



MASTER GARDENER
COLORADO STATE UNIVERSITY
EXTENSION

CMG GardenNotes #171

Identifying Trees and Shrubs

Outline:

- I. Introduction
 - II. Plant Identification Tools, page 1
 - a. Plant Identification Keys, page 2
 - III. Terminology, page 3
 - IV. Plant Identification Process, page 3
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I. Introduction

Plant identification is a skill that takes time and patience to develop. There are a myriad of rewards for developing this skill including:

- Serving your community as an informed plant expert
- Confidently communicating with clients about plant ID-related questions
- Enhanced ability to utilize plant diagnostics materials (most are based on plant identification)
- Obtaining the personal satisfaction of knowing the names of plants in gardens, landscaping, and in natural areas

The steps to plant identification involve observation, questioning, and research, similar to the process learned in diagnosing tree disorders (*CMG GardenNotes* #112).

Colorado Master Gardeners are often asked to identify plants either over the phone, with photos, or with a single leaf or plant part. Asking informed questions about the plant may provide the details needed for successful identification, but more than likely you will need to see a sample. Good samples include the stem with leaves attached, and flowers or fruit whenever possible.

For details on the taxonomic system, including use of scientific names, refer to *CMG GardenNotes* #122, **Taxonomic Classification**.

II. Plant Identification Tools

The most important skill used in successful plant identification is the ability to observe and define the characteristics of an individual plant. Examine the plant and note the overall appearance, and the structure, shape, and texture of stems, leaves, flowers and fruit, as well as any available roots. Use visual clues as well as the texture and scent of the plant. However, use caution, as some plants or plant parts are known to be irritating or toxic. One thing to keep in mind when observing plant characteristics is that even on the same plant, there is variation in

each of the leaves, stems, flowers, etc. Your chances of a correct identification increase when you look at the characters as an average from the whole plant, not just from one or two leaves.

Simple tools such as a hand lens, ruler, and a sharp blade (knife, scalpel or pruning shears) are helpful for examining plant parts. For more detailed work, a dissecting microscope is useful, especially for observing the details of small hairs or floral parts.

If you aren't able to identify a plant on the spot, you can collect samples (with permission only) for future identification or simply maintaining a visual collection of your own! Samples can be stored short-term in resealable plastic bags in the refrigerator for 1-2 weeks. Long-term storage involves pressing the sample between layers of newspaper in a plant press or between flat, heavy objects (stacks of books work well). When the specimen is completely dried, it can be mounted on special herbarium paper.

There are many references available for plant identification, both print and electronic. While photo books are easy to use, they often only contain the most common of species (otherwise photo books would be large, heavy, and very expensive). Website search features often require that the user already know something about the family or the name of the plant, but they are very useful in confirming identification or to obtain additional information regarding characteristics.

a. Plant Identification Keys

Plant Identification keys are designed to systematically compare plant structures until the identification of a plant species is reached. Authors of plant keys use the most up-to-date and scientific references to design a series of choices based on differing plant characteristics. In most cases, keys attempt to use easily distinguishable characteristics. However, when groups are more similar (i.e. determining between species or subspecies), the characters used in sorting out groups will require closer inspection and greater attention to detail.

i. Dichotomous Keys

The term "dichotomous" comes from the Greek word *dikhotomos*, which means "to cut in two". The premise of a dichotomous key is to give two choices, and only two choices, at each step. The step is called a couplet and will compare variations in similar plant characteristics, such as

- 1a. Leaves narrow, less than ½ inch.....go to 2
- 1b. Leaves wider than ½ inch.....go to 7

Read both statements in the couplet and choose the statement that best describes the plant being examined. Each statement is followed by a number, which indicates the next couplet you will read. If the leaf width is less than ½ inch, move down to the couplet labeled 2a and 2b. If the leaf width is more than ½ inch, skip couplets 2 through 6 and resume the process at 7a and 7b. Remember: try to look at the average appearance of the plant as a whole to answer questions about individual characteristics.

When you reach a couplet that gives you a plant name instead of a number, you have reached your identification. Check with your online and print resources to check that your identification is correct!

ii. *Outline Keys*

In outline keys, the options you compare are at each indentation level. More often these options not be adjacent in line order. For example, from the key below the first choice would be either I (needles single) or II (needles in clusters). If the needles were single, the next choice would be a (needles flat) or b (needles square).

- I. Needles single
 - a. Needles flat in cross-section and flexible
 - i. Leaf scar oval, bud tips pointed – *Pseudotsuga* (**Douglas fir**)
 - ii. Leaf scar round, bud tips roundish – *Abies* (**fir**)
 - b. Needles square in cross-section and stiff – *Picea* (**spruce**)
- II. Needles in clusters of 2 or more – *Pinus* (**pine**)

There are many key formats that give you more than just two options to evaluate each subsequent level. Select the characteristics that best describe the plant as a whole.

