

MINNESOTA TREES



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Cover Photograph: Autumn colors are one of the many treasures Minnesota's trees provide. Two Norway pines, Minnesota's state tree, are framed by the autumn fabric of smooth sumacs in the foreground and a large eastern cottonwood overhead.

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Beginner's Guide Available

Casual nature observers and elementary and secondary school-age youth may prefer the inexpensive, 20-page *A Beginner's Guide to Minnesota Trees*. It identifies the 35 tree species commonly found in Minnesota with easy-to-follow keying symbols. Call the University of Minnesota Extension Service Distribution Center at (800) 876-8636 or (612) 625-8173 for price and availability. Ask for item BU-06593.

MINNESOTA TREES

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ILLUSTRATION CREDITS

Bruce L. Fuller, Minnesota Extension Service, University of Minnesota. Drawings of speckled alder (leaf), and staghorn sumac (leaf) were reproduced from the Minnesota Extension Service publication *Minnesota Forest Trees* (1972) by William R. Miles and Bruce L. Fuller.

John Molstad, University of Minnesota, Minnesota Extension Service. Drawings of coniferous tree leaves and seed cones (figure 4), deciduous tree leaves (figure 5), twig characteristics (figure 6; false terminal bud, valvate bud scales, pith shape, arrangements, male catkin), fruits (figure 7; samara, double samara, multiple of drupes, acorn), black ash (twig), green ash (twig), white ash, American mountain-ash (twig), European mountain-ash, common prickly-ash (leaf), European white birch, paper birch (twig), blue-beech (twig), buckeye (fruit), catalpa (twig), black cherry (twig, fruit), chokecherry (twig), pin cherry (twig), Kentucky coffeetree (twig, fruit), American elm (twig, bark), rock elm (twig, fruit), Siberian elm, slippery elm, douglas-fir, ginkgo (twig), hackberry (twig), bitternut hickory (twig), shagbark hickory (twig), ironwood (twig), eastern larch, European larch, basswood, black locust (twig), honeylocust (leaves), boxelder (twig, fruit), Norway maple, red maple (twig, fruit), silver maple (fruit), sugar maple (twig, fruit), tatarian maple, black oak (twig, fruit), bur oak (twig), eastern pin oak (fruit), northern pin oak (fruit), swamp white oak (fruit), American plum, Canada plum, balsam poplar (twig), bigtooth aspen (leaf, twig), trembling aspen, jack pine (leaf), ponderosa pine (leaf), red pine (leaf), Scotch pine (leaf), white pine (leaf), black walnut, butternut (fruit), twig, bebb willow, black willow (twig), heartleaf willow, laurel willow, peachleaf willow, pussy willow, sandbar willow, shining willow, and white willow.

Michael W. Rathke with assistance from Daniel M. Rathke. Drawings of twig characteristics (figure 6; twig, thorn), fruits (figure 7; capsule, drupe, legume, pome), prairie crabapple, common buckthorn, alternate-leaf dogwood, hawthorn, amur maple, nannyberry, roundleaf serviceberry, Saskatoon serviceberry, staghorn sumac (twig, fruit), and wahoo.

A. E. Hoyle, U.S. Department of Agriculture, Forest Service. Drawings of black ash (leaf, fruit), green ash (leaf, fruit), American mountain-ash (leaf, fruit), paper birch (leaf, fruit), yellow birch, river birch, blue-beech (leaf, fruit), northern white-cedar, black cherry (leaf), chokecherry (leaf, fruit), pin cherry (leaf, fruit), American elm (leaf, fruit), rock elm (leaf), balsam fir, hackberry (leaf, fruit), eastern hemlock, bitternut hickory (leaf, fruit), shagbark hickory (leaf), ironwood (leaf, fruit), eastern redcedar, honeylocust (thorn, fruit), boxelder (leaf), sugar maple (leaf), black oak (leaf), red oak (leaf), swamp white oak (leaf), white oak (leaf, fruit), balsam poplar (fruit), bigtooth aspen (fruit), eastern cottonwood, jack pine (twig, seed cone), red pine (closed seed cone), white pine (seed cone), downy serviceberry (leaf), black spruce, white spruce, butternut (leaf), and black willow (leaf, fruit) were reproduced from the University of Minnesota, Department of Agriculture, Extension Division publication *Common Forest Trees of Minnesota* (1930) by Wilbur Mattoon and Parker Anderson.

Leta Hughey, U.S. Department of Agriculture, Forest Service. Drawings of sweet birch, Ohio buckeye (leaf), northern catalpa (leaf, fruit), Kentucky coffeetree (leaf), amur corktree, Fraser fir, ginkgo (leaf, fruit), shagbark hickory (fruit), black locust (leaf, fruit), black maple, red maple (leaf), silver maple (leaf), red mulberry, white mulberry, chinkapin oak, eastern pin oak (leaf), Austrian pine, ponderosa pine (seed cone), Scotch pine (seed cone), red pine (open seed cone), balsam poplar (leaf), white poplar, Russian-olive, blue spruce, and Norway spruce were reproduced from "Important Forest Trees of the United States" by Elbert Little in *The Yearbook of Agriculture 1949*.

University of Minnesota, Minnesota Extension Service. Drawings of poison ivy (page 24), poison sumac (page 24), and common prickly-ash (twig, fruit) (page 42) were reproduced with permission of the Minnesota Extension Service from the publication *Pesky Plants* (1989) by T. Kommedahl.

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The Witch Tree, precariously perched on a granite rock at the edge of Lake Superior near Grand Portage, is deeply rooted in Minnesota's history. The centuries-old white-cedar holds a special place in American Indian spirituality. People of all backgrounds and traditions respect it as a symbol of strength and endurance.

INTRODUCTION

Trees contribute much to the quality of life enjoyed in Minnesota, so we naturally are interested in knowing more about them. This book introduces you to more than 100 trees found in Minnesota forests and backyards.

The book is divided into four sections: (1) background information, (2) descriptions of coniferous trees and their identifying characteristics, (3) descriptions of deciduous trees and their identifying characteristics, and (4) projects to help you enjoy learning about trees.

With this book in hand, you'll make many new friends—the trees growing in Minnesota. With pride, you'll be able to say, “That’s a sugar maple, and the tree to the left is a basswood.”

What Is a Tree?

For our purposes, a tree is defined as a woody plant usually having a single, upright stem growing to a height of at least 15 feet with a defined crown developing at least two or more feet above the ground. Shrubs, in contrast, usually have several upright or spreading stems branching from the base and grow less than 15 feet tall. Plants that commonly develop into trees are included in this book.

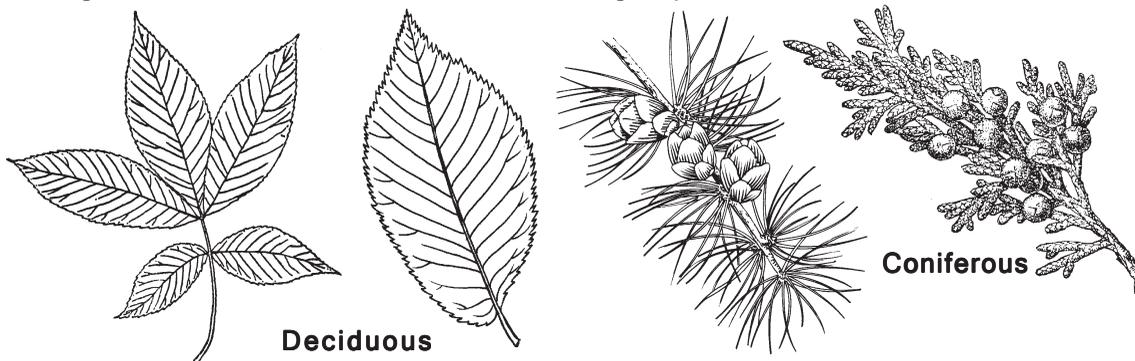
Identifying Trees

When we try to identify things, whether rocks, animals, or trees, we begin by connecting them with groups of things with similar characteristics. Trees can be classified into two broad groups: *coniferous* and *deciduous*. Coniferous trees bear their seeds in cones and have very narrow or overlapping leaves. All of our coniferous trees except the larches are evergreens, meaning that they maintain their leaves throughout the year. Deciduous trees, in contrast, do not bear their seeds in cones and have broad leaves that drop in autumn. Figure 1 shows the basic differences between coniferous trees and deciduous trees.

If you know whether a tree is coniferous or deciduous, you are ready to begin. If the tree is coniferous, turn to Section Two. If it is deciduous (or without leaves), turn to Section Three.

The introductions to both sections describe features commonly used to identify trees in each group. They also contain keys for identifying trees by genus (e.g., maple, pine). If you are unsure about how to use an identification key, read “How to Use a Key” on page 2.

Figure 1. Trees can be divided into two groups: deciduous and coniferous.



How to Use a Key

A key is a tool that reduces the process of identifying something to a series of steps.

If you are trying to identify a tree and think you know its name or genus (e.g., maple, pine), find that tree's description using the species index at the back of this book, then check its characteristics with those provided in the text. To assist your identification, species with similar characteristics are grouped together in the text. If you are unsure of what it is, use the keys to help narrow the possibilities.

Three keys are provided: (1) coniferous trees (page 8); (2) deciduous trees with leaves (page 25); and (3) trees without leaves, including larches (page 75). The keys are based on differences in leaves, twigs, fruits, and bark.

Each step in the key has two alternative descriptions (labeled *a* and *b*) with the same number and indentation on the page. Select the one of the pair that best describes the tree you are examining. Proceed to the next pair of descriptions directly below and indented closest to your choice. Continue this process until you get to the name of the genus or species. (If both choices seem reasonable at any step, try going both ways.) Finally, read the species descriptions to confirm your identification.

For example, suppose that the unknown tree you are examining is an imaginary coniferous tree known as blue pine. It has 6- to 8-inch long, bluish-green, needlelike leaves, and 8- to 12-inch long seed cones. The correct steps for identifying the tree are highlighted in the example key below.

Example Key

(correct steps for identifying blue pine are highlighted)

- 1a. Seeds borne in woody (rarely fleshy) cones; leaves needlelike or overlapping (like fish scales), persistent in winter (coniferous tree).**
- 2a. Leaves brownish-green, less than 2" long.
 - 3a. Cones fleshy; leaves overlapping Brown cedar
 - 3b. Cones woody; leaves needlelike Brown pine
- 2b. Leaves bluish-green, 2" long or greater.**
 - 4a. Cones less than 8" long, leaves 3" - 4" long False blue pine
 - 4b. Cones 8" - 12" long; leaves greater than 6" long Blue pine**
- 1b. Seeds not borne in cones; leaves broad and flat absent in winter (deciduous tree).

Section One:

BACKGROUND

Common and Scientific Names

Each species has a common and a scientific name. Common names usually are based on characteristics or uses of the tree (e.g., swamp white oak, bitternut hickory, paper birch, Kentucky coffeetree). Despite efforts to standardize them, common names tend to vary from location to location. Scientific names, on the other hand, are the same worldwide and describe one and only one species. For example, our state tree often is called Norway pine in Minnesota and red pine in other parts of the country. However, the scientific name of this tree is *Pinus resinosa* throughout the world.

Scientific names are written in Latin and composed of two words. The first word is the name of the genus, and the second is the species expression (or epithet). For red pine, the complete scientific name is *Pinus resinosa*; the genus is *Pinus*, and the species expression is *resinosa*. Note that scientific names are written in italics (or underlined) and the first letter of the genus name is capitalized. Although it is important to recognize scientific names, you will want to remember the common names.

Size and Shape

A tree's size and shape can help you identify it and select appropriate species to plant in different locations. Small trees grow to a mature height of 25 feet or less. Medium-sized trees reach a mature height of 26 to 50 feet, while large trees commonly exceed 50 feet at maturity. As a general rule, you should only plant small trees near power lines.

Height estimates given in the tree descriptions that follow are for mature trees under average conditions in the Upper Midwest. Heights in parentheses are for older trees or for trees growing under very favorable conditions in Minnesota.

Some species show distinctive branching patterns and trunk forms. An open-grown American elm, for example, easily can be identified at a distance by its vase-shaped crown composed of several upright stems forking off the main trunk and drooping at their ends. Kentucky coffeetree tends to develop a narrow, pyramid-shaped or rounded crown of crooked branches, while basswood tends to have a broad, rounded crown of spreading branches. With a little practice, you can become quite proficient at identifying open-grown trees from a distance.

A tree's trunk also can offer some identification clues. Some trees, such as the black willow, often develop a twisted or leaning trunk. Others, such as eastern white pine, tend to develop a tall, straight trunk that is flared (buttressed) at the base. Basic trunk descriptions are given along with the typical mature trunk diameter. Trunk diameter is expressed as the diameter 4½ feet above the ground, known as the diameter at breast height (dbh).

Other Characteristics

Leaves, twigs, fruits (or seed cones), and bark are described for each tree. Key identifying characteristics are italicized in the text. Definitions of the features needed to identify trees are provided in the introduction to the section.

Like people, trees are unique individuals that are influenced by many genetic and environmental factors. Genetic factors are passed from one generation to the next. Environmental factors that can influence a tree's characteristics include soil nutrients, water, light, competition, climate, and disturbance. Although genetic factors may influence almost any characteristic of the tree, environmental factors tend to influence tree size, crown form, and the size and number of leaves, branches, and fruits. Because genetic and environmental factors affect the appearance of a tree, you should carefully examine several characteristics to make an accurate identification.

Range: Native and Introduced Trees

Each species is described as native or introduced to Minnesota and its general geographic range and hardiness zone is identified. Many native species occur outside the identified range because of outlying populations or, more often, because people planted them there. In nature, species survival is based on an ability to outcompete or coexist with others and reproduce in a specific habitat type, known as a *niche*. When we plant and care for trees, however, we eliminate (or greatly reduce) competition, allowing many species to survive outside their natural niche. In these cases climate, soil nutrients, and landscape patterns become the primary limiting factors.

Hardiness Zones

When selecting trees for planting, it is important to select plants that can survive in the area. The best technique usually is to use species native to the area. The U.S. Department of Agriculture (USDA) plant hardiness zones also can provide assistance. Figure 2 shows the different hardiness zones in Minnesota based on minimum winter temperatures. Note that each

zone is divided into two parts, with (a) being the colder half. While hardiness ratings are useful, they only are general references; many factors can influence a tree's ability to survive in a specific area.

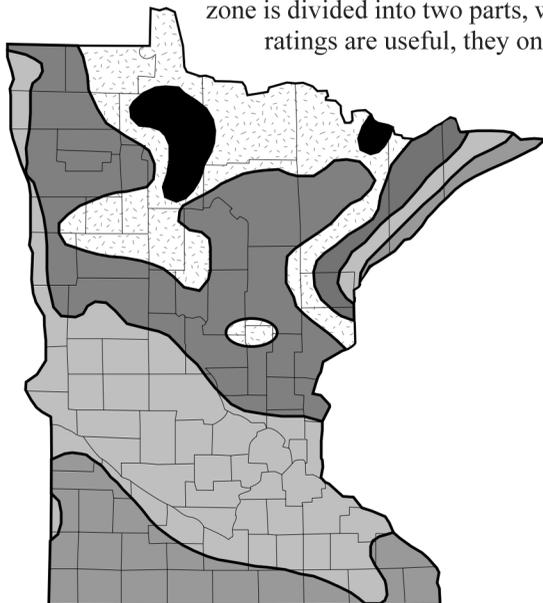


Figure 2. USDA plant hardiness zone map of Minnesota.

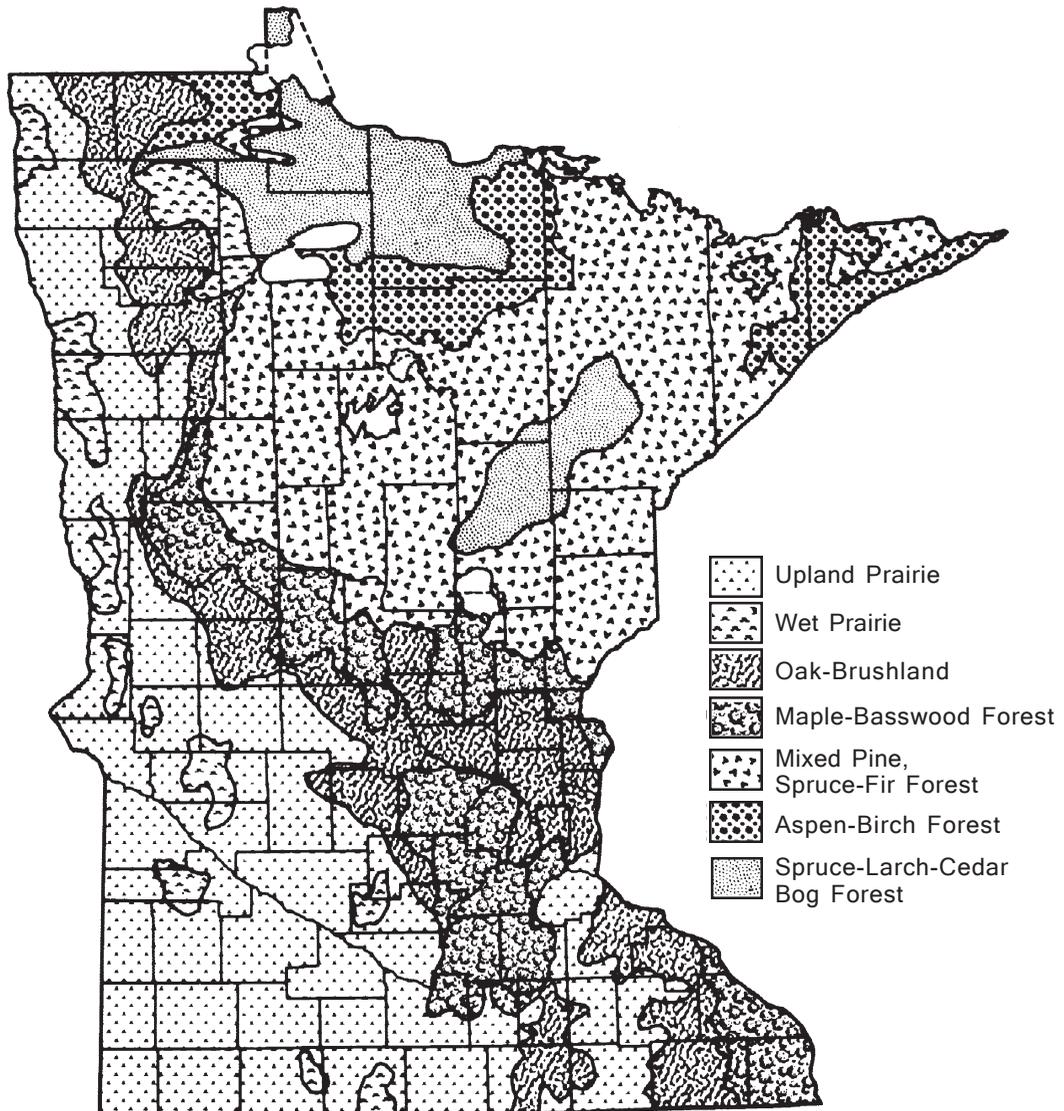


Natural Vegetation

Minnesota is uniquely situated at the edge of three major ecological communities—eastern deciduous forest, western tall grass prairie, and northern coniferous forest. Thus, many species have only a small portion of their geographic range within the boundary of the state.

The occurrence of these ecological communities largely has been determined by climate, soils, and landscape patterns. Within each community, different vegetative types can occur because of natural disturbances (e.g., fire, drought, windstorm, ice damage, and insect and disease outbreaks), soil types, topography, and microclimates. Figure 3 shows the vegetative types present in Minnesota prior to European settlement.

Figure 3. Original vegetation of Minnesota prior to European settlement.



Minnesota Forests

The acreage of Minnesota's forests has greatly decreased since the first European settlers arrived. Then, about 31.5 million acres of our state's 51.2 million acres were forested. With the development of agriculture, roads, and cities, forests now cover only about 16.7 million acres. Fortunately, tree planting and natural succession are restoring some of the previously forested areas.

Minnesota's forests have immense economic and environmental importance. The production and processing of wood and wood fiber is the second largest manufacturing industry in Minnesota. Millions of tourists and recreational users are attracted to the beauty and solitude of our forests. Forests also provide habitat for wildlife, protect soils, and renew water resources. And they enhance the appearance of communities and promote health by reducing noise, cutting energy costs, screening unsightly views, and attracting songbirds and other wildlife.

Your interest in learning more about trees is a major step toward protecting and enhancing these values.

Shade Tolerance, Growth Rate, and Life Span

The tree descriptions in this book include remarks about tree uses, habitat, landscape limitations, and unique characteristics. They also note shade tolerance, height growth rate prior to maturity, and typical life span.

