
Forest Stewardship Field Day:

Forest Plant Identification



October 29, 2015; 9:00 am – 3:00 pm, ET
Morningside Nature Center
3540 East University Avenue, Gainesville, FL 32641

This program will give landowners an opportunity to learn to identify some of the tree, shrub and herbaceous species on their forest properties. We'll cover sandhill, flatwoods and swamp species, identifying live specimens in the field. We 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. A water cooler is on site – bring a water bottle if you wish to take water to the field.



Agenda:

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|----------|--|
| 9:00 am | Sign-in, meet and greet at Morningside Nature Center, picnic area pavilion |
| 9:15 | Welcome and Introduction: Plant ID Primer , <i>Chris Demers, Dr. Michael Andreu, UF/IFAS School of Forest Resources and Conservation (SFRC) and Geoff Parks, City of Gainesville, Nature Operations</i> |
| 10:00 | Tree / Plant ID Hike in the Field , <i>Geoff Parks and Dr. Michael Andreu</i> |
| 12:00 pm | Lunch |
| 1:00 | Tree / Plant ID Hike in the Field , <i>Geoff Parks and Dr. Michael Andreu</i> |
| 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 a grant from the Sustainable Forestry Initiative.

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Questions about this or other Forest Stewardship Program activities can be directed to
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http://www.sfrc.ufl.edu/forest_stewardship

Got Invasives?

Invasive exotic plant problem? Use the Florida Invasives.org website to find financial and or technical assistance to manage or prevent an infestation.

FloridaInvasives.org is 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. It 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?

Public and private land managers have identified the high ecological and economic cost of invasive species as a statewide problem in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of federal, state and local agencies along with nongovernment organizations in Florida, formed to link efforts at preventing and controlling infestations of 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?

Each year, multiple agencies and organizations provide cost-share programs, grants and/or technical assistance to help landowners and land managers with various agriculture or natural resource management practices. Invasive exotic species management is an important practice covered within many of these programs.

FISP has created a searchable database, accessible at FloridaInvasives.org, that allows you to determine which agency or organization(s) might have an assistance program for your needs. Simply provide your county, target species and other pertinent information into the online tool, and you will retrieve a current list of available programs along with the most up-to-date contact information. 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. Log on at <http://FloridaInvasives.org> to find assistance with your invasive species problem.

Conclusion

The Florida Invasive Species Partnership has created FloridaInvasives.org to help connect Florida's landowners and land managers with available technical and/or financial assistance programs to prevent or control invasive exotic species problems. These programs have been collected, evaluated and categorized in a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners.

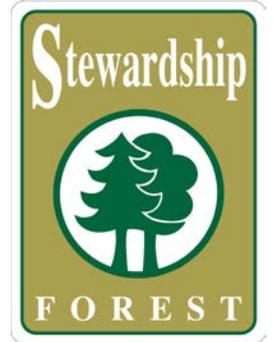
Go to FloridaInvasives.org to find out more.



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://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/For-Landowners/Programs/Forest-Stewardship-Program>



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.treefarmssystem.org/florida>

How to Identify a Tree¹

Michael G. Andreu, Erin M. Givens, and Melissa H. Friedman²

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).

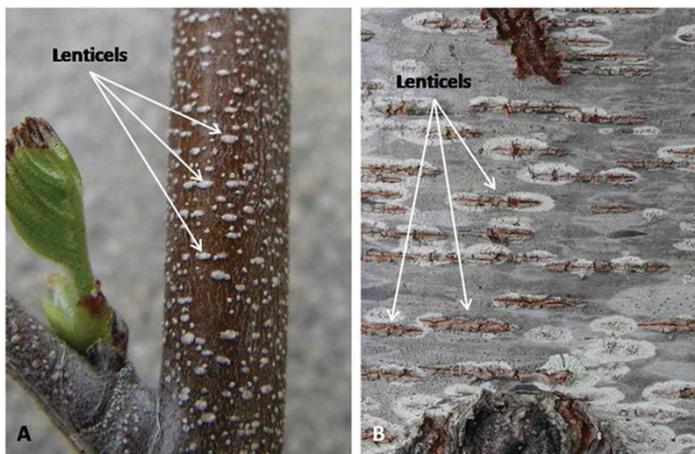


Figure 3. On these black cherry trees you can see lenticels, a distinguishing characteristic for this tree. A) shows young black cherry bark containing dot lenticels, and B) shows an older black cherry bark with horizontal lenticels.