III. Terminology

The terminology of plant identification can be intimidating to a beginner, as well as the experienced plant taxonomist. There are specific terms for the tiniest of traits. For example, in *Plant Identification Terminology: An Illustrated Glossary*, James Harris lists 35 terms that describe the hairs on the surfaces of stems and leaves. Because there are so many specific terms, most plant taxonomists have specific glossaries with drawings (such as the one listed above).

Most keys and photo references also often contain a glossary with definitions of the botanical terms used in that publication. With practice, commonly used words become familiar; however, there are some terms that are used infrequently. There is no need to memorize all botanical terms! Use your resources and look them up as needed. When you are first learning to use botanical terms, it is often helpful to draw a picture of the structures or paraphrase the definitions in your own words.

IV. The Plant Identification Process

Plant identification is a process that begins with observing the plant as a whole, followed by systematically evaluating the details of the plant parts. When observing the whole plant, take some notes and draw some pictures of the larger features. Attention to detail is important in plant identification, but at the beginning of the process, try not to get overwhelmed with those details. There are an unlimited numbers of features on each plant, but you will only require some of them to identify the plant. The necessary details can be determined as you work through the key. Follow these first steps to get you started in your plant identification process—these will provide you with the larger features that will narrow down your possibilities before diving into more detailed observations.

a. Step 1: Collect Basic Information Regarding the Plant

i. Determine if the Tree/Shrub is a Conifer or a Broadleaf Flowering Plant

- **Conifers** are woody trees and shrubs generally with needle-like or scale-like foliage, and usually evergreen. Seeds are produced in cones, which are generally woody, (like a pine cone) but sometime fleshy and berry-like (juniper fruit) (see **Figure 1**). Examples include arborvitae, Douglas fir, fir, junipers, larch, pine, spruce, and yews.

Conifers are *Gymnosperms* (along with *Ginkgo biloba* and cycads), which are a group of plants that do not flower, but instead produce seed in a 'cone' structure made of modified leaves called scales. The term 'Gymnosperm' literally means "naked seed" and refers to the exposure of the female reproductive structure during pollination (instead of wrapped in an ovary as in flowering plants) rather than the actual seed being uncovered.

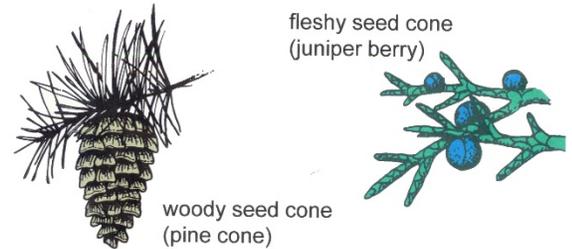


Figure 1: Woody and fleshy cones of conifers

- **Broadleaf flowering plants** are *Angiosperms*, which is a highly diverse group of plants that produce flowers and seeds enclosed in fruits. Flowers range from tiny and inconspicuous to large and showy.. This group includes woody trees, shrubs, and vines and is often referred to as broadleaf plants due to the large, flattened leaf blade (see **Figure 2**).



Figure 2: Large, flattened leaf blade common of Angiosperms

ii. Determine if the Plant is Deciduous or Evergreen

- **Deciduous** plants shed leaves in the fall. Most broadleaf flowering plants in Colorado are deciduous, along with a few conifers such as some *Larix* (Larch).
- **Semi-evergreen** plants may retain some leaves, depending on winter temperatures and moisture.
- **Evergreen** plants retain leaves for multiple seasons. Leaves (needles) will be present throughout the year. Most conifers are evergreen, along with some broadleaf plants such as *Mahonia* (Oregon grape).

iii. Determine the Growth Habit of the Plant.

Growth habit refers to the genetic tendency of a plant to grow in a certain shape and to attain a certain mature height and spread.

- **Trees** typically have a single trunk and mature height over 12 feet.
- **Shrubs** typically have multiple-branches from the ground and a mature height less than 12 feet.
- **Vines** have a climbing, clasping, or self-clinging growth habit.

Note: Many landscape plants could be considered small trees or large shrubs. The term “tree” or “shrub” would be applied based on the general appearance of the plant. The species, cultivar, or variety name sometimes indicates plant characteristic, including form.

b. Step 2 – Consult a Key to Lead You Through the Identification Process.

Each region of the county has a variety of keys written for trees in that region. Examples of keys for the Colorado region include the following:

- *Key to Common Landscape Trees and Shrubs of Colorado*, CMG GardenNotes #177 at <http://www.cmg.colostate.edu/TreeID/177.html>
- *Identifying Conifers*, CMG GardenNotes #172 at <http://www.ext.colostate.edu/mg/Gardennotes/172.pdf>
- *Flora of Colorado* Jennifer Ackerfield. Brit Press. 2015
- *Trees and Shrubs of Colorado*. Jack L. Carter. Second edition, 2006

CMG GardenNotes #172, **Identifying Conifers**, gives more details on identification of conifers. CMG GardenNotes #173, **Identifying Broadleaf Trees and Shrubs**, gives more details on identifying broadleaf flowering trees and Shrubs.

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