



## CMG GardenNotes #173

# Identifying Broadleaf Flowering Trees and Shrubs

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Identification of broadleaf trees and shrubs is a skill mastered with practice and knowledge of the plant families. Most trees and shrubs can be readily identified to family and genus with a basic knowledge of the plant's characteristics and the use of a key. There are always a few exceptions with plants that do not look like their relatives. Identification to specific epithet requires more skill and a closer look at plant characteristics. Identification to variety and cultivar can be very difficult, as the defining characteristics may not be clearly observable from plant samples. Identify the plant to the level you are comfortable and to what the task requires.

Keys can be arranged in a variety of ways, but most start by separating Gymnosperms from Angiosperms then start with broad, easily identifiable characteristics to narrow the plant to family level. Usually, the more specific and smaller plant characteristics will be used to narrow the plant down to genus and specific epithet. The following sections will cover the most common characteristics you will encounter in a plant key. Some of these characteristics you will come across with every plant you key, and you should be comfortable using these terms.

## Leaf Characteristics

### a. Leaf Arrangement [Figure 1]

- **Alternate** – Arranged in staggered fashion along stem, i.e., willow.
- **Opposite** – Pair of leaves arranged across from each other on stem, i.e., maple.
- **Whorled** – Arranged in a ring around the stem, i.e., catalpa.

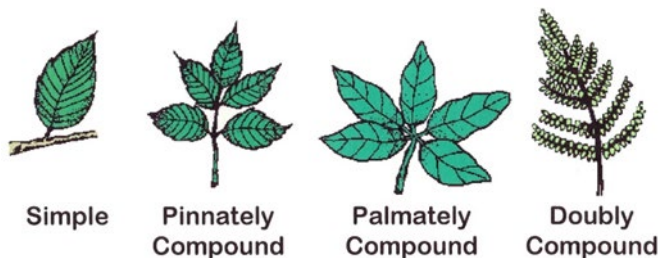
Figure 1. Leaf Arrangement on the Stem



b. Leaf Form [Figure 2]

- **Simple** – Leaf blade is one continuous unit, i.e., cherry, maple, and elm.
- **Compound** – Several leaflets arranged on one petiole.
- **Pinnately compound** – Leaflets arranged on both sides of a rachis are an extension of the petiole, like a feather, i.e., honeylocust.
- **Palmately compound** – Leaflets radiate from one central point at the tip of the petiole, i.e., Ohio buckeye and horse chestnut.
- **Doubly pinnately** (or bipinnately) compound – leaflets are arranged on a branch off the rachis, i.e., Kentucky coffee tree.

Figure 2. Variety of Leaf Forms

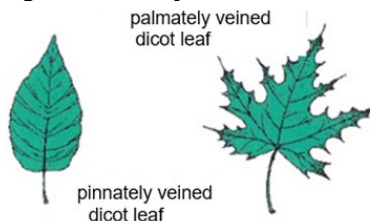


**Note:** Sometimes identifying a "leaf" or "leaflet" can be confusing. Look at the petiole attachment. A leaf petiole attaches to the stem at a bud node. There is no bud node where leaflets attach to the petiole.

c. Leaf Venation [Figure 3]

- **Pinnately** veined leaves have a central vein down the center with smaller veins branching off and extending to the leaf margin, i.e., elm, peach, and linden.
- **Palmately** veined leaves radiate smaller veins out in a fan-shaped pattern from a central point at the petiole leaf stem, i.e., maple, mulberry, and poplar.

Figure 3. Variety of Leaf Venation



d. Leaf Shape [see Figures 4-7]

Leaf shape is a primary tool in plant identification. Descriptions often go into fine detail about general leaf shape, and the shape of the leaf apex and base. There is no hard and fast dividing line where one type suddenly becomes another type; rather it is a judgment call. When using keys, look at several leaves from the plant, select the average shape, and be flexible in your description. The authors of these plant identification keys are aware of the variation within plants and will often write several options into the key. The following figures show the common overall shapes, leaf apices and bases, and leaf margins.