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.

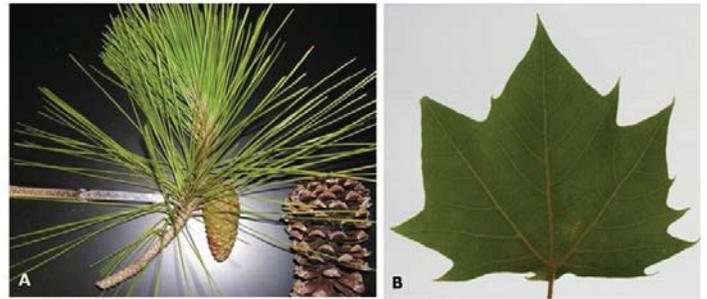


Figure 4. The difference between A) needlelike pine tree leaves, and B) the broad leaf of a sycamore.

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

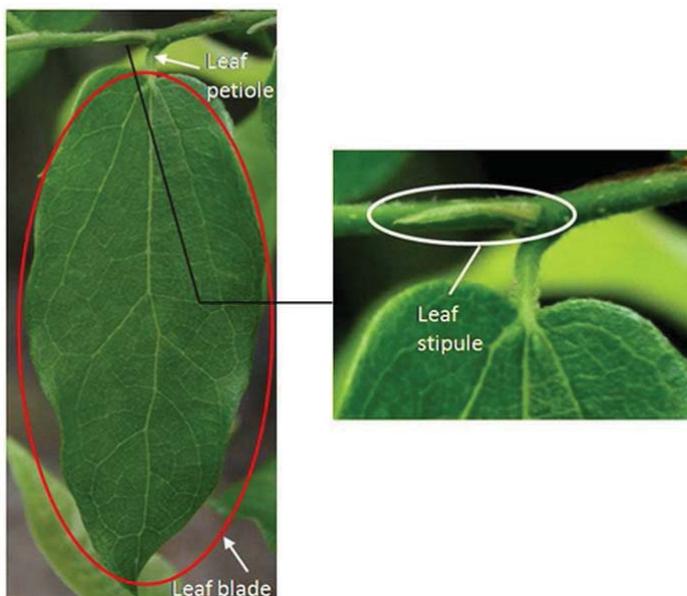


Figure 6. Components of a simple leaf.

Credits: Michael G. Andreu

the leaf blade to the branch, and stipules are small vegetative structures that form at the base of the petiole or on the twig.

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.

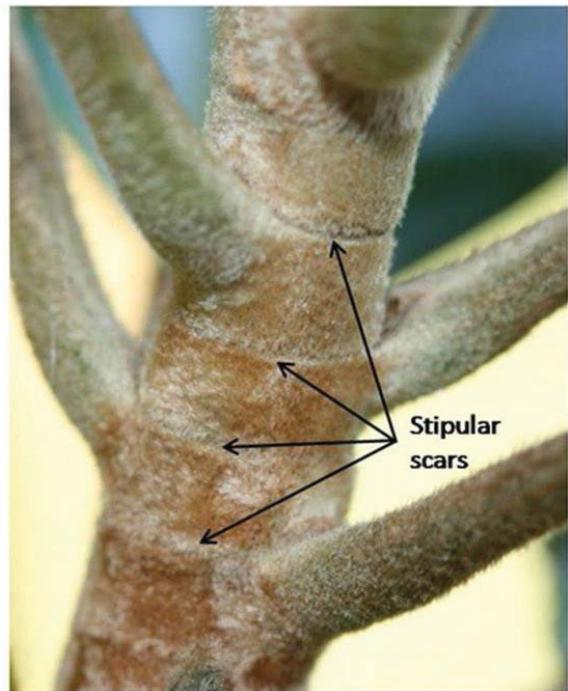


Figure 7. Stipular scars encircling a magnolia twig.