Shade Tolerance

Shade tolerance describes the species' ability to establish and survive in various degrees of shade. Shade-intolerant species require full sunlight. Intermediate species can survive in partial shade. Shade-tolerant species can survive in dense shade. These classes not only provide important species selection information for planting, they also can help you differentiate species growing in a shaded forest from those growing in full sunlight.

Growth Rate

Growth rates are based on the height increase of a tree growing under average conditions in the Upper Midwest prior to maturity. Slow-growing is defined as 12 inches or less per year; moderate-growing, 13 to 24 inches per year; and fast-growing, 25 inches or more per year. Trees grow continuously, but growth usually slows after maturity.

Life Span

Trees are described as short-lived (less than 76 years), intermediate (76 to 150 years), or long-lived (longer than 150 years). A tree's life span is influenced by many factors (e.g., disease, damage). Downtown urban trees, for example, on average live only 10 percent as long as trees in rural areas. Therefore, the classes provided should only be viewed as potential ages.

Section Two: CONIFEROUS TREES



So your tree is coniferous! It belongs to one of the most ancient group of plants living today. This group includes some of the most valuable trees in the world. It also includes the largest of all living plants, the redwoods and giant sequoias.

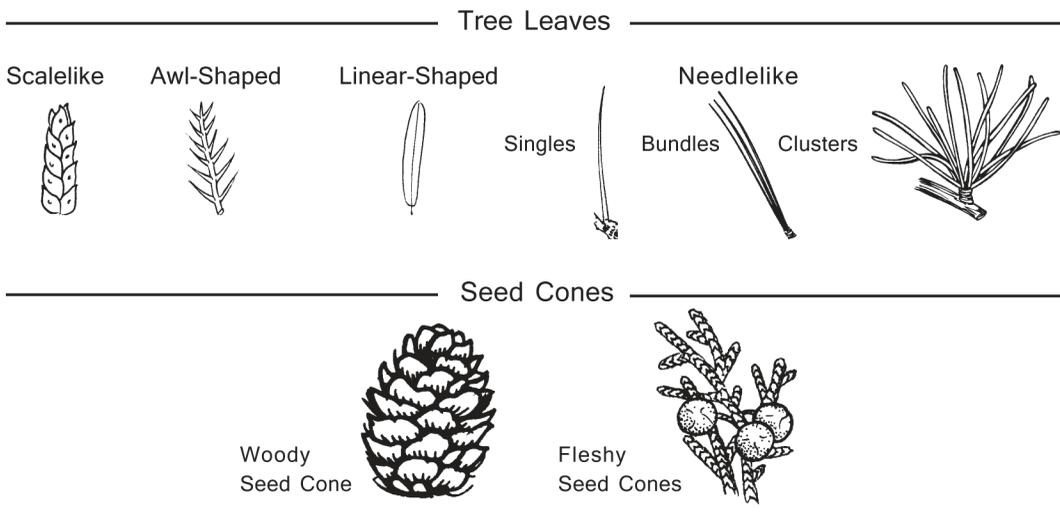
Identifying Coniferous Trees

Since coniferous trees (except larch) maintain their leaves and most of their identifying features throughout the year, we can use the same characteristics to identify them during both summer and winter. Begin by examining the shape of the leaves. Coniferous tree leaves may be needlelike, linear-shaped, scalelike, or awl-shaped (Figure 4). If the leaves are needlelike or linear-shaped, measure them using the ruler on the back cover of this book and determine if they are arranged in singles, clusters or tufts of 12 or more, or held together in bundles of 2 to 5.

Next try to locate a few seed cones on the tree (Figure 4). Coniferous tree seeds are borne on the scales of a woody (rarely fleshy) cone. The seeds are mature in autumn unless otherwise stated. Note the location and position of the cones on the tree and branches. Measure the length of the cone and examine the cone's scales. Most coniferous trees have smooth cone scale tips, but some are armed with sharp points. On others a small, winglike bract extends beyond the scales.

Finally, examine the color and texture of the twigs and bark. Twigs, located at the ends of the branches, represent the newest growth. The texture, color, and size of the twigs and their buds can offer important identification clues. Bark is the outer protective layer on the main trunk of a tree. It is difficult to describe, but offers important identification clues. This especially is true for tall trees in which leaves and cones may be out of reach.

Figure 4. Coniferous tree leaves and seed cones.



Key to Coniferous Trees



- 1a. Leaves scalelike or awl-shaped.
 - 2a. Twigs flattened; cones woody, brown; leaves entirely scalelike **White-cedar, p. 9**
 - 2b. Twigs 4-sided; cones fleshy (berrylike), bluish; leaves awl-shaped and scalelike **Junipers, p. 9**
- 1b. Leaves linear-shaped (flattened in cross section) or needlelike.
 - 3a. Leaves borne in clusters or bundles (2 or more).
 - 4a. Leaves borne in clusters of 12 or more on stubby spur shoots, singly at twig ends **Larches, p. 10**
 - 4b. Leaves borne in bundles of 2 - 5 **Pines, p. 11-13**
 - 3b. Leaves borne singly, never in clusters or bundles.
 - 5a. Leaves needlelike, 4-sided, stiff (not flexible), often sharply pointed **Spruces, p. 14-15**
 - 5b. Leaves linear-shaped, flattened, soft, relatively flexible, usually blunt.
 - 6a. Leaves borne on small, peglike stalks; scattered teeth on leaf margins; rough leaf scars (stalks) on twigs **Hemlock, p. 16**
 - 6b. Leaves borne on whitish cushions or flush with twig; smooth leaf margins; slightly raised leaf scars (smooth) on twigs.
 - 7a. Buds relatively large, sharply pointed, not sticky; cones hang down, scales persistent, scattered on tree, forklike bracts extend beyond cone scales **Douglas-fir, p. 16**
 - 7b. Buds small, blunt, sticky; cones erect, scales deciduous, occur near top of tree, bracts rarely extend beyond scales **True Firs, p. 17**

Coniferous Tree Descriptions

Trees with Scalelike or Awl-shaped Leaves (Cedars, Junipers)

NORTHERN WHITE-CEDAR or arborvitae
(*Thuja occidentalis*)

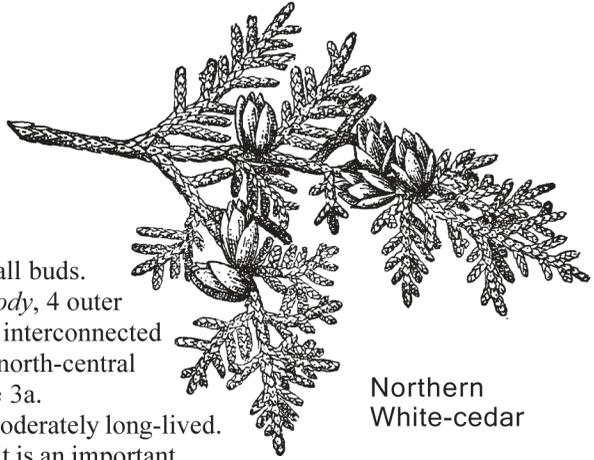
Small to medium tree, 25' - 50' (60') tall; columnar to pyramidal crown; trunk often twisted or leaning, fluted, up to 36" diameter. **Leaves:** Scalelike, aromatic when crushed, green to yellowish-green.

Twigs: Yellowish-green to light red, slender, flattened (forming fanlike sprays), very small buds.

Seed cones: 1/3" - 1/2" long, light brown, woody, 4 outer scales. **Bark:** Reddish-brown with shallow, interconnected fissures and fibrous ridges. **Range:** Native, north-central and northeastern Minnesota; hardy to Zone 3a.

Remarks: Shade-tolerant; slow-growing; moderately long-lived.

Typically found in northern swamps where it is an important winter food source for deer and rabbits. Also survives on dry, limestone soils. Live lower branches sprout roots and form new trees when covered by soil or plant litter. Rot-resistant wood often is used for fence posts, roof shingles, and fire-by-friction kits. The name *arborvitae*, meaning "tree of life," is traced to the early French explorer Jacques Cartier whose crew was saved from scurvy by a tea brewed from the tree's vitamin C-rich foliage and twigs.



Northern
White-cedar

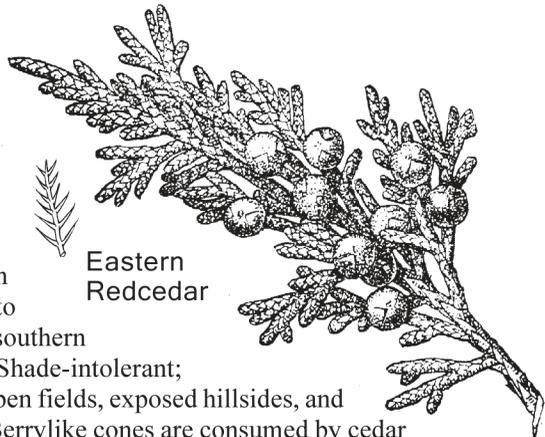
EASTERN REDCEDAR or juniper
(*Juniperus virginiana*)

Small to medium tree, 25' - 50' tall; columnar to pyramidal crown; trunk up to 24" diameter.

Leaves: Scalelike and awl-shaped, dark green, reddish-brown in winter. **Twigs:** Brown, 4-sided, slender; buds very small, covered by leaves.

Seed cones: Round, 1/4" - 1/3" diameter, fleshy (berrylike), pale green to dark blue with a whitish film, matures in one year. **Bark:** Reddish-brown to gray with narrow, fibrous strips. **Range:** Native, southern half of Minnesota; hardy to Zone 3b. **Remarks:** Shade-intolerant;

slow-growing; long-lived. Commonly found in open fields, exposed hillsides, and rocky ledges. Also inhabits low, swampy areas. Berrylike cones are consumed by cedar waxwings and other animals, which then disperse the seeds in their droppings. Aromatic, rose-colored wood is strong, light, and durable; prized for use in cabinets, chests, and pencils.



Eastern
Redcedar

ROCKY MOUNTAIN JUNIPER (*Juniperus scopulorum*)

Small to medium tree, very similar to eastern redcedar.

Leaves: Scalelike leaves rarely overlap the ones directly above them when mature; do not change color in winter. **Seed cones:** Berrylike cones take two years to mature.

Range: Introduced from the Rocky Mountains; hardy to Zone 3b.

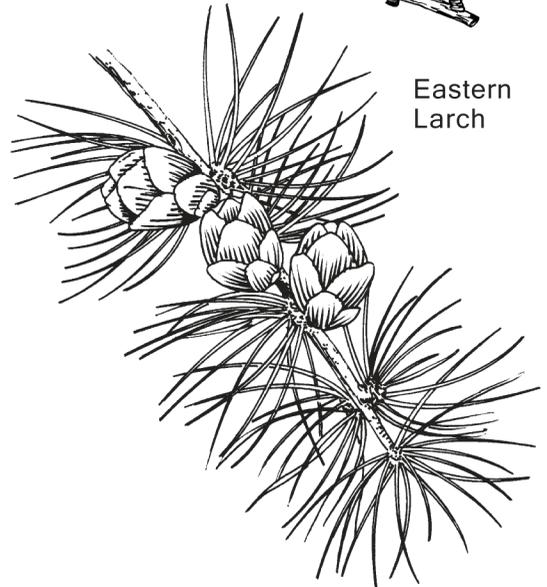
Trees with Needlelike Leaves Grouped in Clusters of 12 or More (Larches)

EASTERN LARCH or tamarack (*Larix laricina*)

Medium to large tree, 40' - 70' tall; narrow, pyramidal crown; trunk up to 24" in diameter.

Leaves: Needlelike, 3-sided in cross section, $\frac{3}{4}$ " - $1\frac{1}{2}$ " long, *deciduous*, borne singly or clustered on wartlike (short) spur shoots in groups of 12 - 30; soft, light green; yellow in autumn. **Twigs:** Orangish-brown to gray, dark red buds. **Seed cones:** $\frac{1}{2}$ " - $\frac{3}{4}$ " long, usually 12 - 15 scales. **Bark:** Dark reddish-brown with small scales (flaky appearance); reddish-purple inner bark. **Range:** Native, northern and eastern Minnesota; hardy throughout.

Remarks: Shade-intolerant; moderately fast-growing; moderately short-lived. Common bog species that may develop on soils too mucky to support a person. In shallow muck overlaying hard clay, larch roots often develop a sharp bend or angle. Pioneers used these angled roots in the construction of small boat frames. The hard, durable wood also is used for poles, pulp, and framing houses. Eastern larch is the only deciduous conifer native to Minnesota.



Eastern Larch

EUROPEAN LARCH (*Larix decidua*)

Large tree. **Leaves:** $\frac{3}{4}$ " - $1\frac{1}{2}$ " long, borne singly or clustered in groups of 30 - 40. **Twigs:** Yellowish-gray. **Seed cones:** $\frac{3}{4}$ " - $1\frac{3}{4}$ " long with 40 - 50 hairy scales. **Range:** Introduced from northern and central Europe; hardy to Zone 3a.



European Larch

SIBERIAN LARCH (*Larix sibirica*)

Large tree. **Leaves:** 1" - 2" long, borne singly or clustered in groups of 30 - 40. **Twigs:** Yellowish-green. **Seed cones:** $\frac{3}{4}$ " - $1\frac{1}{2}$ " long with 20 - 30 hairy scales. **Range:** Introduced from Russia; hardy throughout.

JAPANESE LARCH (*Larix kaempferi*)

Large tree. **Leaves:** Can be distinguished from other larches by bluish-green leaves that have two conspicuous white bands below. **Twigs:** Reddish-brown. **Seed cones:** Cone scales curve downward near the tip. **Range:** Introduced from Japan; hardy to Zone 4a.

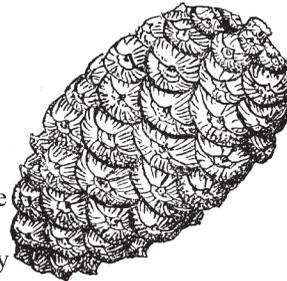
Trees with Needlelike Leaves Grouped in Bundles of 2 to 5 (Pines)

RED PINE or Norway pine (*Pinus resinosa*)

Large tree, 40' - 60' (100') tall; symmetric, rounded crown with stout, horizontal branches spaced in annual whorls along the trunk; trunk, buttressed when mature, up to 36" diameter. **Leaves:** Needlelike, 4" - 6" long, 2 per bundle, *break cleanly when bent*, dark green. **Twigs:** Reddish-brown; buds, orangish-brown to reddish-brown, with loose scales. **Seed cone:** 1½" - 2¼" long, *scale tips unarmed*, pairs usually stick out at right angles from branch. **Bark:** Reddish-brown to gray, flaky; becoming shallowly furrowed with thin, scaly plates (resembling jigsaw puzzle pieces). **Range:** Native, north-central and northeastern Minnesota; hardy throughout. **Remarks:** Shade-intolerant; moderately fast-growing; long-lived; Minnesota's state tree. Important timber tree naturally found on dry, highly acidic, sandy soils. Commonly used in reforestation projects and Christmas tree plantations. Fire dependent; seeds rapidly germinate on exposed soils. Thick bark protects mature trees. Sometimes called "Norway pine," probably because early settlers confused the tree with the Norway spruce of Europe.



Red Pine



EASTERN WHITE PINE (*Pinus strobus*)

Large tree, 40' - 70' (100') tall; oval or irregular crown with horizontal branches spaced in annual whorls along the trunk (plumelike outline); trunk, buttressed when mature, up to 42" diameter. **Leaves:** Needlelike, 2½" - 5" long, 5 per bundle, *soft, flexible*, bluish-green. **Twigs:** Greenish-gray to orangish-brown; buds, reddish or yellowish-brown, pointed tip. **Seed cones:** 4" - 8" long, *flexible*, resin-coated scale tips (white). **Bark:** Greenish-gray, smooth; becoming grayish-brown and deeply furrowed with scaly ridges. **Range:** Native, northern and eastern Minnesota; hardy to Zone 3a. **Remarks:** Intermediate in shade tolerance; fast-growing; long-lived. Once called the "Monarch of the North," eastern white pine is the largest coniferous tree in Minnesota and was the most important timber species in the United States from about 1700 to 1920. British attempts to control white pine harvesting for use in the Royal Navy contributed to the American Revolution. Reestablishment efforts have been slowed by white pine blister rust (a disease) and heavy deer browsing. Attractive Christmas tree and ornamental species that survives on a wide variety of well-drained sites.

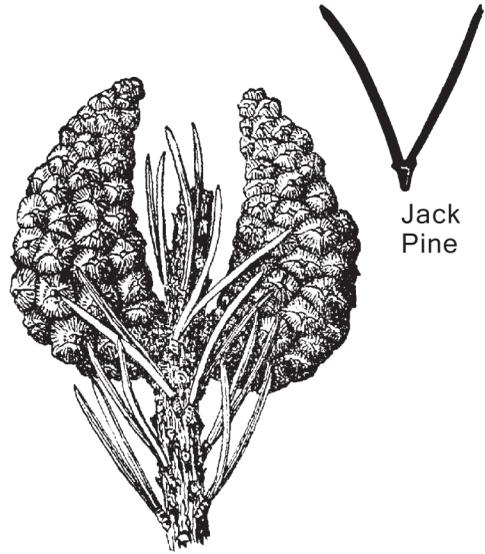


Eastern White Pine



JACK PINE (*Pinus banksiana*)

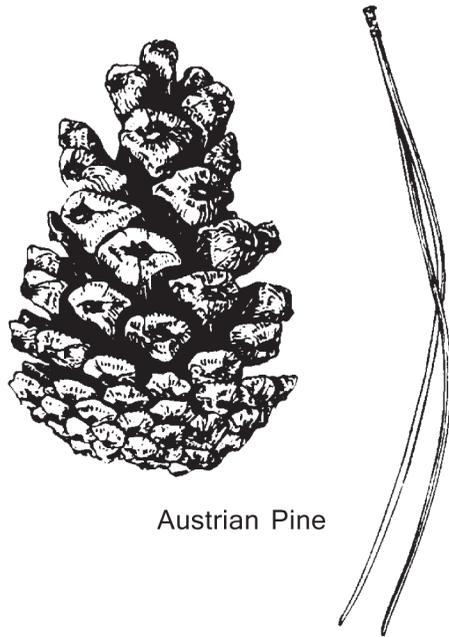
Medium tree, 25' - 40' (50') tall; spreading, cone-shaped to irregular crown, often containing several dead lower limbs; trunk, often crooked, up to 15" diameter. **Leaves:** Narrowly linear-shaped, $\frac{3}{4}$ " - $1\frac{1}{2}$ " long, 2 per bundle, widely forked pairs, often twisted, dark green to yellowish-green. **Twigs:** Reddish- to purplish-brown, scaly; buds, pale brown, resinous, blunt tip. **Seed cones:** 1" - 2" long, curved toward twig, open or closed scales. **Bark:** Grayish-brown, scaly; becoming blackish- to reddish-gray and shallowly fissured with loose, scaly ridges (rugged appearance). **Range:** Native, northern and eastern Minnesota south along Mississippi River to Winona; hardy to Zone 3a. **Remarks:** Very shade-intolerant; fast-growing when young, then moderate to slow; short-lived. Survives on extremely dry, sterile, sandy soils where other pines perish. Considered a pioneer species, it has resin-closed (serotinous) cones that open and disperse seeds following fire. Trees in some areas produce heavy numbers of serotinous cones while others produce large numbers of open cones. The trait may be related to the fire history of the area.



Jack Pine

AUSTRIAN PINE or black pine (*Pinus nigra*)

Large tree, 40' - 60' (100') tall; flat- to round-topped crown with stout horizontal branches spaced in whorls along the trunk; trunk, distinct curves or waves between branch whorls, up to 36" diameter. **Leaves:** Needlelike, 3" - 6" long, 2 per bundle, sharply pointed, very stiff (break cleanly when twisted), dark green. **Twigs:** Yellowish- to greenish-brown, fuzzy; buds, silvery-white, sharply pointed. **Seed cones:** 2" - 3" long, scale tips armed with a small spine. **Bark:** Pinkish-gray to dark gray; becoming deeply fissured with irregular, scaly plates. **Range:** Introduced from central and southern Europe; hardy to Zone 3b. **Remarks:** Shade-intolerant; moderately fast-growing; moderately long-lived. Popular ornamental tree that adapts to urban conditions better than most pines.



Austrian Pine

PONDEROSA PINE (*Pinus ponderosa*)

Large tree, 40' - 70' (100') tall, may exceed 200' in native range; large, conical or flat-topped crown; trunk up to 48" diameter. **Leaves:** Needlelike, 5" - 8" long, 2 or 3 per bundle (rarely 5), stiff (difficult to break), dark green. **Twigs:** Orange-brown, turpentine smell when scraped; buds, reddish, sharply pointed, usually covered with resin droplets. **Seed cones:** 3" - 6" long, scale tips armed with a sharp spine. **Bark:** Grayish-black; becoming reddish-brown and irregularly furrowed with flat, scaly plates.