Figure 4. Variety of Overall Leaf Shapes

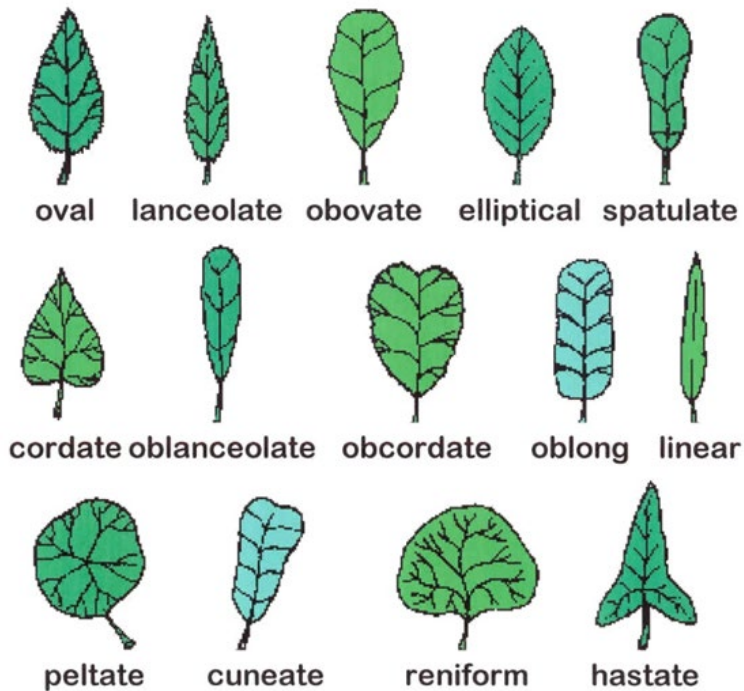


Figure 5. Variety of Leaf Apex Shapes

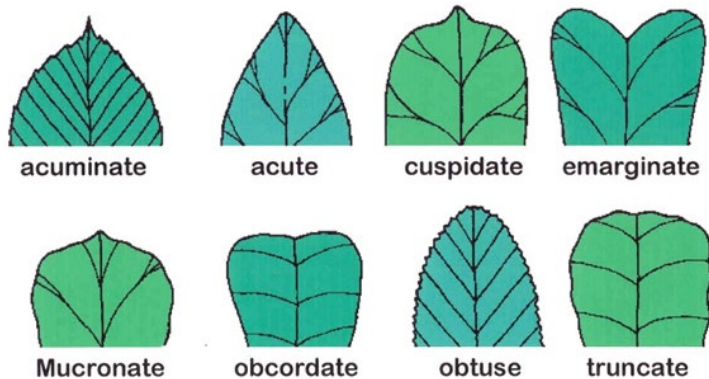


Figure 6. Variety of Leaf Base Shapes

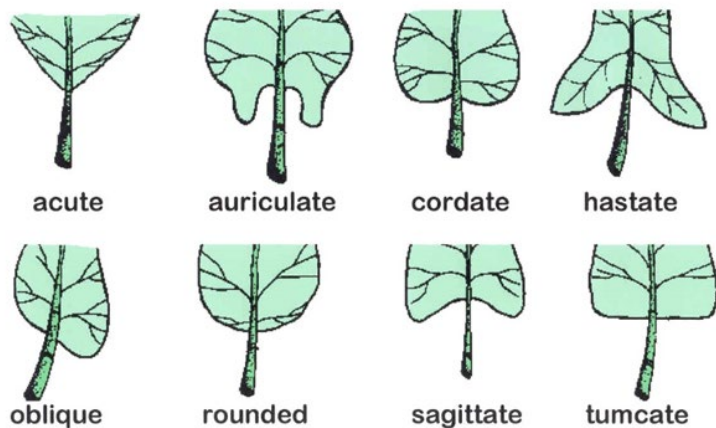
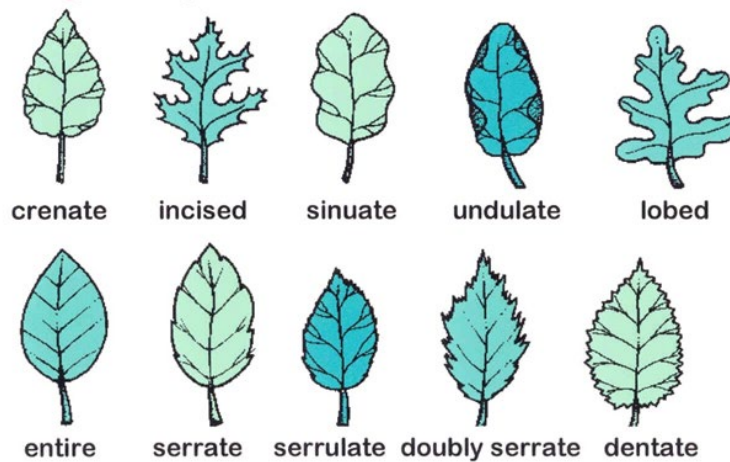


