooperation and Communication: Benefits for Non-Industrial Private Forest Landowners
- Dead Wood: Key to Enhancing Wildlife Diversity in Forests
- Florida Forest Landowner Preferences for Carbon Offset Program Characteristics
- Forest Management in the Interface: Forest Health
- Forest Management in the Interface: Practicing Visible Stewardship
- Forest Resource Information on the Internet: Connecting to Today's Online Resources
- Improving, Restoring, and Managing Natural Resources on Rural Properties in Florida: Sources of Financial Assistance
- Improving, Restoring, and Managing Wildlife Habitat in Florida: Sources of Technical Assistance for Rural Landowners
- Longleaf Pine Regeneration
- Making the Most of Your Mast
- Management Practices to Support Increased Biodiversity in Managed Loblolly Pine Plantations
- Opportunities for Uneven-Aged Management in Second Growth Longleaf Pine Stands in Florida
- An Overview of Carbon Markets for Florida Forest Landowners
- Ownership Succession: Plan Now for the Future of Your Land
- Selecting a Consulting Forester
- Steps to Marketing Timber
- Stewardship Ecosystem Services Study Series: Assessing Forest Water Yield and Purification Ecosystem Services in the Lower Suwannee River Watershed, Florida
- Stewardship Ecosystem Services Study: Carbon Stores on Florida Forest Stewardship Program Lands
- Ten Tips for Encouraging the Use of Your Pine Plantations by Game Species
- Ten Tips for Increasing Wildlife Biodiversity in Your Pine Plantations
- Thinning Southern Pines—A Key to Greater Returns
- Tips for Integrating Land and Wildlife Management: Deer in Forests
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