Range: Introduced from western North America; hardy to Zone 3b. **Remarks:** Shade-intolerant; moderately fast-growing; long-lived. Most widely distributed pine in North America. Wide variation in hardiness among seed sources.



Ponderosa Pine



SCOTCH PINE or Scots pine

(*Pinus sylvestris*)

Medium to large tree, 30' - 50' (100') tall; spreading, irregular to rounded crown; trunk up to 24" diameter. **Leaves:** Needlelike, 1½" - 3½" long, 2 per bundle, pairs not forked, twisted, bluish-green (sometimes silvery). **Twigs:** Reddish- to orangish-brown, scaly; buds, reddish-brown, pointed.

Seed cones: 1½" - 2½" long, short-stalked, tip bent back. **Bark:** Orangish-brown, flaky; becoming reddish-gray and furrowed with scaly ridges; bright orange and flaky on upper trunk. **Range:** Introduced from Europe and Asia; naturalized in Minnesota; hardy to Zone 3a. **Remarks:** Shade-intolerant; moderately fast-growing; moderately long-lived. Attractive ornamental and Christmas tree species that prefers sandy, well-drained soils.



Scotch Pine



MUGO PINE (*Pinus mugo*)

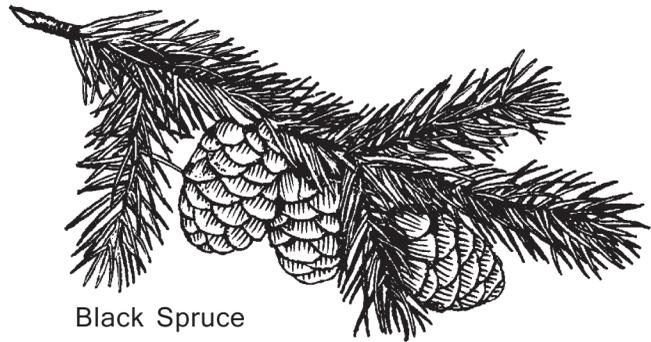
Broad shrub or small tree. **Leaves:** Narrowly linear-shaped, short (1" - 3"), dark green, 2 per bundle. **Seed cones:** ¾" - 2½" long, borne flush with twig. **Bark:** Grayish-black. **Range:** Introduced from central and southern Europe; hardy to Zone 3a.

Trees with Four-sided, Needlelike Leaves (Spruces)

BLACK SPRUCE or bog spruce (*Picea mariana*)

Small to medium tree, 25'- 30' (50') tall; slender, pyramidal crown, often with dead lower branches; trunk up to 12" diameter. **Leaves:** Needlelike, $\frac{1}{4}$ " - $\frac{5}{8}$ " long, blunt tips, blue-green. **Twigs:** *Reddish-brown with scattered reddish hairs*, rough leaf scars; buds, reddish-brown, *extended scale tips*. **Seed cones:** Egg-shaped to nearly round, $\frac{1}{2}$ " - $1\frac{1}{4}$ " long, *purple* (brown when ripe), irregularly toothed scale margins, open or closed scales.

Bark: Grayish- to reddish-brown, thin, flaky scales, olive-green inner bark. **Range:** Native, north-central and northeastern Minnesota; hardy throughout. **Remarks:** Shade-tolerant; moderately slow-growing; moderately long-lived. Common marsh or bog species that often relies on fire to open seed cones and expose mineral soil. Live lower branches sprout roots and form new trees when covered by soil or plant litter. Twigs and leaves once used to brew spruce beer. Transcontinental range, reaching north to the limit of tree growth in Canada and Alaska.

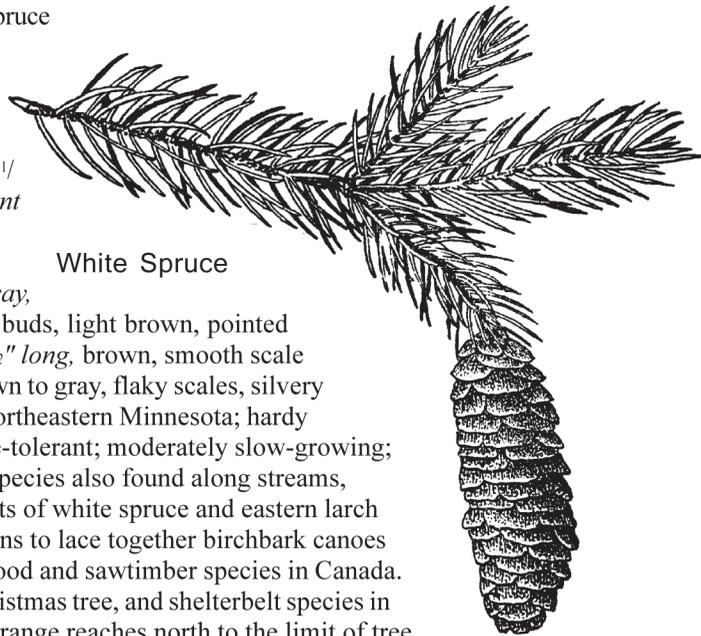


Black Spruce

WHITE SPRUCE or skunk spruce (*Picea glauca*)

Large tree, 40' - 60' (100') tall; dense, pyramidal crown; trunk up to 24" diameter. **Leaves:** Needlelike, $\frac{1}{3}$ " - $\frac{3}{4}$ " long (*rarely $\frac{1}{5}$ "*), blunt tips, *skunklike smell when crushed*, dark bluish-green.

Twigs: *Orangish-brown to gray*, hairless, rough needle scars; buds, light brown, pointed scales. **Seed cones:** $1\frac{1}{4}$ " - $2\frac{1}{2}$ " long, brown, smooth scale margins. **Bark:** Reddish-brown to gray, flaky scales, silvery inner bark. **Range:** Native, northeastern Minnesota; hardy throughout. **Remarks:** Shade-tolerant; moderately slow-growing; moderately long-lived. Bog species also found along streams, rivers, and lakes. Fibrous roots of white spruce and eastern larch were used by American Indians to lace together birchbark canoes and baskets. Principal pulpwood and sawtimber species in Canada. Valuable wildlife habitat, Christmas tree, and shelterbelt species in Minnesota. Transcontinental range reaches north to the limit of tree growth in Canada and Alaska. Black Hills spruce (*Picea glauca* var. *densata*) is among the most commonly planted varieties of white spruce. The variety is desired for its dense, cone-shaped crown of bright bluish-green foliage and drought tolerance.



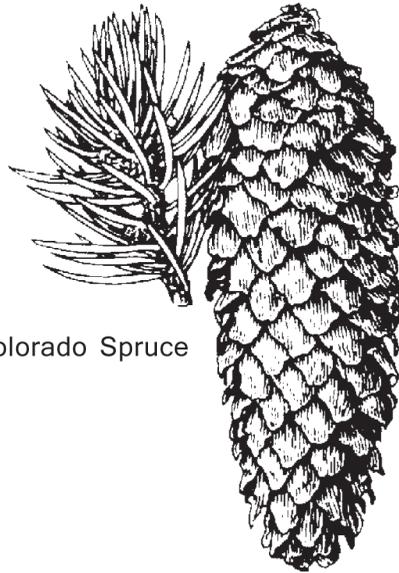
White Spruce

COLORADO SPRUCE or blue spruce

(*Picea pungens*)

Medium to large tree, 30' - 60' tall; dense, pyramidal crown often reaching the ground in open areas; trunk, often forked, up to 36" diameter. **Leaves:** Needlelike, $\frac{3}{4}$ " - $1\frac{1}{2}$ " long, very sharp tips, variable color (green to bluish-green or silver-blue). **Twigs:** Orangish-brown to light brown, rough leaf scars; buds, yellowish-brown, curled scale tips.

Seed cones: 2" - 4" long, straw-colored, papery scales with irregularly toothed margins. **Bark:** Grayish-brown, flaky scales; becoming deeply furrowed. **Range:** Introduced from central and southern Rocky Mountains; hardy to Zone 3a. **Remarks:** Shade-tolerant, slow-growing, long-lived. Heavily planted ornamental, Christmas tree, and shelterbelt species that prefers moist, well-drained soils. Fairly drought resistant. Mature trees often are disfigured or killed by cytospora canker or rhizosphaera needlecast fungi.



Colorado Spruce

NORWAY SPRUCE (*Picea abies*)

Large tree, 40' - 65' (100') tall; spreading, pyramidal crown with *drooping or weeping lower branchlets*; trunk up to 36" diameter.

Leaves: Needlelike, $\frac{1}{2}$ " - 1" long, *balsam smell when crushed, slightly pointed tips, shiny, deep green*. **Twigs:** Reddish- to orangish-brown, rough leaf scars; buds, orangish- to reddish-brown, spreading scales. **Seed cones:** 4" - 7" long, brown, *stiff scales* with fine, irregularly toothed margins.

Bark: Reddish- to grayish-brown, flaky scales. **Range:** Introduced from northern and central Europe; hardy to Zone 3b.

Remarks: Shade-tolerant; moderately fast-growing; long-lived. Widely planted ornamental and shelterbelt tree that does best on moist, cool, slightly acidic soils. Wide variation in traits among varieties.



Norway Spruce

Trees with Linear-shaped (Flattened) Leaves (Hemlock, Douglas-fir, True Firs)

CANADIAN HEMLOCK or eastern hemlock (*Tsuga canadensis*)

Medium to large tree, 40' - 60' tall; large, pyramidal crown, *drooping terminal leader* straightens out during the growing season; trunk up to 36" diameter. **Leaves:** Linear-shaped, $\frac{1}{3}$ " - $\frac{2}{3}$ " long, *fine irregularly toothed margins, borne on peglike projections*, dark yellowish-green (two white lines below). **Twigs:** Light brown to grayish-brown with *rough, reddish-brown leaf scars*; buds, small and reddish-brown.

Seed cones: Oval or round, $\frac{1}{2}$ " - $\frac{3}{4}$ " long, borne at twig ends. **Bark:** Reddish- to purplish-brown, scaly; becoming deeply furrowed with scaly ridges, *inner bark with purplish layers*.

Range: Native; rare and localized; Carlton, St. Louis, and Aitkin counties; hardy to Zone 3b.

Remarks: Very shade-tolerant; moderate-growing; very long-lived. Bark rich in tannic acids used by pioneers to tan hides. Foliage and twigs may be used to brew a tea (don't worry—not the same hemlock as the poisonous herb Socrates used to brew his final drink!). Few plants survive beneath a mature hemlock's dense foliage or in the highly acidic soil created by its fallen needles.



Canadian Hemlock

DOUGLAS-FIR or Oregon-pine (*Pseudotsuga menziesii*)

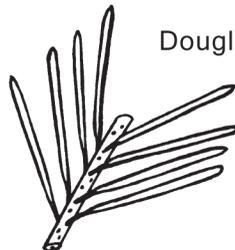
Medium to large tree, 40' - 70' tall, may exceed 300' in native range; dense, pyramidal crown; trunk up to 24" diameter. **Leaves:** Linear-shaped, $\frac{3}{4}$ " - $1\frac{1}{4}$ " long, *borne on slightly raised cushions*, yellow-green to blue-green (two white lines below).

Twigs: Reddish-brown to pale brown with *whitish leaf scars*; buds, reddish-brown, *shiny, sharply pointed*. **Seed cones:** 2" - 4" long, *forklike bracts extend beyond cone scales*. **Bark:** Gray-brown, smooth with scattered resin blisters; becoming reddish-brown and deeply furrowed.

Range: Introduced from Rocky Mountains and Pacific Coast (coastal sources not hardy in Minnesota); hardy to Zone 3b. **Remarks:** Moderately shade-tolerant; fast-growing; long-lived. Principal timber species in United States. Excellent Christmas tree and ornamental species when not grown in dry, windy areas.



Douglas-fir



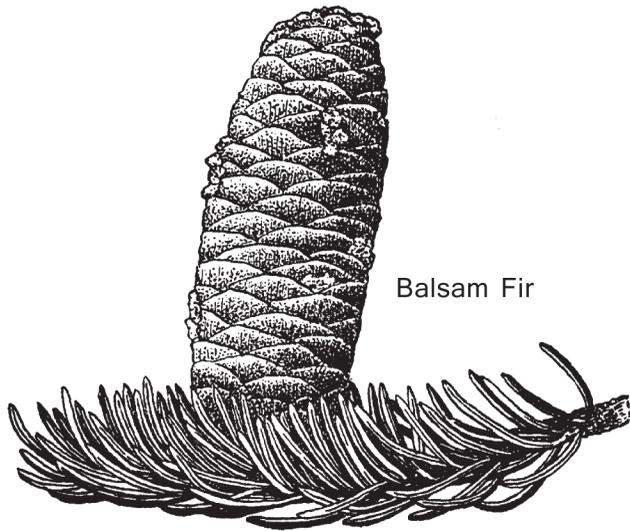
BALSAM FIR (*Abies balsamea*)

Medium tree, 40' - 75' tall; narrow, pyramidal crown; trunk up to 18" diameter. **Leaves:** Linear-shaped, 1/2" - 1" long, shiny green (two silvery lines below). **Twigs:** Grayish, smooth, circular leaf scars; buds, yellowish-brown, blunt, *sticky, clustered*. **Seed cones:** 2" - 4" long, erect, borne near top of tree; *cone scales fall off, leaving a persistent candlelike central stalk*, purple to purplish-brown.

Bark: Light gray with *numerous blisters (pitch pockets)*, smooth; becoming reddish-brown and scaly.

Range: Native, northeastern and southeastern Minnesota; hardy to Zone 3a (grows best in native range).

Remarks: Very shade-tolerant; slow-growing; intermediate-lived. Popular Christmas tree that has excellent needle retention and aroma. Resins collected from trunk blisters formerly used for mounting specimens on microscope slides, cementing lenses, making varnishes, and sealing birchbark canoes. Typically found in moist, shaded forests.



Balsam Fir

FRASER FIR (*Abies fraseri*)

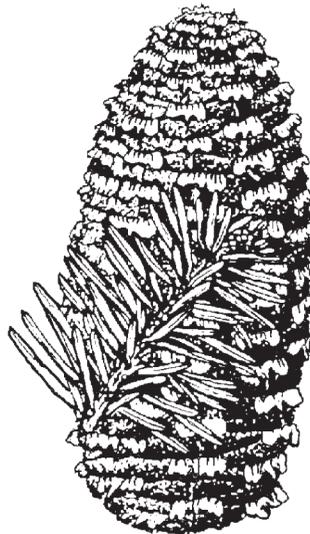
Medium tree, very similar to balsam fir.

Seed cones: Yellowish-green bracts extending beyond the cone scales and curling downward. **Range:** Introduced from the Smoky Mountains; hardy to Zone 4a.

Remarks: Considered the Cadillac of Christmas trees, but not always winter hardy in Minnesota.

WHITE FIR (*Abies concolor*)

Medium tree. **Leaves:** Linear-shaped, 2" - 3" long, silvery blue to silvery green, distinctly curved upward. **Range:** Introduced from western United States; hardy to Zone 4a.



Fraser Fir

Section Three:

DECIDUOUS TREES

So your tree is deciduous! It belongs to one of the most highly developed and diverse group of plants living today, the flowering plants. In tropical regions of the world flowering trees often retain their leaves year-round (evergreen), but here in Minnesota all of our flowering trees lose their leaves in autumn (deciduous).

Identifying Deciduous Trees

Most deciduous trees can be identified in summer by their leaves alone, with twigs, fruits, and bark as added clues to their identification. In winter, when deciduous trees have lost their leaves, we must identify them by twigs, buds, bark, and in some cases, fruits. The previous year's dead leaves also can help confirm your winter identification. They often can be found on the branches or on the ground directly below the tree.

Regardless of the season, begin by examining the arrangement of leaves or leaf scars on the branches or twigs. Determine if the arrangement is whorled, opposite, or alternate (Figure 5). Whorled trees have three (or more) leaves or leaf scars attached to the branches at the same distance from the end; opposite trees have two; and alternate trees have only one. If you cannot reach branches, examine the arrangement of twigs on the branches; this will follow the same pattern as the leaves. Sometimes a twig breaks off or fails to develop, so be sure to look at several areas of the tree.

After examining the tree's leaf or branch arrangement, look at the tree's leaves, or, if it's winter, look at its buds, twigs, bark, and fruits.

Leaves

If leaves are present, check to see if they are simple or compound (Figure 5) by following a leaf from its tip to the base of the leafstalk. If you find a distinct swelling at its base and a bud, it is a simple leaf. (You will need to pick off the leaf since some trees have hidden buds.) You will not find buds at the base of *leaflet stalks* on compound leaves.

If the leaf is compound, count the number of leaflets and examine its pattern to determine if it is palmately compound, pinnately compound, or doubly compound. One tree, honeylocust, will have both pinnately compound and doubly compound leaves.

Next, examine the shape and features of the leaf or leaflet. Determine if the margins (edges) of the leaf or leaflet are smooth, toothed, lobed, or some combination (Figure 5). Most deciduous trees in Minnesota will have toothed leaf margins. Some have doubly toothed margins where you will see both long and short teeth. Trees with lobed leaves often will have a distinct pattern, such as pinnately lobed or palmately lobed (Figure 5).

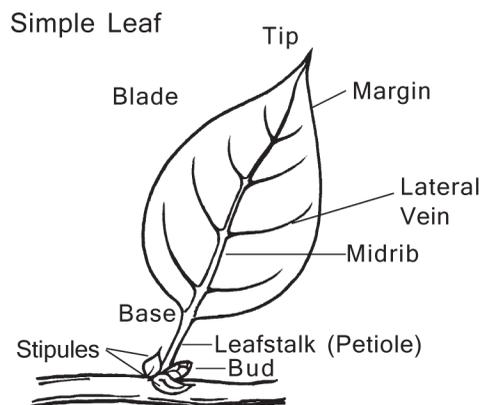
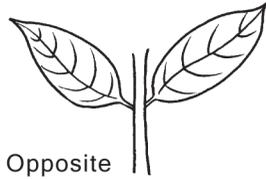
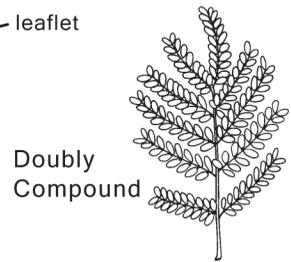
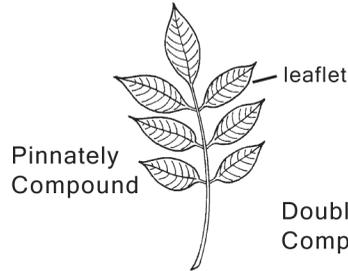
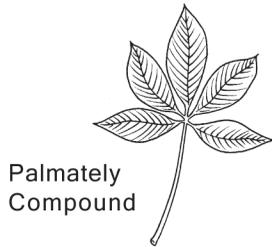
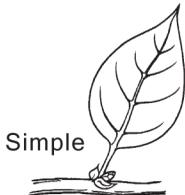


Figure 5. Leaf characteristics.

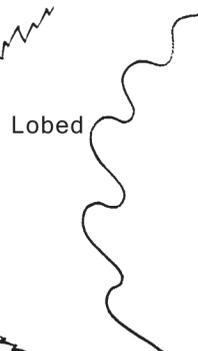
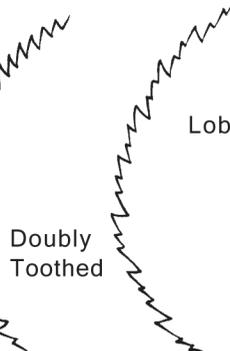
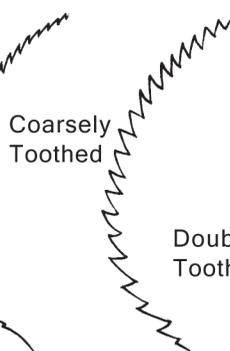
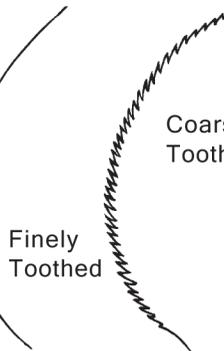
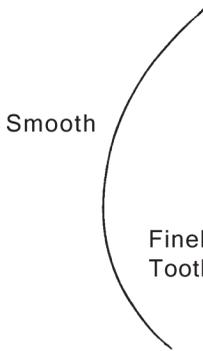
Leaf Arrangements



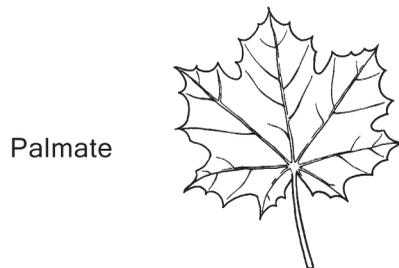
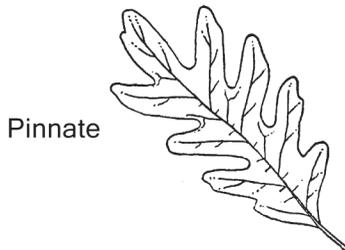
Leaf Types



Leaf Margins



Leaf Lobes



Branches, Twigs, and Buds

Branches, twigs, and buds tend to offer the best winter identification clues because, unlike fruits, they are consistently available.