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.

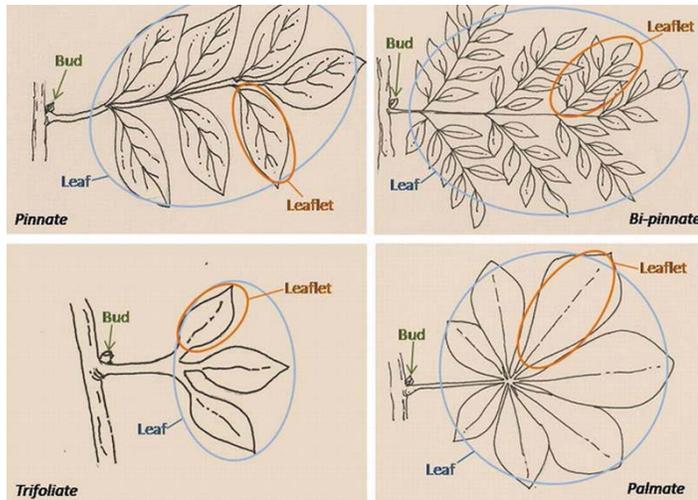


Figure 8. Compound leaf types.
Credits: Line drawings by Becky Brown

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 tree 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.).

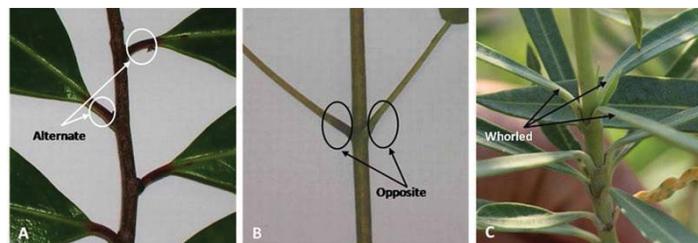


Figure 9. The three main types of leaf arrangement are: A) alternate leaf arrangement, B) opposite leaf arrangement, and C) whorled leaf arrangement.

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).

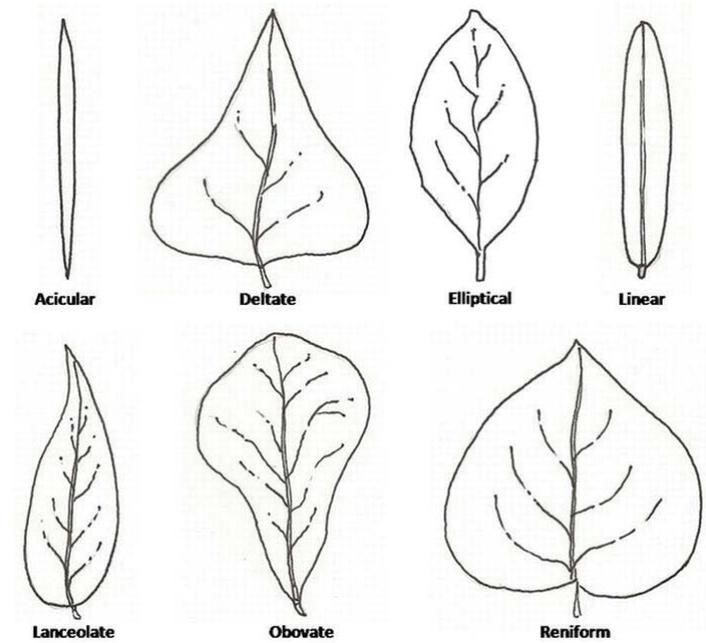


Figure 10. Seven different leaf shapes.
Credits: Line drawings by Becky Brown

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.