Figure 7. Variety of Leaf Margins



#### e. Leaf Surface Texture

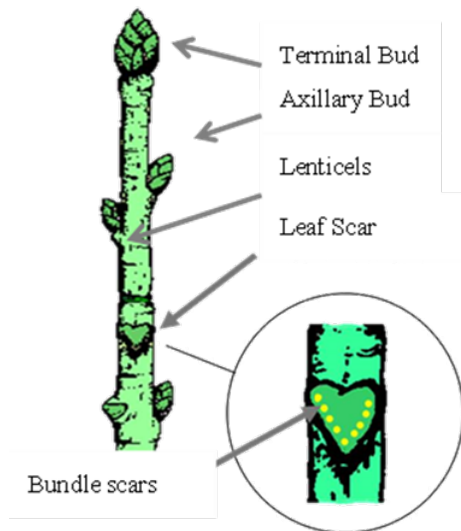
Look at all the leaf surfaces, above and below. Note the location, color, density and length of scales and hairs. These terms are commonly encountered when describing leaf surface texture.

- **Ciliate** – Orderly, widely spaced hairs along the edge (margin), also called fringed.
- **Glandular** – Hairs bearing glands.
- **Glutinous** – Sticky to the touch.
- **Scabrous** – Hairs very short.
- **Stellate** – Star shaped hair (needs magnification).
- **Velutinous** – Dense hairs of equal height, like velvet.

### Stem Characteristics

Stems contain several features important to identifying plants. Cut into the stem to see the pith. Look at the epidermis, buds, arrangement of the nodes and any surface coating or texture. For winter identification of woody plants, look at the pattern of the scales on the terminal and axillary buds and the shape of the leaf scars.

Figure 8. External Stem Features



#### a. External Stem Features [see Figure 8]

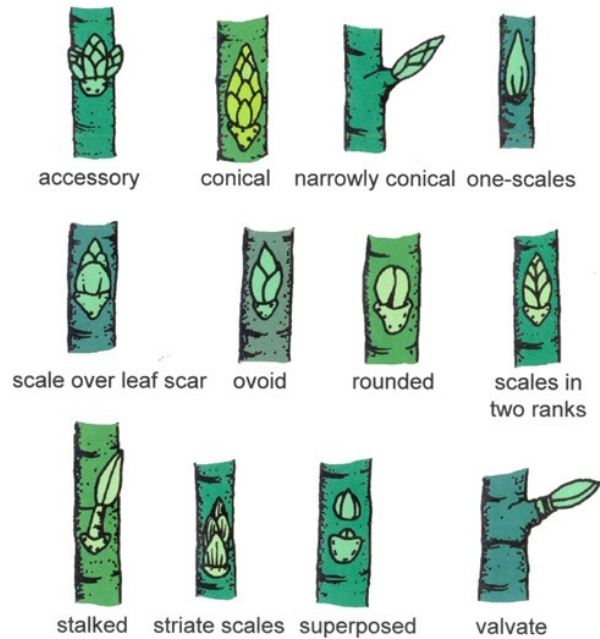
- **Terminal bud** – This bud is where growth that lengthens the stem happens. The young, dividing cells are protected by terminal bud scales.
- **Axillary bud** – These buds, also called lateral buds, when actively dividing, will become a new branch. They are smaller versions of the terminal bud and can also be protected by scales.
- **Leaf scar** – The mark left on a stem where leaf was attached. The shape of the leaf scar is often used in woody plant identification.
- **Bundle scar** – Marks left in the leaf scar from the vascular tissue attachment. The shape of the bundle scar is often used in woody plant identification.
- **Lenticels** – Woody twigs have these pores in the bark to allow for gas exchange. These look like little dots along the stem.

### b. Axillary Bud Type [Figure 9]

The type of axillary bud (the way the scales are arranged over the bud) is another feature used in plant identification.

Figure 9. Illustrations of some bud types.

Figure 9: Axillary Bud Types



### c. Stem Surface Texture

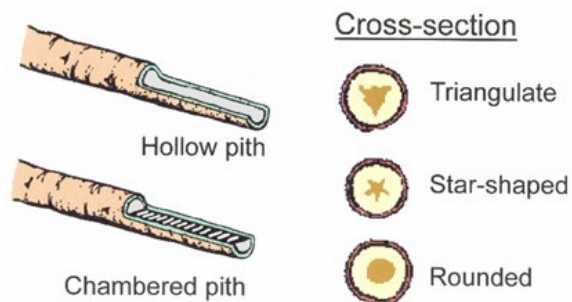
The surface of woody twigs may have a texture that can be used to distinguish one plant from another. Terms used to describe the surfaces of stems can also apply to leaves.