Branches are composed of several years' growth. Twigs are at the ends of branches and represent the newest growth. They can be identified by locating the end of a branch and tracing it back (usually 6 to 12 inches) to a series of encircling scars left by the previous years' bud scales. Branchlets are older sections of branch with a diameter similar to the twigs.

Twigs vary in size, shape, and other characteristics. Walnuts and ashes have stout twigs, while birches and ironwood have slender twigs. When some twigs are broken or scraped, they have a distinct odor—for example, the disagreeable odor of boxelder, the pleasant wintergreen odor of yellow birch, and the bitter almond smell of cherries and plums. Odor can be an excellent identification characteristic, but it can be lost or greatly reduced in cold weather.

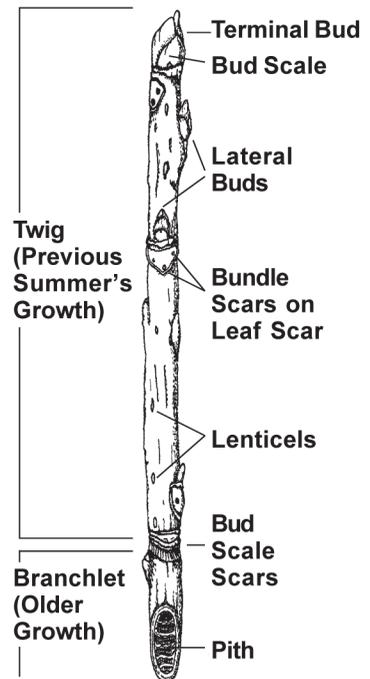
Some twigs or branchlets are armed with spines or thorns, or have prominent stubby, spur shoots (Figure 6). Spur shoots are dwarf branchlets that grow very slowly but retain the same number of leaves as normal (long) branchlets, resulting in a stubby, wartlike appearance. Other twigs exude a milky sap when broken. Still others have a very distinctive pith (core) color or cross-sectional shape that can be examined when cut with a knife (Figure 6). The pith on most trees will be solid throughout, but walnuts and hackberries have a chambered pith in which the tissue has hollow pockets between narrow plates.

Features such as lenticels and bundle scars can be very useful but often can only be observed with a magnifying glass. Lenticels are small pores on the twigs or bark that appear as dots of various sizes and shapes. Some trees (e.g., birches and cherries) have very prominent, horizontally elongated lenticels. Bundle scars are the sealed ends of vascular tissues that once transported water and nutrients to and from the leaf. Bundle scars will appear as dots of various sizes and shapes on a leaf scar. Most trees have three prominent bundle scars, but some have numerous scars that are scattered or arranged in distinct patterns.

Buds are immature twigs bearing leaves, flowers, or both (Figure 6). The buds on most Minnesota trees are covered with scales to protect the immature tissues from damage (e.g., insects, drying). Buds forming along the sides of the twig or branchlet are called lateral buds, while those at the end of a twig are called terminal buds. Some trees have true terminal buds (e.g., hickories, maples, ashes), while others have false or absent terminal buds (e.g., lindens, elms, birches). False terminal buds are a little below and to the side of a leaf scar on the end of the twig.

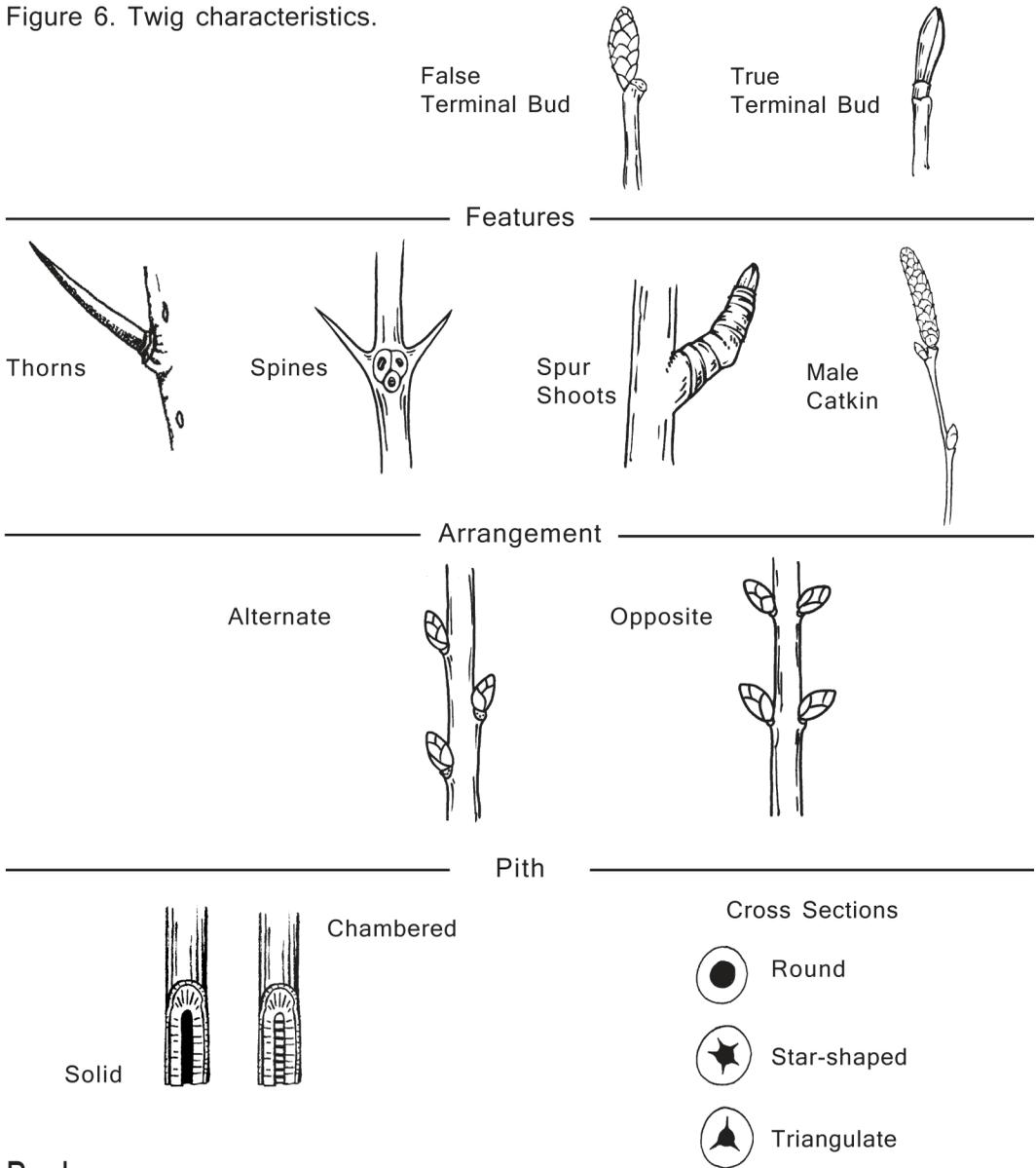
The color, size, and shape of buds offer important clues for identifying most tree species. For example, a slender, bright yellow bud easily identifies bitternut hickory, while a sharply pointed, sticky, aromatic bud identifies balsam poplar.

Some twigs have slender, cigar-shaped male catkins (flowers) that are present in winter (Figure 6). Catkins are compact flowering structures composed of several inconspicuous flowers surrounding an elongated axis. The term *catkin* also is used to describe the grouped arrangement of some fruits (Figure 7).



Twig Characteristics

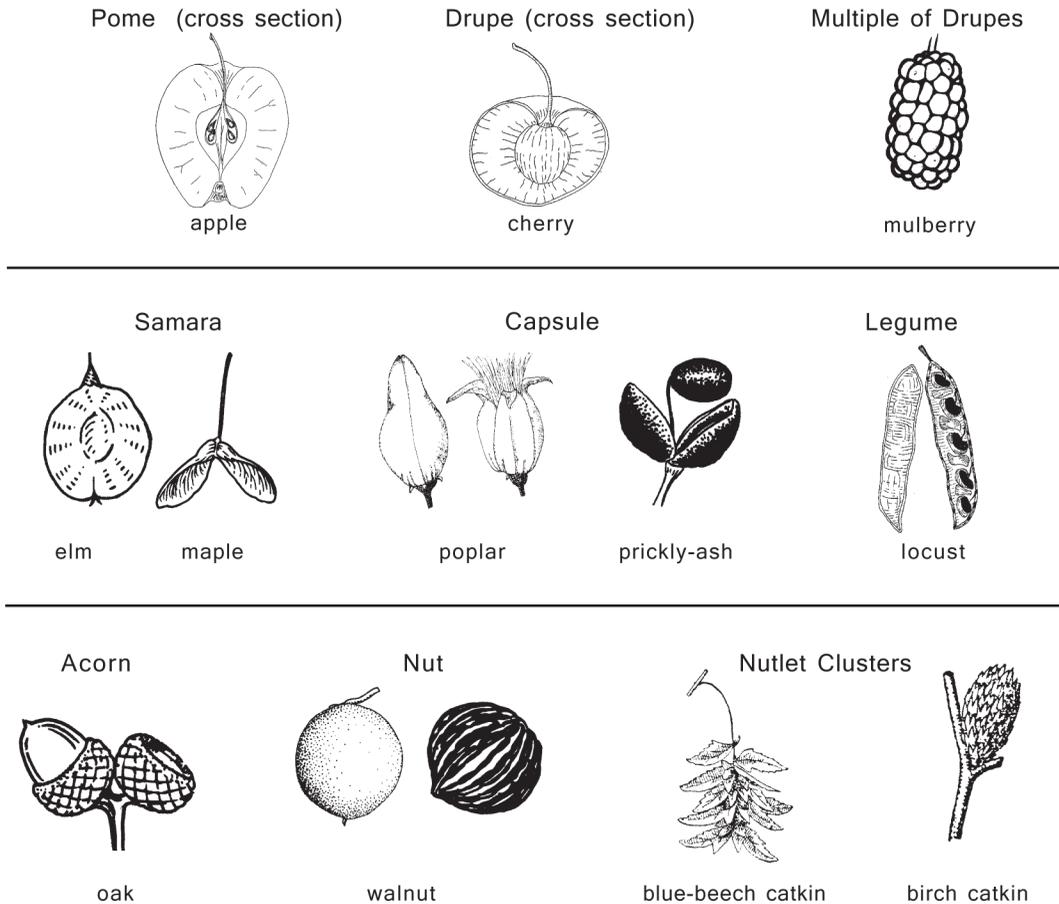
Figure 6. Twig characteristics.



Bark

Bark is the outer protective layer on the main trunk of a tree. Bark varies widely among species in texture and color. For example, black cherry has a black, scaly bark that looks like burned potato chips; bur oak has a thick, deeply furrowed bark; bitternut hickory has a smooth, shallowly fissured bark with interlacing ridges (like chains); paper birch has a thin, papery, curling bark; and a shallow cut into black oak reveals a bright yellow or orange inner bark. Bark is extremely difficult to describe and illustrate, but with experience you will quickly discover its identification value. This especially is true for large trees in which leaves and twigs are not easily accessible.

Figure 7. Fruits of Minnesota trees.



Fruits

Deciduous trees vary in fruit size, shape, and color (Figure 7). Fruits of Minnesota trees include legumes, samaras, acorns, nuts, nutlets, capsules, pomes, and drupes.

Fleshy fruits that do not split to release their seeds include the *drupe*, which has a thin coat protecting a fleshy, often juicy, middle usually containing one seed surrounded by a very hard cover (e.g., cherries, plums); and the *pome*, which has a leathery or hard core containing several seeds (e.g., apples, hawthorns). *Nuts* are single-seeded fruits with hard shells (e.g., walnuts, hickories). *Nutlets* are similar to nuts, but much smaller (e.g., birches, ironwood, blue-beech). *Acorns*, another type of nut, have a moderately hard shell that is partially enclosed by a scaly or warty cup (e.g., oaks). *Samaras* also contain a single seed, but it is attached to a thin, papery wing (e.g., maples, ashes, elms). *Capsules* are dry pods containing two or more chambers that split along sutures to release their seeds (e.g., willows, poplars). *Legumes* are dry, beanlike fruits that split along two sutures (e.g., locusts).

Fruits may occur singly, in close clusters (e.g., birch) or in fused multiples (e.g., mulberry). Persistent fruits are extremely helpful for winter identification.

Words of Caution: Poison Ivy and Poison Sumac

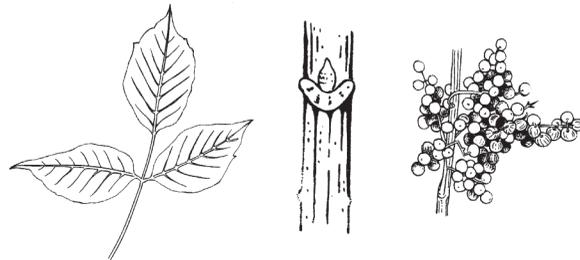
Every outdoor activity has a few safety concerns, and tree identification is no exception. Before learning to identify deciduous trees, you should know how to identify two plants that are poisonous to touch (even in winter) — poison ivy (*Rhus radicans*) and poison sumac (*Rhus vernix*) (Figure 8). Both have alternate arrangements and compound leaves.

Poison ivy commonly is found in open forests, pastures, fence rows, thickets, and dry, rocky fields. It may occur as a herbaceous plant, vine, or upright shrub. It usually has three leaflets with smooth or wavy-lobed margins. The fruit is a green to grayish-white drupe appearing late in summer. Poison ivy has brownish twigs that are covered with conspicuous dots (lenticels) and large, V- or U-shaped leaf scars with numerous bundle scars. The main stem may be quite stout and will be covered with numerous hairlike aerial roots.

Poison sumac most commonly is found in swamps and bogs of southeastern and east-central Minnesota. It usually occurs as a shrub or small tree, 5 to 25 feet tall. Its leaves have 7 to 13 leaflets arranged in pairs with a single end leaflet. The leaflets are dark green and shiny with smooth margins. The fruit is a green to ivory-white drupe grouped in loose clusters that may be 10 to 12 inches long. Twigs are moderately stout, yellowish-brown and covered with conspicuous dark dots or blotches.

Touching these plants causes painful skin irritations (redness, swelling, blisters, itching). If you come in contact with poison ivy or poison sumac, immediately wash infected areas with soap and water to remove excess poison. Symptoms usually appear within 24 hours. Contact your doctor or pharmacist for treatment advice.

Figure 8. Poison ivy and poison sumac.



Poison Ivy



Poison Sumac

Key to Deciduous Trees with Leaves

(if leaves are absent, see page 75)

- 1a. Leaves opposite or whorled.
 - 2a. Leaves compound.
 - 3a. Leaves pinnately compound.
 - 4a. Fruit a single samara or drupe; leaflets 5 - 13, smooth or finely toothed margins, nearly uniform in shape; twigs not covered with whitish film.
 - 5a. Twigs green, gray, purple, or light brown; leaf scars shield-shaped, not encircling buds; fruit a samara **Ashes, p. 30-31**
 - 5b. Twigs orangish-yellow or yellowish-gray; leaf scars horseshoe-shaped, nearly to entirely encircling bud; fruit a drupe, turpentine smell when crushed **Cork-tree, p. 32**
 - 4b. Fruit a double samara; leaflets 3 - 5 (rarely 7), margins toothed or 3-lobed, often irregular in shape; twigs covered with whitish film (easily rubbed off) **Boxelder, p. 32**
 - 3b. Leaves palmately compound **Buckeye, p. 33**
 - 2b. Leaves simple.
 - 6a. Leaf margins palmately lobed or doubly toothed; fruit a samara **Maples, p. 34-37**
 - 6b. Leaf margins smooth or singly toothed; fruit a capsule or drupe.
 - 7a. Fruit a cigar-shaped capsule 8" - 18" long; leaves heart-shaped, 6" - 12" long, often whorled in groups of 3 **Catalpa, p. 38**
 - 7b. Fruit a drupe or a 4-celled capsule; leaves not heart-shaped less than 6" long, always opposite.
 - 8a. Twig tips often armed with a small spine; leaves sometimes alternate near twig ends **Buckthorn, p. 38**
 - 8b. Twig tips not armed with spines; leaves always opposite.
 - 9a. Twigs or branchlets with 4 corky lines or wings; fruit a 4-celled capsule **Wahoo, p. 39**
 - 9b. Twigs or branchlets without corky lines or wings; fruit a drupe.
 - 10a. Leaf margins finely toothed, lateral veins terminate near margins; leafstalk winged or grooved **Nannyberry, p. 39**
 - 10b. Leaf margins smooth, lateral veins nearly parallel leaf margins; leafstalk nearly round **Dogwood, p. 73**
 - 1b. Leaves alternate, never opposite or whorled.
 - 11a. Leaves compound.
 - 12a. Leaves doubly compound or pinnately compound and doubly compound.
 - 13a. Twigs stout, pith salmon-colored; leaves doubly compound, up to 36" long; leaflets 1" - 3" long; thornless **Coffeetree, p. 40**
 - 13b. Twigs slender, pith white; leaves pinnately compound and doubly compound; leaflets $\frac{3}{4}$ " - $1\frac{1}{4}$ " long; often thorny **Honeylocust, p. 41**
 - 12b. Leaves pinnately compound, never doubly compound.

(continued on next page)



- 14a. Branchlets (or twigs) armed with sharp spines paired at the leaf scars.
 - 15a. Leaves have lemonlike smell when crushed; fruit a capsule; bark fairly smooth **Prickly-ash, p. 42**
 - 15b. Leaves not lemon smelling; fruit a legume; bark deeply furrowed **Black Locust, p. 42**
- 14b. Branchlets (or twigs) not armed with spines.
 - 16a. Fruit a husked nut; bark usually rough with inconspicuous lenticels.
 - 17a. Twig pith solid, 5 - 11 leaflets; nut smooth, husk splits into 4 segments **Hickories, p. 43-44**
 - 17b. Twig pith chambered; 14 - 23 leaflets; nut rough, husk not split into segments **Walnuts, p. 44-45**
 - 16b. Fruit fleshy, orange or red; trunk bark smooth with conspicuous horizontal lines or raised dots (lenticels).
 - 18a. Twig and leaf sap clear; fruit a pome **Mountain-ashes, p. 46-47**
 - 18b. Twig and leaf sap milky; fruit a cone-shaped multiple of drupes, covered with numerous hairs **Sumacs, p. 47**
- 11b. Leaves simple.
 - 19a. Leaves fan-shaped with parallel veins, often notched at the tip **Ginkgo, p. 48**
 - 19b. Leaves not fan-shaped.
 - 20a. Leaf margins lobed or notched.
 - 21a. Branchlets (or twigs) do not have thorns or thornlike shoots; fruit not a pome.
 - 22a. Leaves pinnately lobed; buds clustered at twig ends; fruit an acorn.
 - 23a. Lobes often rounded (rarely pointed), without bristle tips **White Oak Group, p. 49-51**
 - 23b. Lobes pointed with bristle tips . **Red Oak Group, p. 52-53**
 - 22b. Leaves palmately lobed or irregularly lobed; buds not clustered at twig ends; fruit not an acorn.
 - 24a. Fruit a capsule; leaves white and very fuzzy below, sap clear **White Poplar, p. 54**
 - 24b. Fruit a multiple of drupes; leaves smooth or hairy below, sap milky **Mulberries, p. 54**
 - 21b. Branchlets (or twigs) armed with thorns or thornlike shoots; fruit a pome.
 - 25a. Thorns smooth, very sharp; pome core hard; spurshoots absent on branchlets **Hawthorn, p. 55**
 - 25b. Thorns rough with buds or leaves often attached; pome core leathery or papery; numerous spur shoots on branchlets **Apples, Pears, p. 55-56**
- 20b. Leaf margins toothed or smooth, never lobed.