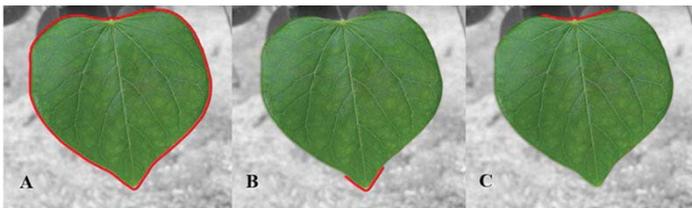


Figure 12. Components of a leaf consist of the margin (A), apex (B), and base (C). Credits: Walter Givens

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

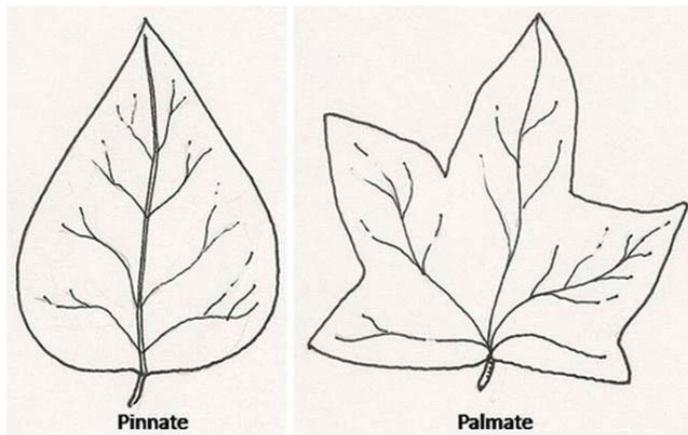


Figure 13. Two different kinds of leaf venation. Credits: Line drawings by Becky Brown

characteristic for some tree species and is therefore useful in the tree identification process.

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.

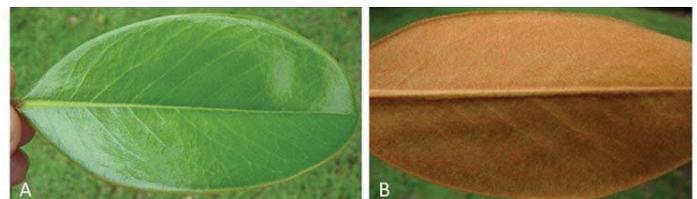


Figure 14. Magnolia leaves are glabrous on their top surfaces (A) and often have a rusty-orange pubescence on their bottom surfaces (B). Credits: Melissa H. Friedman

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.

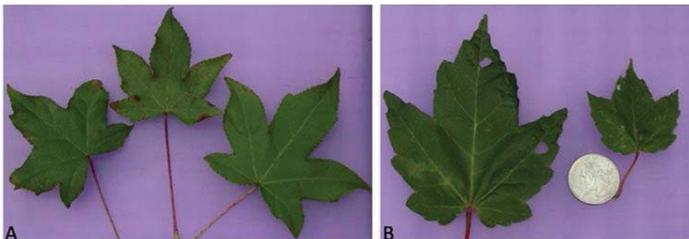


Figure 15. Sweetgum (A) and red maple (B) leaves side by side.
Credits: Michael G. Andreu

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.

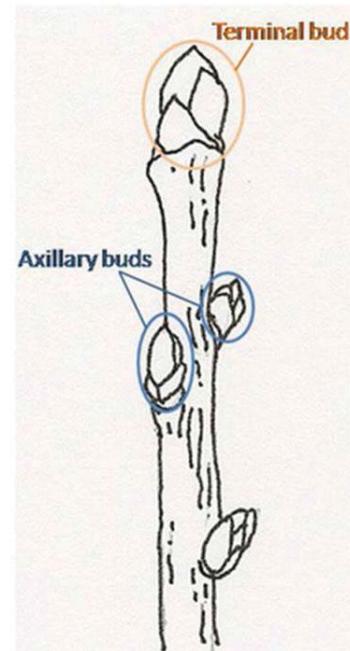


Figure 17. Location of terminal and axillary buds, as they appear on a twig.

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.