- **Farinose** – Covered with a mealy, powdery substance.
- **Glabrous** – Smooth.
- **Glaucous** – Having a bloom or whitish covering, often waxy.
- **Hirsute** – Covered with coarse, stiff hairs, rough enough to break the skin.
- **Pubescent** – Covered with hairs.
- **Scurfy** – Covered with small scales.
- **Tomentose** – Covered with short, matted or tangled, soft, wooly hairs.

### d. Internal Stem Features

Pith is the tissue found at the center of stems and roots. Pith characteristics may provide identification clues. A diagonal cut across the stem reveals if the center of the stem is hollow or if the pith is solid or chambered. A straight cut across the stem reveals the shape of the pith (rounded, star, or triangle). [Figure 10]

Figure 10. Internal stem features used in plant identification.



## Fruit Characteristics

Generally, the identification of trees and shrubs is done without fruit, as the fruit is only around for a short season. However, when fruit is present, it can be a tool in plant identification. For example, legumes are characteristic of the Pea family (*Fabaceae*). The following is an outline key defining the different fruit types you may see on trees and shrubs.



A note on floral terms here, the **carpel** is the innermost section of a flower and contains the female reproductive structures of the plant. One or more carpels make up the pistil. The pistil can have one ovary (chamber), or several ovaries fused together. Single flowers can also have multiple pistils. The pistil is the part of the flower that the fruit is derived from, so these differences in fruit types come from differences in the arrangement of the pistil. A good place to practice your fruit identification is at the grocery store.

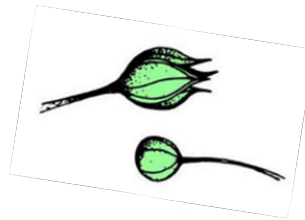
## Key of Fruit Types

### a. Simple fruit – Fruit formed from one pistil.

#### 1. Dry fruit

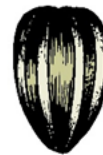
**Dehiscent fruits** – These fruits split open when mature to release seeds.

- **Capsule** – Many seeded fruits formed from more than one united carpel.
- **Follicle** – Composed of one carpel but splits open at maturity along one suture exposing seeds.
- **Legume (Pod)** – Composed of one carpel that splits open along two sutures (like a pea pod). Characteristics of most members of the *Fabaceae* family.



**Indehiscent fruits** – These fruits do not split open when mature; the seed stays intact inside.

- **Achene** – One seeded fruit with seed attached at only one place to the pericarp. Pericarp is very close-fitted and does not split open, at least along regular established lines.
- **Samara** – One or two seeded with a membranous wing.
- **Nut** – A bony, hard, one-seeded fruit.
- **Nutlet** – A tiny nut.



Elm

Ash

Double seeded = Maple



### b. Fleshy fruits

- **Berry** – The entire fruit is fleshy like grapes or currents.
- **Drupe** – The fruit is clearly differentiated into three layers, the outside layer is the epidermis, the middle layer is fleshy,



and the inside layer forms a stony “pit” around the seed like a peach or plum.

- **Pome** – The pericarp is surrounded by the floral cup (hypanthium), which becomes the fleshy edible part of the fruit like an apple.



3. **Aggregate fruits** – Develop from a single flower that contains many separate pistils. The fruits from the individual pistils are arranged on one receptacle.

Examples:

- **Fragaria** (strawberry) – Aggregate of achenes.
- **Liriodendron** (tuliptree) – Aggregate of samaras.
- **Maclura** (Osage-orange) – Aggregate of drupes.
- **Magnolia** (magnolia) – Aggregate of follicles.
- **Rubus** (raspberry) – Aggregate of drupes.

4. **Multiple fruits** – Consists of several flowers which are more or less united into one mass.

Example:

- **Morus** (Mulberry) and pineapples.

### Identification Keys to Landscape Trees

The following is a helpful list of plant identification keys you can use in your broadleaf shrubs and trees identification:

- CMG GardenNotes #172, *Identifying Conifers: Arborvitae, Douglas Fir, Fir, Juniper, Pine, Spruce, and Yew.*
- *Flora of Colorado*, Jennifer Ackerfield. Brit Press 2015.
- *Trees and Shrubs of Colorado*, Jack L. Carter. Second edition, 2006.
- *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses*, Michael A. Dirr, 6<sup>th</sup> Edition, 1998.

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