- 26a. Leaf margins doubly toothed.
 - 27a. Branchlets or trunk armed with thorns.
 - 28a. Thorns smooth without buds or leaves attached, very sharp; spur shoots absent **Hawthorn, p. 55**
 - 28b. Thorns rough with buds or leaves often attached; stubby spur shoots present.
 - 29a. Fruit a drupe; twigs with a bitter almond smell or taste when broken; thorns less than 1" long
..... **Plums, p. 56**
 - 29b. Fruit a pome; twigs lack bitter smell or taste; thorns often greater than 1" long
..... **Apples, Pears, p. 55-56**
 - 27b. Branchlets or trunk not armed with thorns.
 - 30a. Leaf base distinctly lopsided (uneven); fruit a waferlike samara **Elms, p. 57-58**
 - 30b. Leaf base not lopsided (nearly even); fruit a nutlet.
 - 31a. Nutlets grouped in a nonwoody catkin (often absent), slender male catkins also may be present; leaves papery; buds covered with 3 or more overlapping scales.
 - 32a. Trunk bark marked with dark horizontal lines (lenticels), usually peeling in papery strips; leaves attached to branchlets or twigs in 5 rows or more
..... **Birches, p. 59-61**
 - 32b. Trunk bark not marked with dark lines, smooth or peeling in vertical strips; leaves attached to branchlets or twigs in 2 parallel rows.
 - 33a. Trunk grayish-brown, scaly or peeling in vertical strips, nearly round in cross section; nutlet enclosed in an inflated papery sac
..... **Ironwood, p. 62**
 - 33b. Trunk gray, smooth with musclelike ridges, fluted in cross section; nutlet attached to 3-lobed, leaflike bract
..... **Blue-beech, p. 63**
 - 31b. Nutlets grouped in a woody, pineconelike catkin (often present), slender male catkins also may be present; leaves leathery; buds covered with 2 (or 3) outer scales meeting at their edges
..... **Alder, p. 63**
- 26b. Leaf margins singly toothed or smooth, never doubly toothed.
 - 34a. Leaf and twig sap milky; fruit a joined multiple of drupes **Mulberries, p. 54**
 - 34b. Leaf and twig sap clear; fruit not a joined multiple.

(continued on next page)





- 35a. Leaf base distinctly lopsided (uneven), heart-shaped.
 - 36a. Leaves 2" - 7" long, nearly as wide; trunk bark smooth or vertically fissured with smooth ridges; fruit stalk attached to a leaflike wing **Lindens, p. 64**
 - 36b. Leaves 2" - 5" long, about half as wide; trunk bark smooth with corky warts or raised ridges; fruit stalk attached to twig **Hackberry, p. 65**
- 35b. Leaf base nearly symmetric (even), rarely heart-shaped.
 - 37a. Leaves 3 times (or more) as long as wide (not including leafstalk).
 - 38a. Twigs silvery, often thorny; leaves grayish-green above, silvery and scaly below, margins nearly smooth **Russian-olive, p. 65**
 - 38b. Twigs not silvery; thornless; leaves green above, not silvery or scaly below.
 - 39a. Branchlets often brittle at base, pith star-shaped in cross section, smell unlike bitter almonds when broken; buds covered by single scale (or sheath) **Willows, p. 66-67**
 - 39b. Branchlets firm at base, pith nearly round in cross section, bitter almond smell when broken; buds covered with several overlapping scales **Cherries, p. 68-69**
 - 37b. Leaves less than 3 times as long as wide (not including leafstalk).
 - 40a. Twigs distinct bitter almond smell when broken **Cherries, p. 68-69**
 - 40b. Twigs smell unlike bitter almond.
 - 41a. Leaves often thick and waxy, leafstalk often flattened; twig pith star-shaped in cross section; buds often sticky, lowest scale on lateral buds centered directly over leafstalk; fruit a capsule **Poplars, p. 70-72**
 - 41b. Leaves thin and smooth, leaf stalk round; twig pith round in cross section, buds not sticky, lowest scale of lateral buds not centered over leafstalk; fruit not a capsule.

42a. Leaves clustered at ends of upturned twigs, margins smooth, lateral veins nearly parallel margins; fruit a drupe

..... **Alternate-leaf
Dogwood, p. 73**

42b. Leaves not clustered at ends of upturned twigs, margins finely toothed, lateral veins terminate near margins; fruit a pome.

43a. Branchlets with scattered short, stubby spur shoots; trunk or large branches gray to reddish-brown, scaly

..... **Apples, Pears, p. 55-56**

43b. Branchlets without spur shoots; trunk and large branches gray or brown, marked with vertical stripes

..... **Serviceberries, p. 74**



Deciduous Tree Descriptions

Opposite-branching Trees with Pinnately Compound Leaves (Ashes, Boxelder, Cork-tree)

BLACK ASH (*Fraxinus nigra*)

Medium tree, 30' - 50' (80') tall; narrow, rounded crown of upright branches; trunk often leaning or crooked, up to 18" diameter. **Leaves:** Opposite, pinnately compound, 9" - 16" long; *leaflets*, 7 - 13 *flush with leafstalk*, 4" - 5½" long, 1" - 2" wide, finely toothed margins, light yellowish-green; yellow to brown in autumn. **Twigs:** Light green to gray with *light brown dots (lenticels)*, bluish-black buds.

Fruit: Samara, 1" - 1¾" long, *blunt at both ends, notched wing tip*, mature in late summer. **Bark:** Light gray with orangish streaks, smooth; becoming scaly or corky (rubs off easily). **Range:** Native, eastern and northern Minnesota; hardy to Zone 3a. **Remarks:** Moderately shade-intolerant; moderately slow-growing; moderately short-lived. Common bottomland species found in deciduous floodplain forests and borders of coniferous swamps and bogs. Sometimes called hoop ash because when pounded, the green wood splits along annual growth rings into tough, flexible strips. American Indians used these strips to construct baskets, mats, and fish traps.



Black Ash



GREEN ASH or red ash (*Fraxinus pennsylvanica*)

Medium tree, 40' - 60' tall; dense, rounded or irregular crown of upright branches; trunk up to 24" diameter. **Leaves:** Opposite, pinnately compound, 6" - 12" long; *leaflets*, 5 - 9 (*usually* 7), 2¾" - 5" long, 1" - 1¾" wide, *leaflet stalk narrowly winged*, toothed or smooth margins, yellowish-green; yellow in autumn. **Twigs:** Greenish-gray to reddish-brown with light-colored dots (lenticels), *often hairy, leaf scars straight or slightly notched at top*, reddish-brown to dark brown buds. **Fruit:** Samara, 1" - 2" long, *notched or pointed wing tip*, mature in early autumn. **Bark:** Brown to dark gray, smooth or slightly flaky; becoming deeply furrowed with narrow, interlacing ridges (diamond-shaped appearance).

Range: Native and hardy throughout Minnesota.

Remarks: Moderately shade-tolerant, fast-growing, moderately long-lived. Naturally found in wet lowland forests, but tolerant of dry site conditions. Extensively planted urban shade tree; also used in farm shelterbelts and field windbreaks. Hard, tough wood used for interior trim, oars, baseball bats, tennis rackets, tool handles, furniture, and snowshoes.



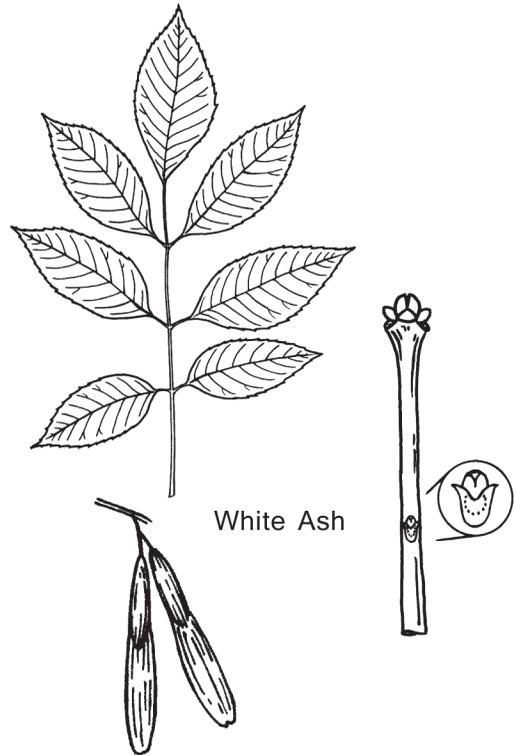
Green Ash



WHITE ASH (*Fraxinus americana*)

Large tree, 40' - 70' tall; dense, rounded to pyramidal crown; trunk up to 24" diameter.

Leaves: Opposite, pinnately compound, 8" - 12" long; *leaflets*, 5 - 9 (usually 7), 2³/₄" - 5" long, 1" - 2" wide, toothed or smooth margins, dark green (*distinctly paler or white below*); yellow or purple in autumn. **Twigs:** Green or purplish with *scattered white dots (lenticels)*, *leaf scars deeply notched or U-shaped at the top*, dark brown buds. **Fruit:** Samara, 1" - 2" long, *notched or rounded wing tip*, mature in late summer. **Bark:** Greenish-gray; becoming dark gray, deeply furrowed with narrow, interlacing ridges (diamond-shaped appearance). **Range:** Native, scattered and rare, southeastern and east-central Minnesota; hardy to Zone 4a. **Remarks:** Intermediate in shade tolerance; moderately fast-growing; moderately long-lived. Similar to green ash, but naturally found in dry upland forests and moist, well-drained forests. Like all ashes, white ash sprouts vigorously from the trunk when injured.



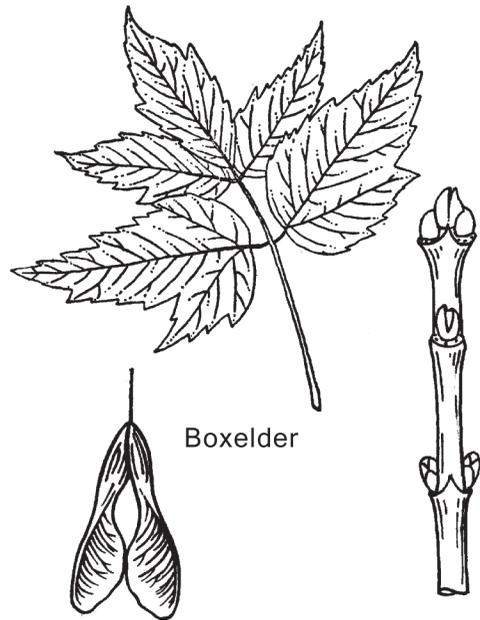
BOXELDER or Canadian maple

(*Acer negundo*)

Medium tree, 30' - 50' tall; broad, rounded crown; trunk often divided low, up to 36" diameter. **Leaves:** Opposite, pinnately compound, 4" - 9" long; *leaflets*, 3 - 5 (rarely 7 - 9), 2" - 4" long, 1" - 2½" wide, irregularly toothed margins (often 3-lobed), pale green; yellow in autumn. **Twigs:** Green to purple with a whitish film (rubs off easily), very smooth, disagreeable odor when broken; buds, white with reddish scales (usually 4), fuzzy. **Fruit:** Samara, 1" - 1½" long, V-shaped pairs, mature in autumn. **Bark:** Yellowish-tan to grayish-brown, blocky; becoming deeply furrowed with orangish troughs and warty ridges.

Range: Native and hardy throughout Minnesota, but scattered or absent in northeast.

Remarks: Shade-tolerant; fast-growing; moderately short-lived. Commonly found in floodplains and disturbed sites. Hardy ornamental that survives in extreme site conditions, but subject to limb breakage. Female trees often attacked by annoying boxelder bugs. Occasionally used for maple syrup.



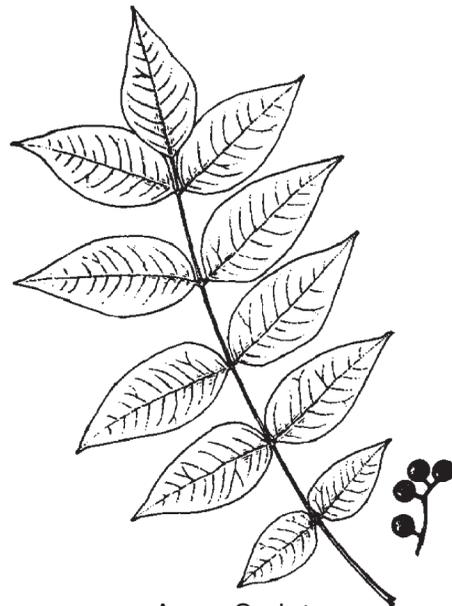
Boxelder

AMURCORK-TREE

(*Phellodendron amurense*)

Medium tree, 30' - 50' tall; broad, rounded crown with low spreading branches; trunk up to 24" diameter. **Leaves:** Opposite; pinnately compound; 6" - 12" long; *leaflets*, 5 - 13, oval, long pointed tips, 2" - 4" long, smooth margins, aromatic when crushed, shiny dark green; yellow in autumn. **Twigs:** Orangish-yellow to yellowish-gray, horseshoe-shaped leaf scars nearly to entirely encircling buds, velvety buds. **Fruit:** Drupe, ½" diameter, black, drupes grouped in 2" - 8" long clusters, 5-seeded, turpentine odor when crushed, mature in autumn. **Bark:** Light gray, soft, corky, becoming deeply fissured.

Range: Introduced from northern China; hardy to Zone 3b. **Remarks:** Moderately shade-intolerant; moderate-growing; moderately long-lived. Attractive ornamental tree that prefers moist, well-drained soils.



Amur Cork-tree

Opposite-branching Trees with Palmately Compound Leaves (Buckeye)

OHIO BUCKEYE (*Aesculus glabra*)

Small to medium tree, 20'- 40' tall; broad, rounded crown; trunk up to 24" diameter.

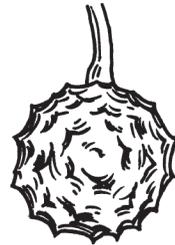
Leaves: Opposite, *palmately compound*, 4" - 15" long; leaflets, 5 (rarely 7), 3" - 6" long, 1" - 2¼" wide, fine irregularly toothed margins, yellowish-green; orange, or yellow in autumn.

Twigs: Reddish-brown to ashy-gray, stout, *disagreeable odor when broken*, shield-shaped leaf scars; *terminal buds*, ½" - ¾" long, *reddish-brown*, *scales ridged down the center*. **Fruit:** Capsule, 1" - 2" diameter, round or *pear-shaped*, *prickly or warty husk*, containing 1 - 2 brown seeds with white caps, mature in mid-autumn. **Bark:** Ash-gray, smooth; becoming deeply furrowed with thick, scaly plates (alligator hide appearance).

Range: Introduced from east-central United States; hardy to Zone 3b. **Remarks:** Intermediate in shade tolerance; moderately slow-growing; moderately long-lived. Ornamental tree with attractive autumn foliage. Some superstitious people carry buckeye seeds in their pockets to ward off rheumatism or to bring good luck.



Ohio Buckeye



Opposite-branching Trees with Simple, Palmately Lobed or Doubly Toothed Leaves (Maples)

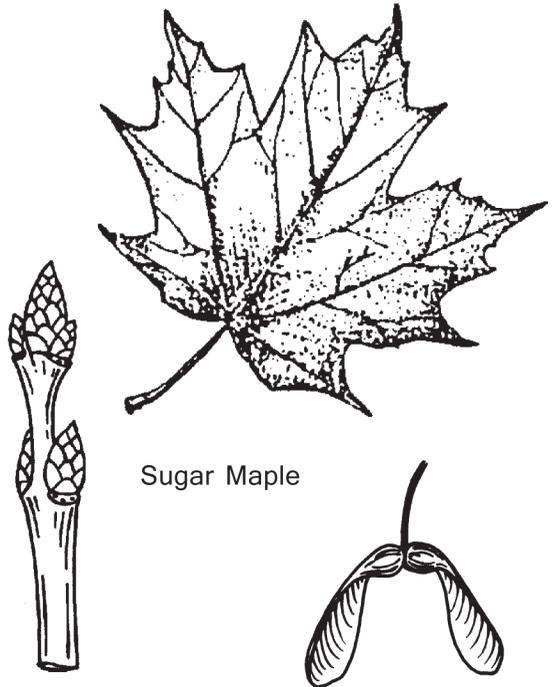
SUGAR MAPLE or hard maple

(*Acer saccharum*)

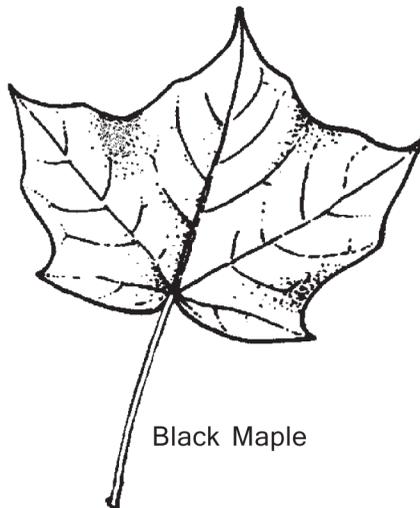
Large tree, 40' - 70' (80') tall; broad, round or oval crown; trunk up to 36" diameter.

Leaves: Opposite, simple, 3½" - 5½" long, nearly as wide, palmately lobed; lobes: 5 (rarely 3), rounded crotches, smooth or wavy margins; light green; yellow, orange, or deep red in autumn. **Twigs:** Reddish-brown to gray with scattered whitish dots (lenticels); buds, reddish-brown to dark brown, cone-shaped, pointed tip, numerous scales. **Fruit:** Samara, ¾" - 1¼" long, U-shaped pairs with nearly parallel wings, mature in autumn. **Bark:** Light gray, smooth or warty; becoming dark gray to nearly black with deep, irregular furrows and narrow plates that curl at the edges, sometimes scaly. **Range:** Native, eastern Minnesota; hardy to Zone 3b.

Remarks: Very shade-tolerant; slow-growing; long-lived. Attractive, widely planted ornamental tree naturally found on moist, fertile soils. Primary source of maple syrup and maple sugar. Principal timber species; its hard, closely grained, light brown wood is used in furniture, flooring, cabinets, cutting boards, veneer, and musical instruments. Occasionally develops unique wood grain pattern known as bird's eye, curly, tiger, or blister maple.



Sugar Maple



Black Maple

BLACK MAPLE (*Acer nigrum*)

Large tree, nearly identical to sugar maple.

Leaves: 3-lobed (rarely 5), smooth or wavy margins, abruptly pointed lobes, drooping sides, dark green. **Range:** Native, southeastern and south-central Minnesota; hardy to Zone 4a.

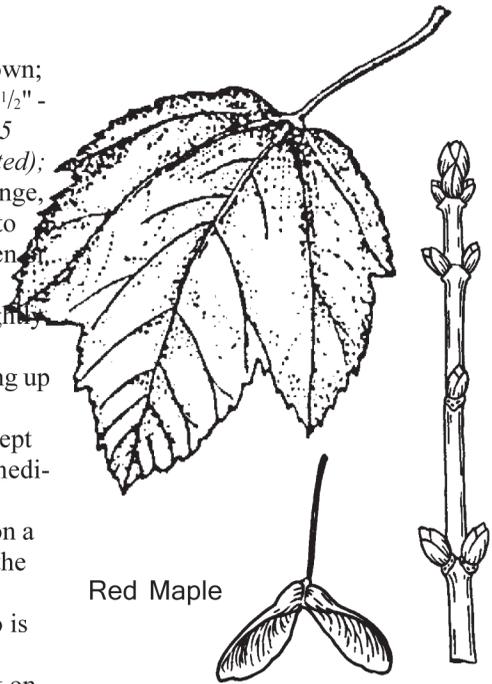
RED MAPLE or soft maple (*Acer rubrum*)

Medium to large tree, 40' - 70' tall; dense, rounded crown; trunk up to 24" diameter. **Leaves:** Opposite, simple, 2½" - 4" long, nearly as wide, palmately lobed; lobes, 3 or 5 (usually 3), relatively shallow crotches (often pointed); doubly toothed margins; light green; scarlet red, orange, or yellow in autumn; red leafstalk. **Twigs:** Bright red to reddish-brown with white dots (lenticels); buds, green or dark red, blunt.

Fruit: Samara, ½" - 1" long, U-shaped pairs with slightly divergent wings, mature in spring.

Bark: Silvery gray, smooth, scaly limb scars; breaking up into large, vertical strips with scaly ridges.

Range: Native and hardy throughout Minnesota except along western and southern border. **Remarks:** Intermediate in shade-tolerance; moderately fast-growing; moderately long-lived. Attractive, hardy tree found on a broad range of site conditions. Tannins boiled from the bark formerly used to produce inks and cinnamon-colored dyes. Important ornamental species that also is sometimes used for maple syrup. Common name, red maple, is based on the color of the tree's flowers, not on its leaves.



