

Overview

Dendrology is the study of the characteristics of woody plants to distinguish between species. In this class, students will learn to identify trees by their bark, twigs, leaves and habitat.



Background

Trees are an important part of our everyday life. We use them for thousands of things, ranging from wood for houses and furniture to rayon for clothing and imitation vanilla to flavor food. Wherever we look we see trees in many different shapes and sizes. Each kind of tree can be recognized, just like we recognize people, by its individual physical characteristics. These characteristics are habitat, form, bark, branches and twigs, leaves, fruits and flowers. The study of these characteristics to distinguish between tree species is called *dendrology*.

In addition to species identification, dendrology addresses the concepts of structure and scale. This involves the classification of trees according to their position in the forest canopy or understory. Small woody shrubs spread in the shade of the forest floor. Shade-tolerant trees spread their branches through the understory to gather the medium sunlight available there. Tall, shade-intolerant species dominate the upper canopy, gathering the full sun they require.

The range of tree species in North Carolina is vast. In fact, some areas of the western part of the state support more than 200 different species in a single acre. Only a person with specialized training could be expected to identify all of these, but anyone can learn to recognize a good number of them by knowing what to look at and with a little practice.

Vocabulary

- **Bole:** The main trunk of a tree.
- **Broadleaf:** A class of trees that have broad, flat leaves of many different shapes; most are deciduous; also called hardwood because most broad-leaved trees have harder wood than conifers do; examples include oak, hickory, maple and ash.

- **Conifer:** A class of trees that are evergreen, have needle or scalelike foliage and conelike fruit; often called softwood. Examples include pine, hemlock, cedar and cypress.
- **Crown:** The branches and foliage at the top of a tree.
- **Deciduous:** Trees that lose all of their leaves every year.
- **Dendrology:** The study of trees; tree identification.
- **Evergreen:** Trees that do not lose all their leaves every year but go through a gradual replacement by dropping only their oldest leaves each year. Instead of being bare in winter, these trees have leaves all year.
- **Foliage:** The leaves of a tree or other plant.
- **Habitat:** An area in which a specific plant or animal naturally lives, grows and reproduces.
- **Leaf Margin:** The edge of a leaf.
- **Lenticels:** Small horizontal or vertical slits on the bark of twigs and branches of some species.
- **Pith:** The center part of a twig.
- **Roots:** The underground portion of a tree.
- **Venation:** The pattern of the veins beneath the surface of a leaf.

Doing the Activity

1. Use a diagram to describe and name the major parts of a tree, such as the crown, branches, twigs, leaves, bole and roots, and briefly discuss forest stratification, life zones and competition.
2. Introduce the activity by defining dendrology.
3. Review the differences between evergreen and deciduous trees and broadleaf vs. conifer.
4. Introduce and list the five features of tree identification, then describe them with visual aids:

Subjects

Science (botany, physiology, ecology); language arts (taxonomy, English common names, Latin scientific names)

Concepts

Forests, as well as other ecosystems, contain numerous habitats that support diverse populations of organisms.

The Earth's atmosphere, water, soil, climate and geology vary from region to region, thus creating a wide diversity of biological communities.

Populations of organisms exhibit variations in size and structure as a result of their adaptation to their habitat.

Biological diversity results from the interaction of living and non-living environmental components such as air, water, climate and geologic features.

Objectives

Students will: (1) use five basic features or tools to identify 10 to 20 different species of trees common in the southeastern U.S. These features or tools include habitat, form, bark, branches and twigs, leaves, flowers and fruits. (2) learn the different life zones within a forest.

Materials Needed

Sheltered area with seating for introductory part of class

Wooded area with diverse species for second part of class

Flip chart, posters or chalkboard to display pictures of the features named above.

Samples of bark, twigs and leaves.

Time Needed

Prepare visual aids and gather tree specimens before class.

Class can be taught in 1 hour.

Habitat: includes location (site and geographic location), shade tolerance and position within the forest stratification. Explain the difference in species that grow on a wet lowland site and those that grow on a high, dry ridge.

Form: includes shape of crown, texture, color and shape of bole. Discuss color in terms of fall leaf color for deciduous trees and differences in shades of green in conifers vs. hardwoods. A good example is that one might be able to tell if trees on a mountain slope across a valley are conifers or hardwoods by the color and texture of the crowns. Point out the difference between a cylinder-shaped bole and a conical bole.

Bark: includes color and texture. Describe the range of color represented by the bark of different species: white-gray, to brown, to nearly black. Give examples that the class can see from where they are sitting. Discuss different bark textures: rough blocky bark (shortleaf pine), nearly smooth bark (American beech). Show examples and let students feel them.

Branches and Twigs: includes branching pattern, buds, leaf scars, lenticels, pith, thorns/spikes/spurs. Describe and show the difference in alternate and opposite branching patterns. (White pine in the mountains represents a third type: whorled branching.) Discuss how branching pattern can be used to eliminate a wide range of species when you are trying to identify a specimen.