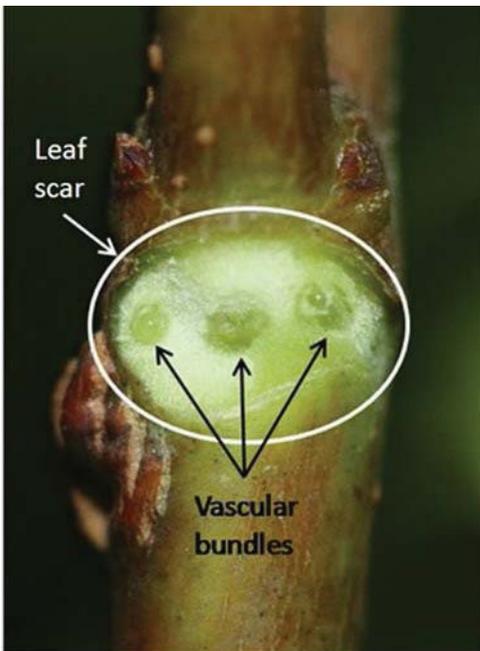


Figure 19. A sweetgum leaf scar showing three vascular bundles. Credits: Walter Givens

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).

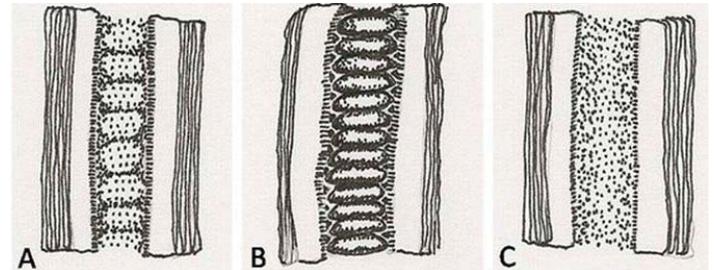


Figure 21. Solid diaphragmed pith (A), chambered pith (B), and solid homogeneous pith (C).

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

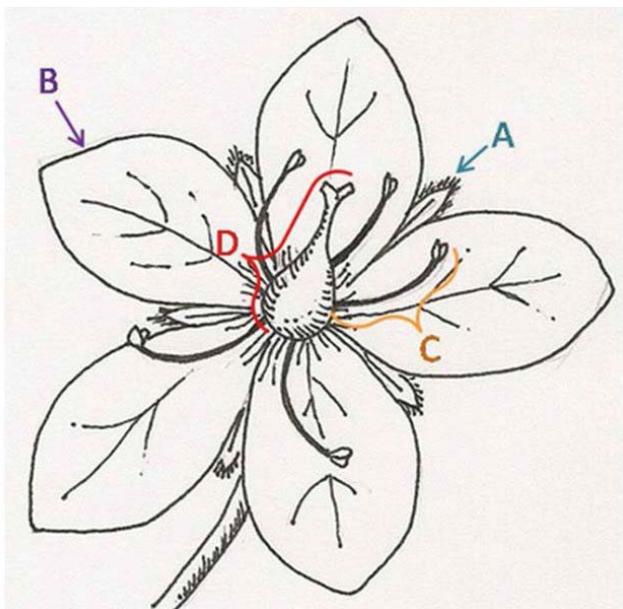


Figure 23. Basic flower anatomy: sepal (A), petal (B), stamen (C), and pistil (D).
Credits: Line drawing by Becky Brown

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.

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).