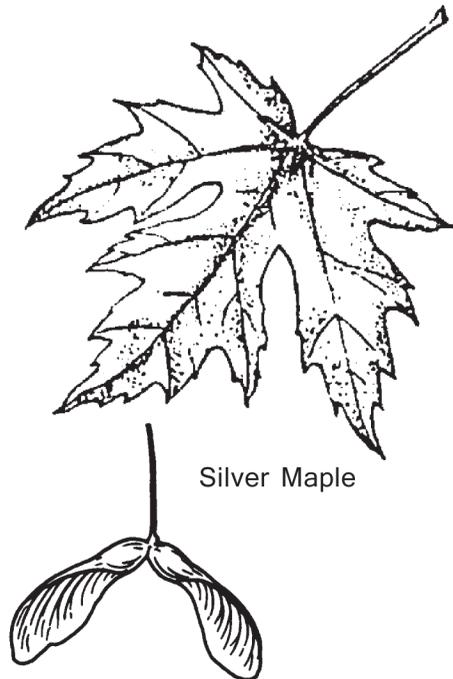
Red Maple

SILVER MAPLE or soft maple (*Acer saccharinum*)

Large tree, 40' - 70' tall; massive, round-topped crown; trunk, often divided low, up to 42" diameter.

Leaves: Opposite, simple, 4" - 6" long, nearly as wide, palmately lobed; lobes, 5, 2 deeply cut crotches come to sharp point, doubly toothed margins; dull green (white or silvery below); pale yellow to orange in autumn.

Twigs: Yellowish-gray to reddish-brown, disagreeable odor when broken; buds, dark red, blunt. **Fruit:** Samara, 1½" - 2½" long, V-shaped pairs with widely divergent wings, mature in spring. **Bark:** Gray; smooth; becoming furrowed with long, scaly, narrow strips that often curl at the ends. **Range:** Native, southern and east-central Minnesota, north to Duluth and west to upper Mississippi River; hardy to Zone 3b. **Remarks:** Moderately shade-intolerant; fast-growing; moderately short-lived. Prolific seed producer commonly found in moist bottom-land forests. Sprouts vigorously when injured. Extensively planted as a fast-growing street tree that is somewhat tolerant of extreme site conditions, but has brittle branches and roots that may damage sidewalks, sewers, and drains. Occasionally used for maple syrup.



Silver Maple

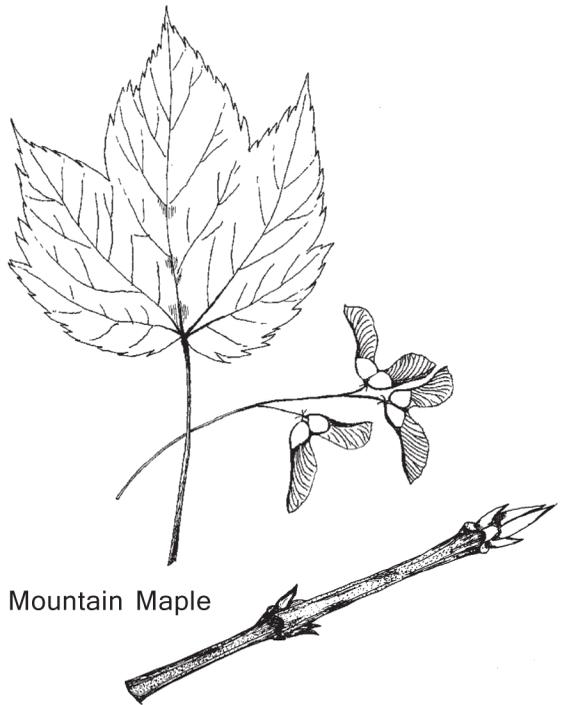
MOUNTAIN MAPLE (*Acer spicatum*)

Shrub or small tree, 10' - 20' (30') tall; small, irregular crown of upright branches; trunk, often crooked and divided, up to 7" diameter.

Leaves: Opposite, simple, 2½" - 4½" long, two-thirds as wide, palmately lobed; lobes, 3 (rarely 5), shallow crotches, coarsely toothed margins; light green; deep red or orange in autumn. **Twigs:** Yellowish-green to reddish-green with velvety, gray hairs; terminal buds, red, perched on a small stalk, 2 scales.

Fruit: Samara, ¾" - 1" long, U-shaped pairs with divergent wings, mature in autumn. **Bark:** Reddish-brown to brown, thin, smooth or slightly furrowed. **Range:** Native, northeastern and east-central Minnesota; hardy throughout. **Remarks:** Shade-tolerant; slow-growing; short-lived. Understory species found in moist, cool, often rocky forests.

Live lower branches sprout roots and form new trees when covered by soil or plant litter.



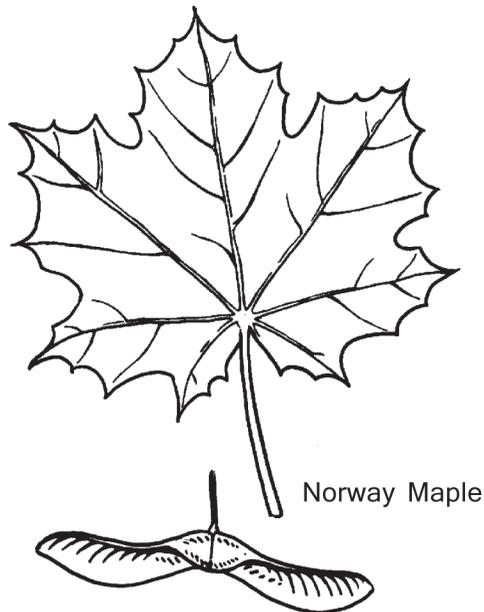
Mountain Maple

NORWAY MAPLE (*Acer platanoides*)

Medium tree, 40' - 60' tall; dense, round crown; trunk up to 24" diameter. **Leaves:** Opposite, simple, 4½" - 7" wide, nearly as long, exudes milky sap when cut, palmately lobed; lobes, 5, shallow crotches, sharp wavy-toothed margins; shiny green; bright yellow or orange-brown in autumn. **Twigs:** Greenish-brown to brown; buds, yellowish-green to brownish-red, exude milky sap when cut. **Fruit:** Samara, 1½" - 2" long, V-shaped pairs with extremely divergent wings, flat, mature in autumn. **Bark:** Dark gray, smooth; becoming closely fissured with narrow, interlacing ridges. **Range:**

Introduced from Europe and western Asia; hardy to Zone 4a. **Remarks:** Shade-tolerant, moderate-growing, moderately long-lived. Extensively planted ornamental street tree.

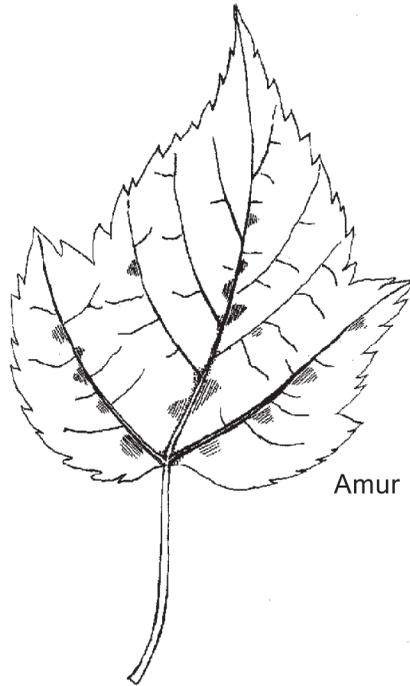
Varieties with red or purple foliage often are planted, but are not always winter hardy in Minnesota.



Norway Maple

AMUR MAPLE (*Acer ginnala*)

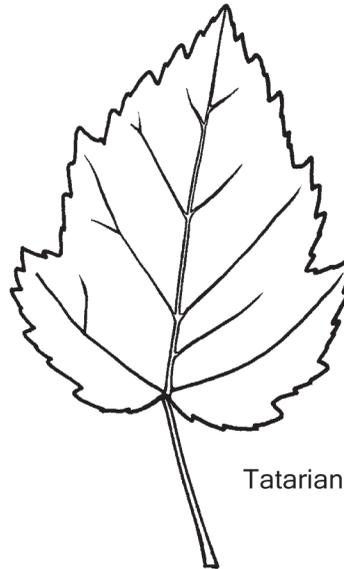
Shrub or small tree, 15' - 18' tall; round to irregular crown; trunk, often multistemmed, up to 12". **Leaves:** Opposite, simple, 1½" - 3" long, usually less than one-third as wide, palmately lobed with doubly toothed margins, middle lobe much larger than lateral lobes; dark green; bright red or orange in autumn. **Twigs:** Yellowish-brown, slightly angled; buds, reddish-brown, small (⅛" long). **Fruit:** Samara, 1" long, U-shaped pairs with nearly parallel wings, mature in autumn. **Bark:** Grayish-brown, smooth; becoming vertically striped. **Range:** Introduced from China and Japan; hardy to Zone 3a. **Remarks:** Shade-tolerant; moderate growth rate; moderately long-lived. Attractive ornamental that requires a well-drained soil. Commonly planted in above-ground containers.



Amur Maple

TATARIAN MAPLE (*Acer tataricum*)

Shrub or small tree, very similar to amur maple. **Leaves:** Doubly toothed or obscurely lobed margins. **Fruit:** Samara, 1⅓" - 1¾" long. **Range:** Introduced from Europe; hardy to Zone 3a.



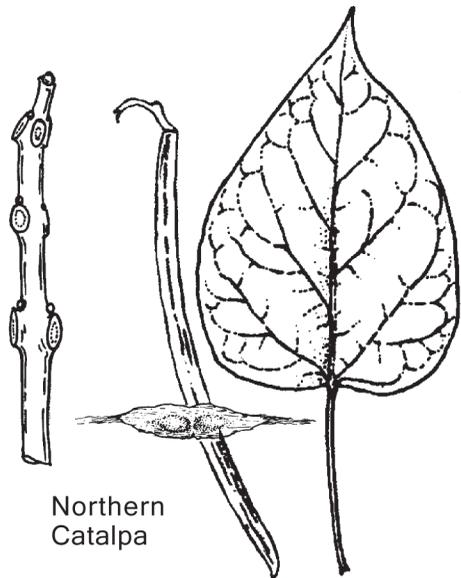
Tatarian Maple



Opposite- or Whorled-branching Trees with Simple and Finely Toothed or Smooth Leaves (Catalpa, Buckthorn, Nannyberry, Wahoo, Most Dogwoods - See Page 73)

NORTHERN CATALPA or hardy catalpa (*Catalpa speciosa*)

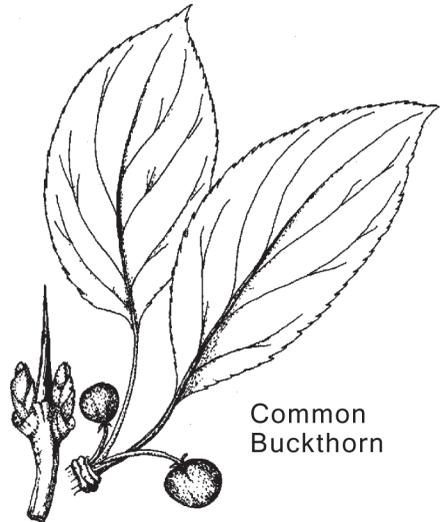
Large tree, 50' - 80' tall; conical or rounded crown; trunk up to 24" diameter. **Leaves:** *Opposite or whorled in threes, simple, heart-shaped, 6" - 12" long, 4" - 8" wide, smooth margins, dull green, blackish in autumn.* **Twigs:** *Brown, round or shield-shaped leaf scars (distinctly raised); dark brown to black buds.* **Fruit:** *Capsule, 8" - 18" long, beanlike, splits into 2 parts, feathery winged seed pairs, present through winter, mature in spring.* **Bark:** *Brown, deeply furrowed with scaly, vertical ridges.* **Range:** *Introduced from Mississippi and Ohio river valleys; hardy to Zone 4b.* **Remarks:** *Shade-intolerant; moderately fast-growing; moderately short-lived. Attractive ornamental tree with showy flowers. Should not be planted on dry, exposed sites.*



Northern
Catalpa

COMMON BUCKTHORN (*Rhamnus cathartica*)

Shrub or small tree, 8' - 20' (30') tall; rounded crown; up to 5" diameter. **Leaves:** *Opposite (occasionally alternate), simple, 1" - 2 1/4" long, 3/4" - 2" wide, round to pointed tip, finely toothed margins, distinctly curved lateral veins (slightly sunken in surface), dark green, greenish-yellow in autumn.* **Twigs:** *Gray, stubby-spur shoots, usually spine tipped; buds, brown, fuzzy scale tips.* **Fruit:** *Drupe, 5/16" diameter, bluish-black, containing 3 or 4 seeds, mature in early autumn.* **Bark:** *Brown, peeling, yellow inner bark.* **Range:** *Introduced from Europe, naturalized in southern Minnesota; hardy throughout.* **Remarks:** *Moderately shade-tolerant; moderately fast-growing; short-lived. Considered a nuisance species that has escaped from cultivation. Widely spread by birds that consume large numbers of the berrylike fruits and pass the undamaged seeds in their droppings.*



Common
Buckthorn

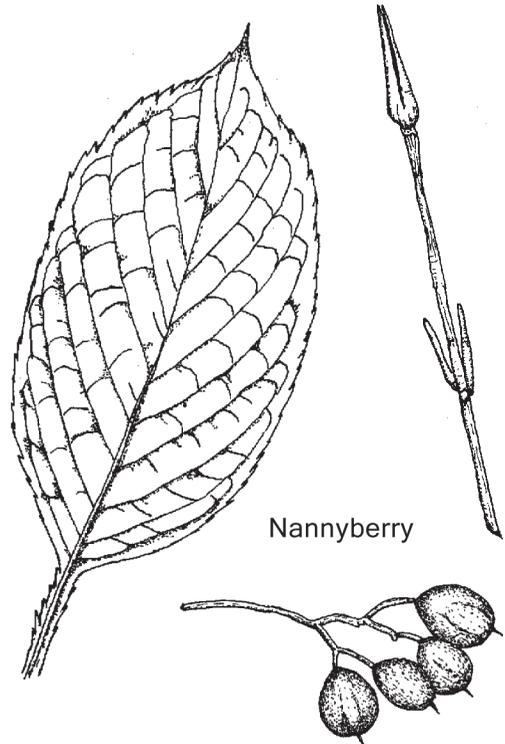
NANNYBERRY (*Viburnum lentago*)

Shrub or small tree, 8' - 25' tall; dense, rounded crown of drooping branches; trunk, often divided low, up to 7" diameter. **Leaves:**

Opposite, simple, 2" - 5" long, 1" - 2½" wide, finely toothed margins, shiny green; red or reddish-purple in autumn; *winged or grooved leafstalk*. **Twigs:** Light green to gray-brown; *terminal buds, brownish-gray, 2 scales, often fat and bulb-shaped at base, long pointed tip*.

Fruit: Drupe, ½" diameter, bluish-black, containing one seed (flat), clustered, mature in early autumn. **Bark:** Reddish-brown to brownish-gray; furrowed with irregular, scaly plates; skunklike odor when broken.

Range: Native and hardy throughout Minnesota, but scattered or absent in southwest. **Remarks:** Moderately shade-tolerant; moderate-growing; short-lived. Common understory species found on rocky hillsides and near woodland edges, stream banks, and wetlands. Edible fruits develop a sweet datelike flavor after the first frost.



Nannyberry

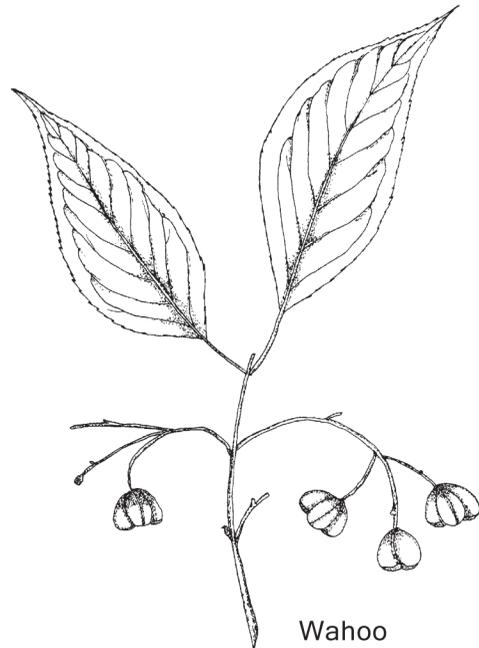
WAHOO or eastern burningbush
(*Euonymus atropurpureus*)

Shrub or small tree, 12' - 20' tall; broad, flat-topped crown; trunk up to 4" diameter. **Leaves:** Opposite, simple, 2" - 4½" long, half as wide, finely toothed margins, dull green (hairy below); yellow to scarlet red in autumn. **Twigs:**

Green to purplish-brown with 4 corky lines or wings, often 4-sided; buds, small, green (reddish tinge). **Fruit:** Capsule, ½" wide, 4-celled, red to purple seeds (fleshy), clustered, mature in autumn.

Bark: Gray, smooth; becoming shallowly fissured. **Range:** Native, scattered, southern half of Minnesota; hardy to Zone 4a.

Remarks: Shade-tolerant; moderately fast-growing; short-lived. Commonly found in thickets, hillsides, woodland edges, and stream banks. Prefers rich, moist soils that are well drained.



Wahoo



Alternate-branching Trees with Doubly Compound Leaves (Coffeetree and Honeylocust)

KENTUCKY COFFEETREE

(*Gymnocladus dioica*)

Large tree, 50' - 70' tall; open, rounded or pyramidal crown of crooked branches (witch's fingers); trunk, often divided low, up to 24" diameter. **Leaves:** Alternate, *doubly compound*, 12" - 36" long; leaflets, often 40 or more, 2" - 2½" long, ¾" - 1½" wide, smooth margins, bluish-green; yellow in autumn. **Twigs:** Brownish-gray, *very stout*, cupped leaf scars, salmon-colored pith; lateral buds, brown, sunken in craters, hairy. **Fruit:** Legume, 6" long, 1½" wide, purplish-brown, mature in autumn. **Bark:** Brownish-gray, smooth; *becoming scaly or blocky with vertical strips that curve outward at the edges (cupped)*. **Range:** Native, rare, southeastern Minnesota in Mississippi River Valley to St. Paul and Minnesota River Valley to New Ulm; hardy to Zone 3b. **Remarks:** Shade-intolerant; moderate-growing; moderately long-lived. Floodplain species. Distribution in Minnesota may be correlated with former American Indian villages whose inhabitants apparently grew the trees for their seeds. The seeds were used in a dice game or roasted and eaten like chestnuts. Common name, Kentucky coffeetree, derives from the seeds, which were roasted, pulverized, and boiled into a bitter, black, coffeelike beverage. Uncooked, however, the seeds and surrounding pulp are poisonous. Kentucky Coffeetree is a popular ornamental tree that prefers fertile, moist soils.

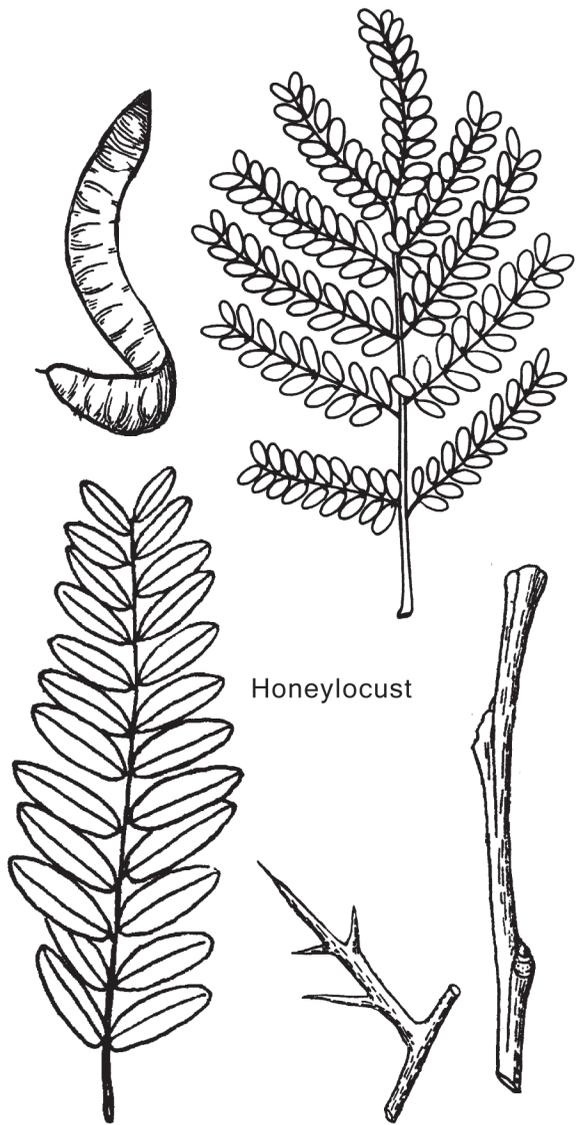


Kentucky
Coffeetree



HONEYLOCUST (*Gleditsia triacanthos*)

Medium tree, 40' - 60' (80') tall; open, often flat-topped crown; trunk, often divided low, up to 36" diameter. **Leaves:** Alternate, doubly compound (usually at twig tips) and pinnately compound; leaflets, $\frac{3}{4}$ " - $1\frac{1}{4}$ " long, narrowly egg-shaped, very finely toothed margins, deep green; yellow in autumn. **Twigs:** Reddish-brown, shiny, zigzags, often thorny; thorns, 1" - 3" long, stiff, often three-forked; lateral buds, brownish, small, 3 or more sunken in leaf scar. **Fruit:** Legume, 6" - 18" long, 1" wide, twisted, purplish-brown, mature in late fall. **Bark:** Grayish-brown with dark lines (lenticels), smooth; becoming blackish with irregularly shaped, platelike, vertical ridges; often thorny (2" - 8" long). **Range:** Native, scattered and rare, southeastern Minnesota (native populations probably extinct); hardy to Zone 3b (variable). **Remarks:** Shade-intolerant; fast-growing; moderately long-lived. Naturally found in moist lowlands and limestone-derived soils, but also tolerates dry sites. Common name, honeylocust, is based on the immature fruits that contain a sweet pulp that tastes like a mixture of honey and castor oil. The pulp is relished by wildlife and cattle, and formerly was fermented into a beerlike beverage. Thornless and seedless varieties commonly are used in ornamental plantings.