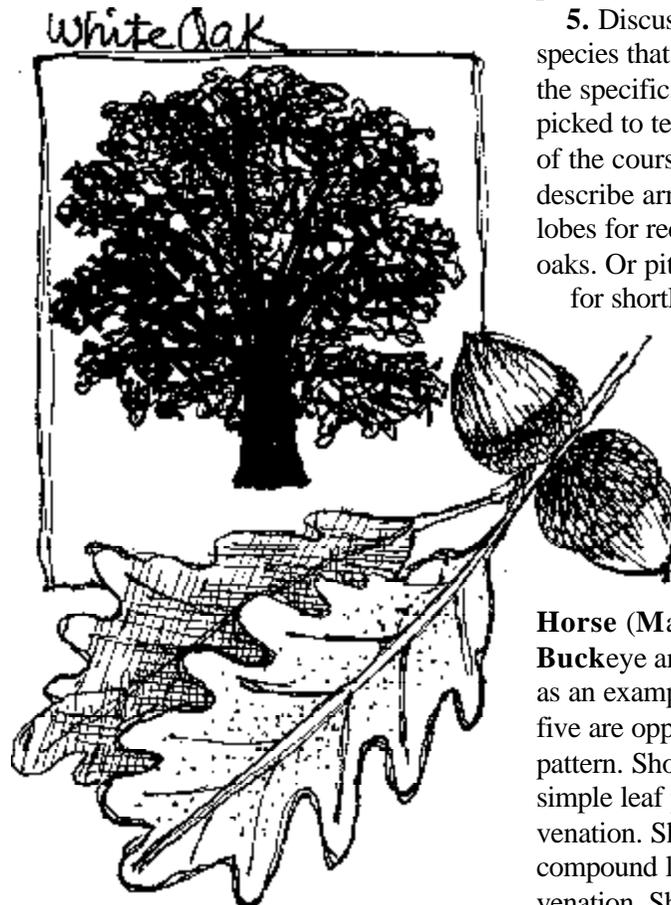
Introduce **MAD Bucking Horse**, which describes the trees in the Southeast with opposite branching pattern, **Maple**, **Ash** and **Dogwood**, **Buckeye** and **Horse chestnut**.

Use a diagram and examples of twigs to cover buds, leaf scars, lenticels and pith. Define a leaf as it relates to a bud. Explain that a true leaf is defined by where the bud set is located. Point out the differences in buds among species (big/small, hairy/smooth, multiple/single, color, scales). Show the leaf scar associated with each bud. Point out lenticels (air slits in the bark of twigs of some species, e.g. black cherry). Slice open a twig at an angle and show the pith (or use a diagram). Different species have various pith characteristics (color, full/hollow, chambered). Mention thorns and other special-

ized parts of some twigs.

Leaves, flowers and fruits: includes leaf pattern, venation, shape, margin, texture; flower color, arrangement, shape, timing of bloom; fruit type, size, color, arrangement.

Differentiate between simple vs. compound leaf pattern using the principle described above on where a true leaf begins. Allow students to classify samples



shown in class by leaf pattern. (Hold up a branch with several twigs and leaves. Have someone identify the bud then determine whether it is simple or compound.)

Describe and diagram leaf venation examples. Parallel venation is common in grasses, but not in many trees. Pinnate venation represents one main vein as an axis along the leaf with others splitting off from it. Palmate venation represents several main veins branching off from one point near the base of the leaf. Use the hand (palm) as a tool to remember palmate.

Describe and diagram leaf shapes (examples include needlelike, scalelike, linear, elliptical, lanceolate, oblanceolate, ovate, obovate, oval, circular, spatulate).

Explain that it is not important to remember the exact name of the shapes, but to picture the shapes in their mind so they can recognize them later.

Demonstrate different leaf margins (entire, sinuate, lobed, serrate, dentate, doubly serrate). Let students feel examples of different leaf textures (glabrous, pubescent, tomentose).

5. Discuss any differences in species that might be useful for the specific trees you have picked to teach in the lab section of the course. For example, describe armed versus unarmed lobes for red oaks and white oaks. Or pitch pockets present for shortleaf pine but not for loblolly pine.

6. Review the process-of-elimination principle again before beginning the lab section. Use **MAD Bucking**

Horse (Maple, Ash, Dogwood, Buckeye and Horse Chestnut) as an example. Point out that all five are opposite branching pattern. Show maple. Determine simple leaf pattern, palmate venation. Show ash. Determine compound leaf pattern, pinnate venation. Show dogwood. Determine simple leaf pattern, pinnate venation. Focus on the importance of using the tools of identification one at a time, rather than just guessing by the appearance of a tree.

7. Divide the students up evenly among guides. Take the groups to each predetermined tree and allow them to use the tools of tree identification to get as close to an identification as possible. Help them to complete the identification and discuss any interesting facts about the species (use, fall color, geographic range).

Helpful Hints

Use visual aids if possible. Smaller groups during the lab section allow greater focus on each specimen. Remind students that some dendrology questions will be on the quiz. If the dendrology relay will be run at the conclave, explain it to them during the lab portion of the course. A little hint of competition usually helps some students pay attention longer.

References

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Little, E.L. *The Audubon Society Field Guide to North American Trees, Eastern Region*. Chanticleer Press, Inc., New York.

Sargent C.S. *Manual of the Trees of North America*. Dover Publications, New York.

Others: *Textbook of Dendrology, A Guide to Trees of the Southeastern U.S.*