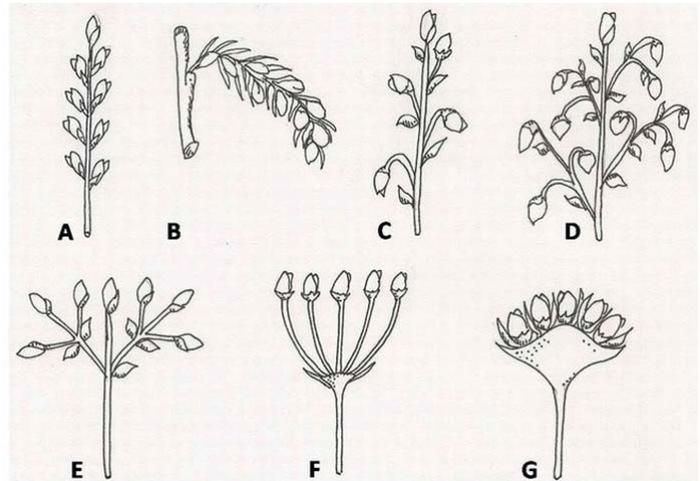


Figure 24. Flower inflorescence types: spike (A), catkin (B), raceme (C), panicle (D), cyme (E), umbel (F), and head (G).
Credits: Line drawing by Becky Brown

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 elliotii*) (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.

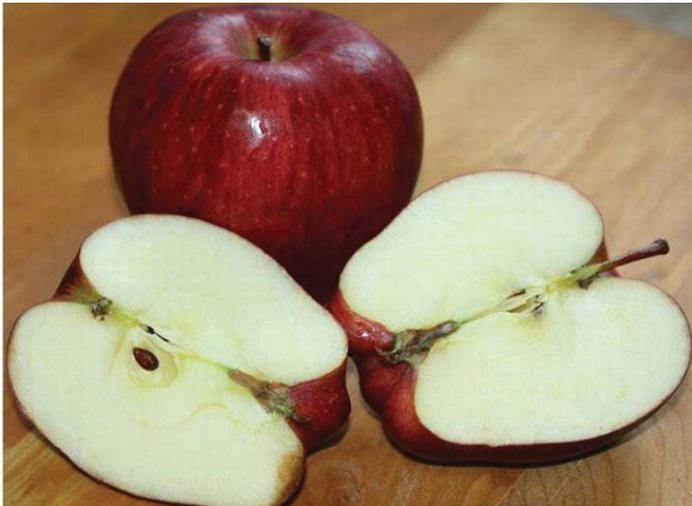


Figure 26. Apple pome or fruit.
Credits: Walter Givens

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!

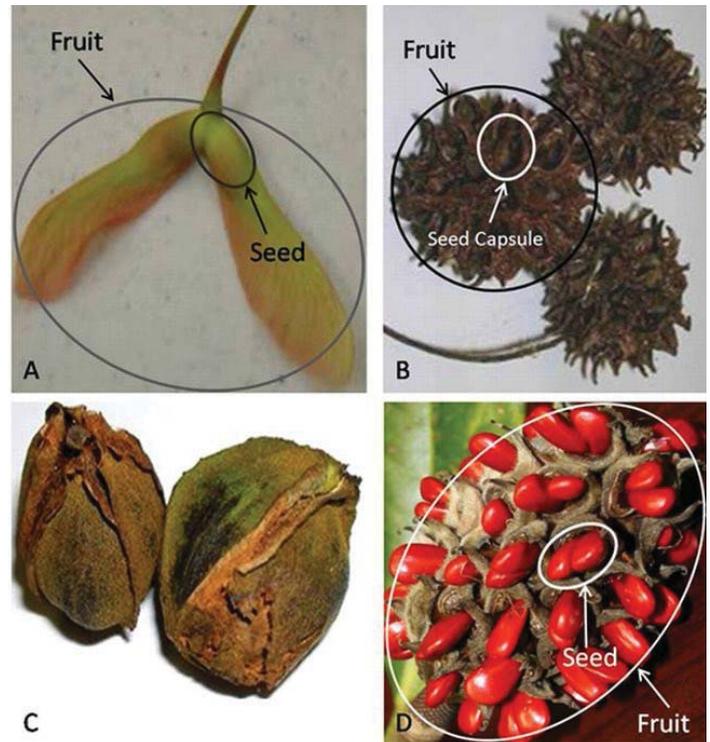


Figure 27. Four different kinds of fruit: red maple samaras (A), sweetgum capsule (B), bitter pecan (*Carya aquatica*) nut (C), and magnolia follicle (D).

Credits: A–C: Mary E. Thornhill, D: Michael G. Andreu

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

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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: |

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.

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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/floras/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

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