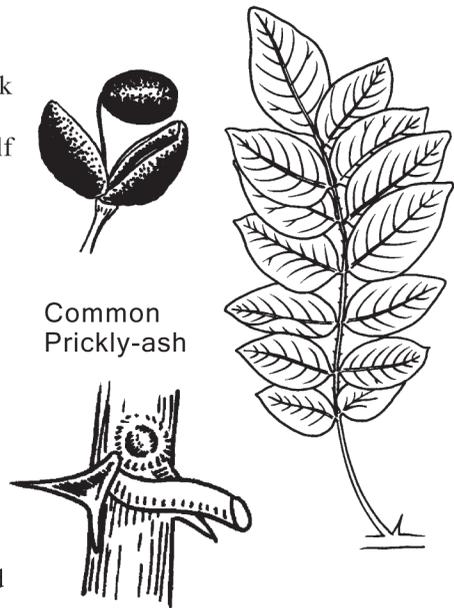


Alternate-branching Trees with Pinnately Compound Leaves and Thorns (Prickly-ash, Black Locust, Honeylocust - See Page 41)

COMMON PRICKLY-ASH

(*Zanthoxylum americanum*)

Shrub or small tree, 4' - 15' (25') tall; rounded crown; trunk up to 6" diameter. **Leaves:** Alternate, pinnately compound, 5" - 10" long; leaflets, 5 - 11, 1" - 2" long, one-half as wide, egg-shaped, *lemonlike smell when crushed*, smooth margins, dull green; yellow in autumn. **Twigs:** Brown or gray, zigzags, *lemonlike smell when broken*, *paired spines* ($\frac{1}{3}$ " long); *lateral buds, red, fuzzy, small*. **Fruit:** Capsule, reddish-brown, clustered, black seeds, mature in late summer. **Bark:** Gray to brown, often with darker lines (lenticels), smooth. **Range:** Native throughout Minnesota, often absent in north; hardy to Zone 3a. **Remarks:** Moderately shade-tolerant; fast-growing; short-lived. Forms dense thickets in forest edges, and open, often grazed, woodlands. Often considered a nuisance tree. Leaves, bark, and fruits contain zanthoxylin, a lemon-smelling oil used in some drug preparations. Inner bark and fruits formerly were chewed to relieve toothaches.

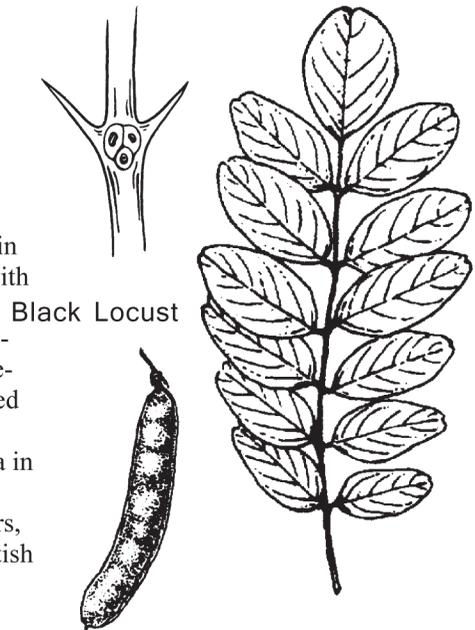


Common Prickly-ash

BLACK LOCUST (*Robinia pseudo-acacia*)

Medium tree, 30' - 60' tall; open, irregular crown; trunk, often crooked, up to 24" diameter. **Leaves:** Alternate, *pinnately compound*, 6" - 14" long; leaflets, 7 - 19, $1\frac{1}{2}$ " - 2" long, $\frac{1}{2}$ " - $\frac{3}{4}$ " wide, smooth margins, blue-green; yellow in autumn. **Twigs:** Brown, *paired spines* ($\frac{1}{2}$ " - 1" long); lateral buds, reddish-brown, 3 or more sunken in leaf scar, hairy. **Fruit:** Legume, 2" - 4" long, $\frac{1}{2}$ " wide, *dark-brown, containing 4 - 8 seeds*, mature in late autumn. **Bark:** Grayish-brown; deeply furrowed with *interlacing ridges and orangish troughs*.

Range: Introduced from eastern United States; naturalized in Minnesota; hardy to Zone 3b. **Remarks:** Shade-intolerant; fast-growing; short-lived. Commonly planted erosion-control species that rapidly spreads from root suckers. Often considered a nuisance species. Bacteria in the roots fix nitrogen, improving soil fertility. Durable, rot-resistant wood is used for fence posts, mine timbers, dowels, and firewood. During the War of 1812, the British credited American naval successes to the use of black locust timber in their ships. Although several factors contributed to British losses, the perception started a black locust planting craze in Europe.



Black Locust

Alternate-branching, Nut-producing Trees with Pinnately Compound Leaves (Hickories, Walnuts)

BITTERNUT HICKORY

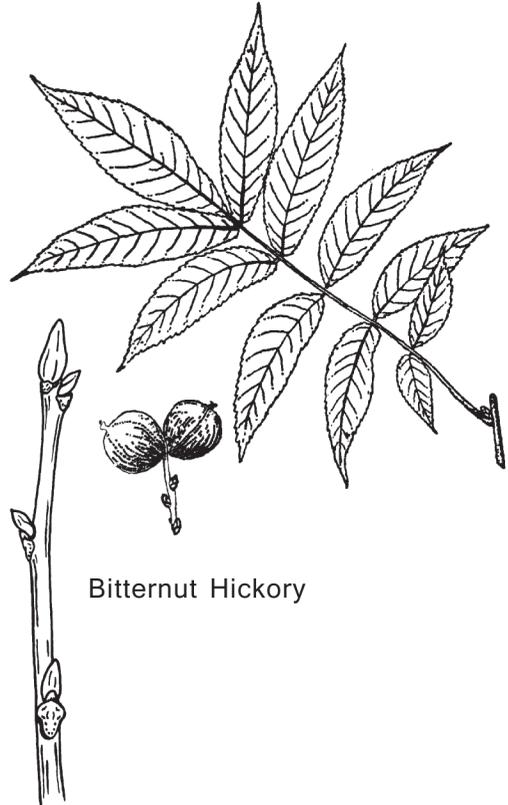
(Carya cordiformis)

Medium to large tree, 40' - 80' tall; broad, rounded crown with upright branches; trunk up to 24" diameter. **Leaves:** Alternate, pinnately compound, 6" - 10" long; leaflets, 7 - 11, finely toothed margins, bright green; golden yellow in autumn. **Twigs:** Greenish-brown to gray-brown with whitish hairs, bundle scars scattered on leaf scar or arranged in a monkey-face pattern, star-shaped pith; buds, bright yellow, flattened. **Fruit:** Nut, $\frac{3}{4}$ " - $1\frac{1}{4}$ " diameter, rounded, sharply pointed tip; thin, 4-ribbed husk (splitting halfway down from tip); mature in autumn.

Bark: Grayish, smooth with shallow interlacing ridges; becoming shallowly furrowed.

Range: Native, southeastern and east-central Minnesota, occasionally found along upper Mississippi River and tributaries of the St. Louis River; hardy to Zone 4a.

Remarks: Moderately shade-tolerant; moderately slow growing; moderately long-lived. Common species found on variety of sites, from moist lowlands to dry uplands. Bitter nuts are unpalatable to humans and many wildlife species. Oils extracted from the boiled nuts formerly used for lamp fuel and rheumatism medicine. Heavy, hard wood used for tool handles, firewood, and smoking meats (reportedly the best hickory flavor).

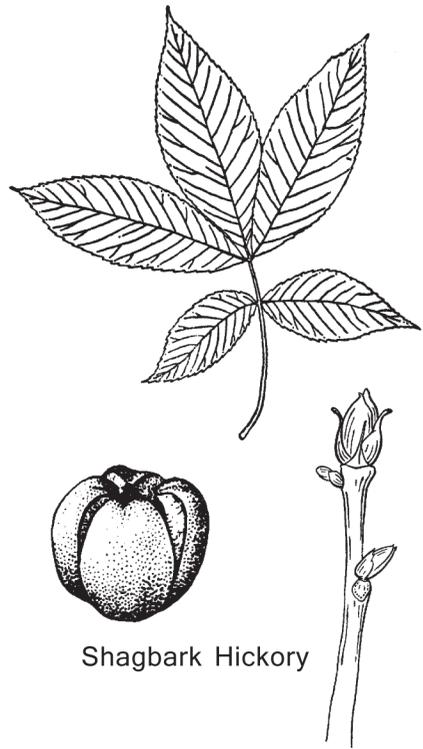


Bitternut Hickory



SHAGBARK HICKORY (*Carya ovata*)

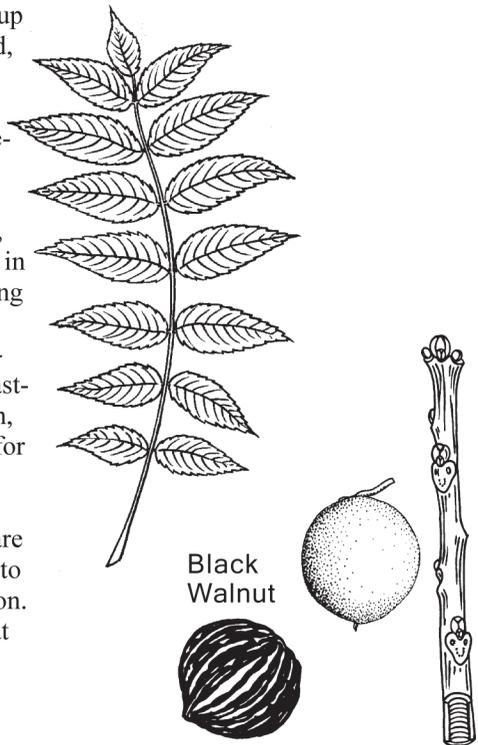
Medium to large tree, 40' - 60' (80') tall; narrow, irregular crown; trunk up to 24" diameter. **Leaves:** Alternate, pinnately compound, 8" - 14" long; leaflets, 5 - 7 (usually 5), *upper 3 larger than lower 2*, finely toothed margins, dark yellowish-green; golden yellow in autumn. **Twigs:** Gray to reddish-brown with whitish hairs, stout, bundle scars scattered on leaf scar or arranged in a monkey-face pattern, star-shaped pith; *terminal buds, large, egg-shaped, loose scales*. **Fruit:** Nut, 1" - 1½" diameter, oval; thick, 4-ribbed husk (splitting from tip to base); mature in autumn. **Bark:** Gray, smooth; *breaking up into long, curved strips that are loosely attached (shaggy appearance)*. **Range:** Native, southeastern corner of Minnesota; hardy to Zone 4b. **Remarks:** Shade tolerant when young, moderately shade-intolerant when mature; slow growing; long-lived. Heavy, strong wood makes an excellent charcoal; also used for tool handles, wagon wheels, skis, and baskets. Delicious nuts are consumed by humans and wildlife. American Indians formerly crushed and boiled the nuts to produce a sweet oil (hickory milk) used in corn cakes and grits.



Shagbark Hickory

BLACK WALNUT (*Juglans nigra*)

Large tree, 50' - 70' (100') tall; large, open crown; trunk up to 36" diameter. **Leaves:** Alternate, pinnately compound, 12" - 24" long; leaflets, 14 - 23, terminal leaflet often smaller or absent, finely toothed margins, yellowish-green; yellow in autumn. **Twigs:** Light brown to orange-brown, stout, *chambered pith (light brown)*, hairy, bundle scars in 3 U-shaped clusters (monkey-face pattern); *buds, tan to white, 1/3" long, fuzzy*. **Fruit:** Nut, 2" diameter, *round, aromatic husk (not sticky)*, mature in autumn. **Bark:** Brownish-black, slightly scaly; becoming darker and deeply furrowed with scaly ridges. **Range:** Native, southeastern and south-central Minnesota; hardy to Zone 4a. **Remarks:** Shade-intolerant; fast-growing; moderately long-lived. Typically found in rich, well-drained lowland sites. Prized timber species used for furniture, cabinets, caskets, gun stocks, and veneer. Individual trees suitable for high quality veneer occasionally sell for several thousand dollars. Nut kernels are sweet and delicious, but woody seed cover is difficult to crack and wildlife often consume them prior to collection. Roots exude a natural herbicide, known as juglone, that is toxic to many plants including tomatoes.



Black Walnut

BUTTERNUT or white walnut

(*Juglans cinerea*)

Medium tree, 40' - 60' tall; flat or round-topped open crown with ascending branches; trunk, often divided, up to 24" diameter. **Leaves:**

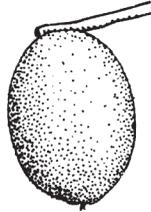
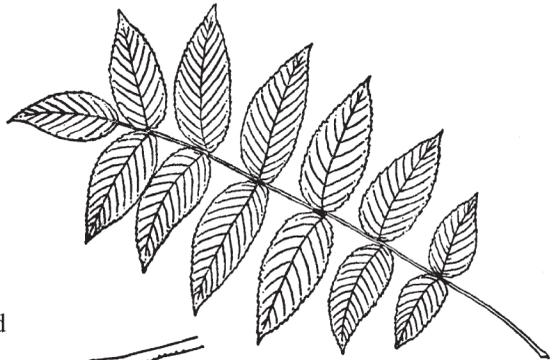
Alternate, pinnately compound, 15" - 25" long; leaflets, 11 - 17, finely toothed margins, yellowish-green; yellow or brown in autumn. **Twigs:** Greenish-gray to reddish-brown, rough, hairy, stout, *finely chambered pith (dark brown)*, bundle scars in 3 U-shaped clusters on leaf scar (monkey-face pattern); buds, *brownish, 1/2" - 3/4" long, fuzzy.*

Fruit: Nut, 2 1/2" diameter, *egg-shaped, sticky husk (stains your fingers)*, mature in autumn.

Bark: *Whitish-gray*, smooth; becoming narrowly fissured with *broad, flat ridges.*

Range: Native, southeastern and east-central Minnesota; hardy to Zone 4a.

Remarks: Shade-intolerant; fast growing; moderately long lived. Uncommon species being destroyed by butternut canker, a fungus first reported in 1967. A search currently is underway to identify disease-resistant trees. Common name, butternut, refers to the butterlike oil that American Indians extracted from the tree's edible nut kernels. Confederate troops in the Civil War sometimes were called "butternuts" because their homemade uniforms were colored with dyes obtained from the tree's inner bark and nut husks. The sap can be boiled to produce a sweet syrup, and the wood is a favorite among carvers.



Butternut



Alternate-branching Trees with Pinnately Compound Leaves and Fleshy, Orange or Red Fruits (Mountain-Ashes, Sumacs)

AMERICAN MOUNTAIN-ASH

(*Sorbus americana*)

Small tree, 15' - 30' tall; open, rounded crown; trunk up to 12" diameter. **Leaves:** Alternate, pinnately compound, 6" - 9" long; *leaflets*,

11 - 17, sharp finely toothed margins, 1½" - 4" long, one-third to one-half as wide, dark yellowish-green; yellow in autumn. **Twigs:** Reddish-brown, spur shoots on branchlets; *terminal buds*, dark red, hairy, pointed, exude a gummy sap.

Fruit: Pome, bright orange or red, ¼" diameter, clustered, mature in autumn. **Bark:** Light grayish-brown with dark lines or dots (lenticels), smooth or slightly scaly. **Range:** Native, northeastern Minnesota; hardy throughout. **Remarks:** Moderately shade-intolerant; slow-growing; short-lived. Attractive ornamental, but very susceptible to fire blight (bacterial disease) and sunscald. Concoctions extracted from the mountain-ash's inner-bark reportedly were used in colonial times to exorcise people falsely convicted of being witches.



American Mountain-ash



EUROPEAN MOUNTAIN-ASH or

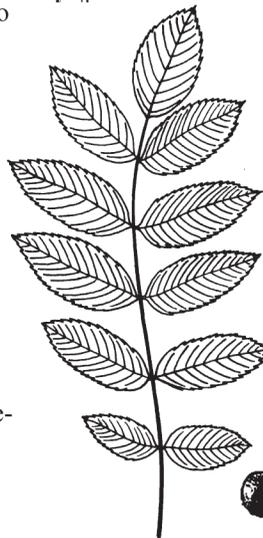
Rowan tree (*Sorbus aucuparia*)

Small tree, 15' - 30' tall; rounded crown; trunk up to 12" diameter. **Leaves:** Alternate, pinnately compound, 4" - 8" long; leaflets, 9 - 17, finely toothed margins, ¾" - 2" long, about one-third as wide,

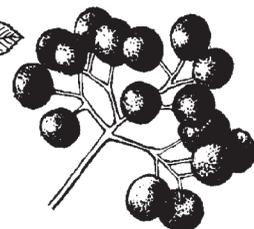
dull green (*whitish hairs below*); yellow in autumn. **Twigs:** Reddish-brown, *white hairs (velvety)*, spur shoots on branchlets; *terminal buds*, ½" long, *white-woolly*. **Fruit:** Pome, bright orange or red, ⅜" diameter, clustered, mature in autumn. **Bark:** Dark gray with dark lines or dots (lenticels), smooth or slightly scaly, *aromatic*.

Range: Introduced from Europe and Asia; naturalized in some areas; hardy throughout.

Remarks: Moderately shade-intolerant; moderate-growing; short-lived. Most commonly planted mountain-ash. The fruits are an important winter food source for many birds and formerly were used to bait bird traps. The Latin species expression, *aucuparia*, is derived from the root words *avis* and *capere*, meaning "to catch birds."



European Mountain-ash



SHOWY MOUNTAIN-ASH (*Sorbus decora*)

Small tree, similar to American mountain-ash. **Leaves:** Pinnately compound; leaflets, 11 - 15, 1¹/₄" - 2³/₄" long, more than one-third as wide, bluish-green. **Fruit:** ³/₈" - ¹/₂" diameter, bright red. **Range:** Native to northeastern Minnesota and scattered interior locations; hardy throughout.

STAGHORN SUMAC (*Rhus typhina*)

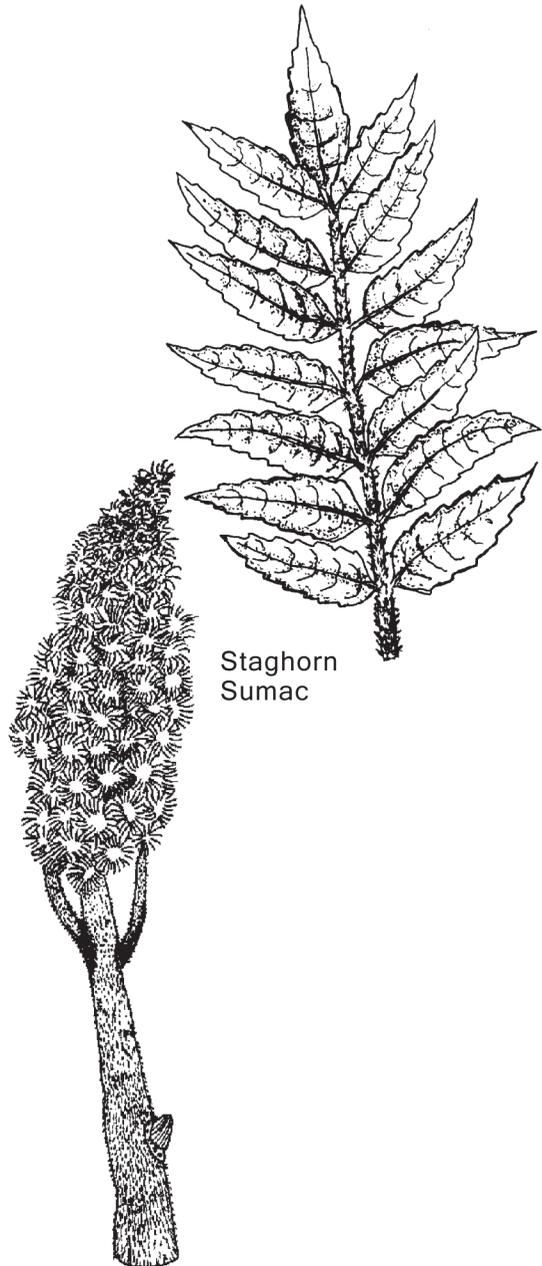
Tall shrub or small tree, 10' - 20' tall; open, irregular, flat-topped crown; trunk up to 6" diameter. **Leaves:** Alternate, pinnately compound, 12" - 24" long; *leaflets, 11 - 31, 2" - 4³/₄" long, ³/₄" - 1³/₅" wide, sharply toothed margins, dark green (often with red hairs below); bright orange, red, or purple in autumn; reddish, hairy leafstalk. **Twigs:** Brown, *dense velvety-brown hairs, very stout; lateral buds, small, cone-shaped, surrounded by horseshoe-shaped leaf scar.* **Fruit:** *Multiple of drupes, cone-shaped, dark red with long hairs, mature in autumn.* **Bark:** Dark brown to yellowish-brown, smooth or slightly scaly.*

Range: Native, southeastern and east-central Minnesota; hardy to Zone 4a.

Remarks: Shade-intolerant; fast-growing; short-lived. Forms dense thickets in abandoned fields or at forest edges. Berrylike fruits can be used to brew a sour lemon-tasting drink. Common name, staghorn, is based on the fuzzy twigs, which feel like the velvety antlers on a buck deer.

SMOOTH SUMAC (*Rhus glabra*)

Tall shrub or small tree, similar to staghorn sumac; distinguished by its hairless twigs and leafstalks. **Range:** Native throughout Minnesota; hardy to Zone 3a.

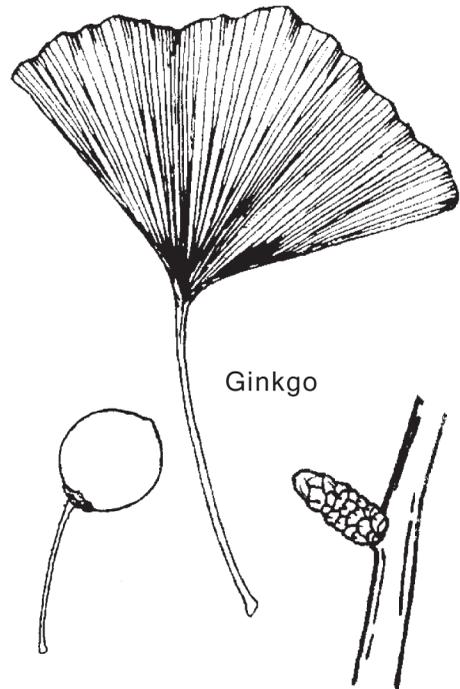


Alternate-branching Trees with Simple, Fan-shaped Leaves (Ginkgo)

GINKGO or maidenhair tree (*Ginkgo biloba*)

Medium tree, 40' - 60' tall; pyramid-shaped crown; trunk, distinctly tapered, up to 30" diameter. **Leaves:** Alternate, *fan-shaped*, 1" - 2" long, 1½" - 3" wide, born singly or *clustered on wartlike spur shoots*, often notched at the tip, light green; yellow in autumn. **Twigs:** Yellowish-green to gray, *numerous wartlike spur shoots*, *leaf scars with 2 bundle scars*; buds, reddish-brown, small. **Seeds:** Drupelike (exposed), fleshy, 1" long, yellowish, stalked, fleshy, vomitlike smell when overripe, mature in early autumn.

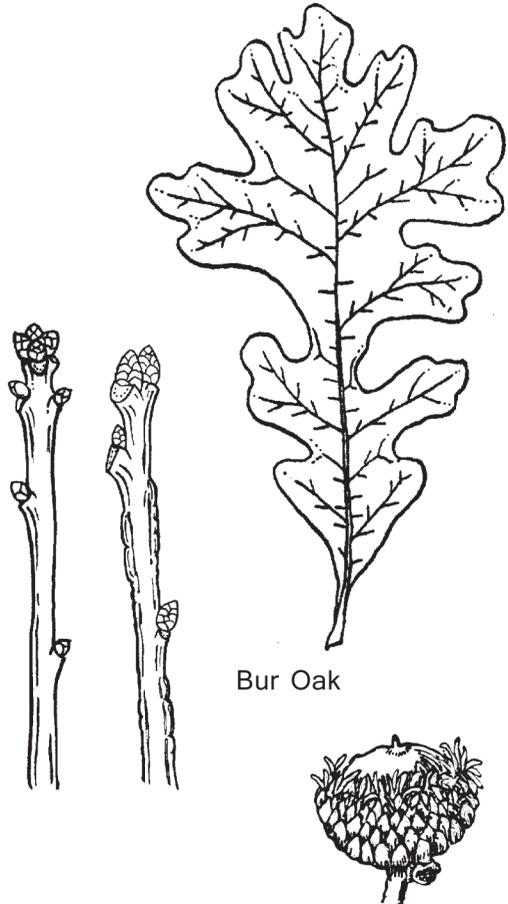
Bark: Gray, slightly rough; becoming deeply furrowed. **Range:** Introduced from eastern China; hardy to Zone 4a. **Remarks:** Shade-intolerant; moderately slow-growing; long-lived. Durable ornamental tree that is the sole survivor of an ancient plant family. Since female trees produce ill-smelling fruits, nurseries primarily sell male tree selections.



Alternate-branching, Acorn-producing Trees with Simple, Pinnately Lobed Leaves with Rounded Tips (White Oak Group)

BUR OAK (*Quercus macrocarpa*)

Large tree, 50' - 80' tall; broad, rounded crown with stout, spreading branches (rugged appearance); trunk up to 48" diameter. **Leaves:** Alternate, simple, 4" - 12" long, 3" - 6" wide, pinnately lobed (sometimes wavy-toothed); lobes, 5 - 9, center pair cut almost to the midrib, rounded tips; shiny, dark green; yellow or brown in autumn. **Twigs:** Yellowish- to grayish-brown, slightly hairy, often with corky ridges or wings; buds, reddish-brown, clustered at twig ends. **Fruit:** Acorn, $\frac{3}{4}$ " - 2" long; very deep cup (covering top one-half or more) with hairy margins; mature in autumn. **Bark:** Dark grayish-brown, furrowed, rough; becoming deeply furrowed with thick, vertical ridges. **Range:** Native throughout Minnesota; hardy to Zone 3a. **Remarks:** Intermediate shade tolerance; slow-growing; long-lived. Extremely hardy species; its thick bark and deep root system protect it from fire and drought. Commonly found on dry hillsides and prairie borders, but grows best on well-drained lowland sites. Attractive shade tree tolerant to urban pollution and root disturbance, but requires considerable space.



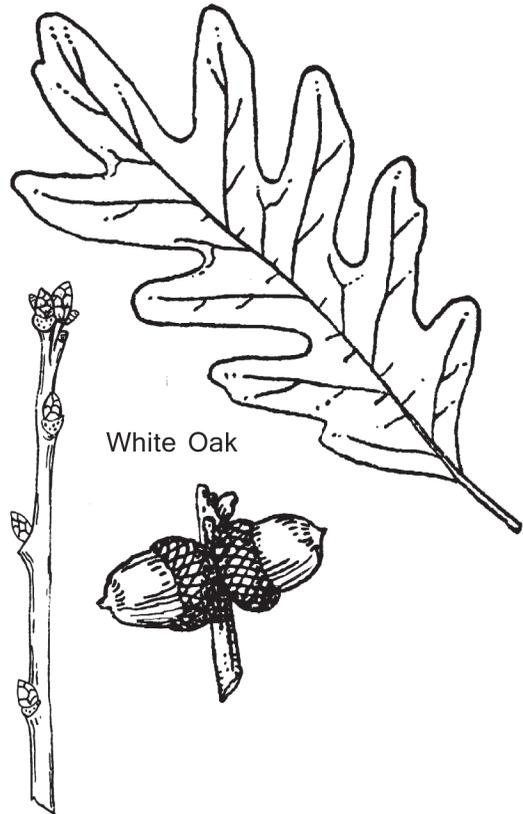
WHITE OAK (*Quercus alba*)

Large tree, 50' - 70' (100') tall; broad, open crown with stout, rugged-looking branches; trunk up to 48" diameter. **Leaves:** Alternate, simple, 4" - 9" long, 2" - 4" wide, pinnately lobed; lobes, 5 - 9, rounded tips, crotches nearly uniform in depth (fingerlike); bright green; red or brown in autumn.

Twigs: Reddish-green to reddish-gray; buds, dark reddish-brown, clustered at twig ends.

Fruit: Acorn, $\frac{3}{8}$ " - $1\frac{1}{4}$ " long, bowl-shaped cup (covering top one-third), mature in autumn.

Bark: Light ashy gray; breaking up into irregularly shaped, scaly blocks or shallow furrows with narrow, vertical ridges; large branches often scaly. **Range:** Native, southeastern and east-central Minnesota; hardy to Zone 3b. **Remarks:** Intermediate in shade tolerance; moderately slow-growing; very long-lived. Typically found on moist, well-drained soils. Valuable timber species; its tough, close-grained wood is used for support timbers, paneling, flooring, furniture, tobacco pipes, and whiskey barrels. Prior to the use of steel, it was heavily used in ship construction. The USS *Constitution* ("Old Ironsides") and several of the mine sweepers used in World War II were constructed with white oak timber. Attractive urban shade tree when space permits. White oak acorns are a valuable fall food source for many wildlife species, notably squirrels, deer, mallards, wood ducks, and blue jays.



White Oak



SWAMP WHITE OAK or bicolor oak

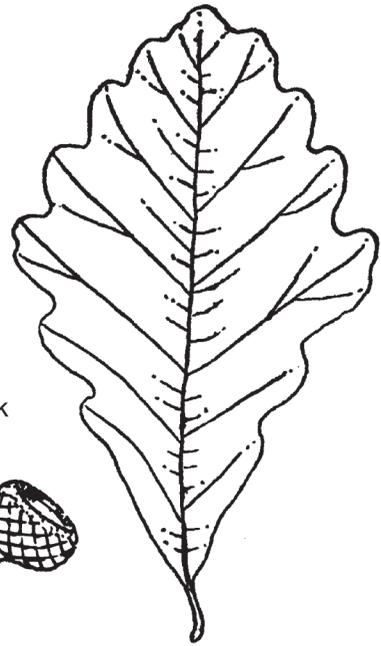
(*Quercus bicolor*)

Medium to large tree, 50' - 60' tall; narrow, open, round-topped crown often with drooping branches; trunk up to 36" diameter.

Leaves: Alternate, simple, 4" - 7" long, 2" - 4½" wide, pinnately lobed (*sometimes wavy-toothed*); lobes, 5 - 12, broadly rounded tips, shallow crotches; shiny green (*whitish-green below*); red or brownish-orange in autumn. **Twigs:** Light brown to reddish-orange; buds, light brown to orangish-brown, cluster at twig ends. **Fruit:** Acorn, ¾" - 1¼" long, pairs often attached to a 1" - 4" stalk, bowl-shaped cup (covering top one-third) with a slightly hairy margin; mature in autumn.

Bark: Light brown with papery scales; becoming grayish-brown and deeply fissured with blocky plates. **Range:** Native, southeastern Minnesota along Mississippi River and west along Minnesota River to Le Sueur County, scattered locations in Yellow Medicine County; hardy to Zone 4a. **Remarks:** Intermediate in shade tolerance; slow-growing; long-lived. Lowland species that tolerates poor drainage and drought. Wood is similar to white oak but more knotty. Latin species expression, *bicolor*, refers to the leaves, which are shiny green above and whitish-green below.

Swamp
White Oak

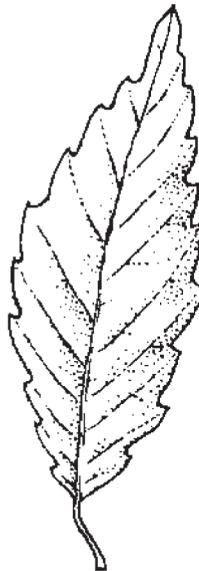


CHINKAPIN OAK (*Quercus muehlenbergii*)

Medium tree. **Leaves:** Pinnately toothed (rarely lobed) with pointed tips, shiny green.

Bark: Ash-gray and flaky or blocky (not furrowed or ridged). **Range:** Native to Houston County (native populations probably extinct).

Chinkapin Oak



Alternate-branching, Acorn-producing Trees with Simple, Pinnately Lobed Leaves with Pointed Tips (Red Oak Group)

NORTHERN RED OAK (*Quercus rubra*)

Large tree, 60' - 70' tall; broad, rounded crown with spreading branches; trunk up to 36" diameter. **Leaves:** Alternate, simple, 4" - 9" long, 3" - 6" wide, pinnately lobed; lobes, 7 - 11, bristle-tipped, wavy crotches cut halfway to midrib; dull green; brown or dark red in autumn. **Twigs:** Reddish-brown; buds, reddish-brown, pointed, hairy scales, clustered at twig ends. **Fruit:** Acorn, $\frac{5}{8}$ " - $1\frac{1}{8}$ " long, saucerlike cup (very shallow), mature in autumn. **Bark:** Gray to reddish-brown, smooth, somewhat shiny; becoming dark gray to blackish and shallowly furrowed with long, whitish-gray, flat ridges (ski trail appearance); reddish inner bark. **Range:** Native throughout Minnesota, except in northwest; hardy to Zone 3b. **Remarks:** Moderately shade-tolerant; fast-growing; long-lived. Fire-dependent species with thick bark and deep roots to protect mature trees; young trees sprout back from the stump. Produces a very valuable wood that is used for flooring, veneer, furniture, railroad ties, and numerous other products. Red oak acorns are an important winter food source for squirrels, deer, wild turkeys, and several songbirds. Oaks are susceptible to oak wilt disease, a deadly, native fungus spread overland by picnic beetles and underground through adjoining roots.

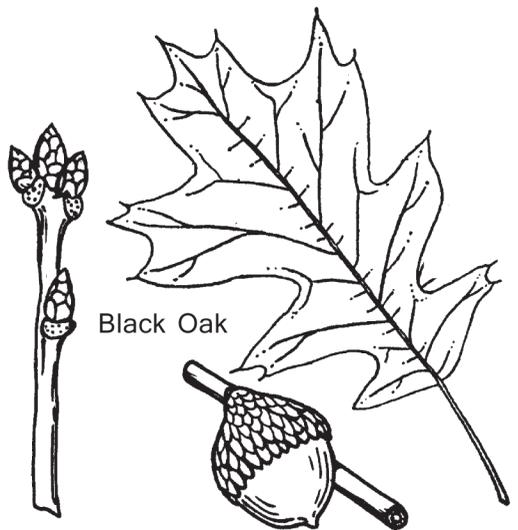


Northern Red Oak

BLACK OAK or yellow oak

(*Quercus velutina*)

Medium to large tree, 40' - 60' tall; open, spreading, irregular, round-topped crown; trunk up to 30" diameter. **Leaves:** Alternate, simple, 4" - 9" long, 3" - 6" wide, pinnately lobed; lobes, 7 - 9, bristle-tipped, shallow or deep crotches; dark green (paler below with scruffy brown hairs); dull red or orangish-brown in autumn. **Twigs:** Reddish brown, often shiny, angled; buds, grayish, woolly, clustered at twig ends, angled terminal buds. **Fruit:** Acorn, $\frac{3}{4}$ " long, bowl-shaped cup (covering top one-third),



Black Oak

mature in autumn. **Bark:** *Ash-gray to nearly black with shallow, often orangish fissures; becoming deeply furrowed with blocky ridges; bright orange or yellow inner bark.* **Range:** Native, southeastern Minnesota; hardy in Zone 4b. **Remarks:** Moderately shade-intolerant; moderately fast-growing; long-lived. Often found on dry, sandy upland soils and rocky ridges. Except for the bright orange or yellow inner bark, black oak is difficult to distinguish from northern red oak. Cross-pollinates with northern red oak or northern pin oak to form hybrids that are lumped into groups known as the “red oak complex.” Bark once an important source of leather tannin and yellow dyes.

NORTHERN PIN OAK or Hill’s oak

(Quercus ellipsoidalis)

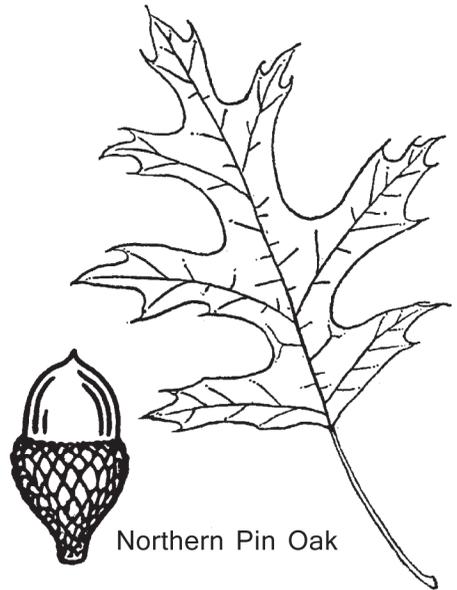
Medium tree, 40' - 60' tall; irregular crown with many small drooping branches; trunk up to 18" diameter. **Leaves:** Alternate, simple, 3" - 5" long, 2½" - 4" wide, pinnately lobed; lobes, 5 - 7, long bristle-tips, deep crotches cut nearly to midrib; shiny green (often with white hairs below); deep red, yellow, brown, or purple in autumn.

Twigs: Reddish-brown; buds, reddish-brown, clustered at twig ends. **Fruit:** Acorn, ½" - ¾" long; cone-shaped cup (covers top one-third to one-half); mature in autumn.

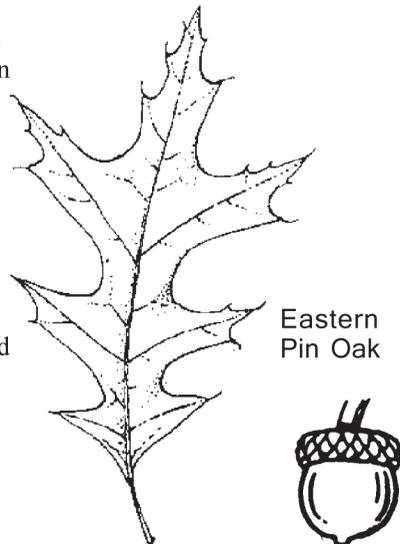
Bark: Dark brown to grayish-black, smooth; becoming shallowly fissured with rough, slightly blocky ridges; light yellow inner bark. **Range:** Native, southeastern and central Minnesota, spreading north to Beltrami County; hardy to Zone 3b. **Remarks:** Shade-intolerant; moderately fast-growing; moderately long-lived. Often found on dry uplands and sandy soils. Excellent wildlife habitat species, producing both food and nesting cavities. Often described as scarlet oak (*Quercus coccinea*), an eastern and southern United States species not native to Minnesota, in early state records. Not recognized as a separate species until 1899, when it was described by pioneer botanist E. J. Hill, hence the alternative name “Hill’s oak.”

EASTERN PIN OAK (*Quercus palustris*)

Large tree, very similar to northern pin oak; distinguished by its symmetric, pyramidal crown and its nearly round acorn that has a shallow, saucerlike cup. **Range:** Introduced from the eastern United States; hardy to Zone 4a. **Remarks:** Pin oak suffers from iron chlorosis that can be avoided only by planting on slightly acidic soils.



Northern Pin Oak



Eastern Pin Oak



Alternate-branching Trees with Simple, Palmately or Irregularly Lobed Leaves (White Poplar, Mulberries, Hawthorn - See Page 55, Apple - See Pages 55-56)

WHITE POPLAR or European poplar (*Populus alba*)

Large tree, 40' - 70' tall; rounded or irregular crown of many stout, crooked branches; trunk, often crooked and forked low, up to 24" diameter. **Leaves:** Alternate, simple, 2½" - 4" long, nearly as wide, *palmately lobed* (often toothed), *dark green* (*white-woolly hairs below*); reddish-yellow in autumn. **Twigs:** Light green with *white hairs*; buds, white, fuzzy. **Fruit:** Capsule, splitting into 2 parts, containing numerous seeds with cottony hairs, capsules grouped in 1½" - 3" long catkins, mature in late spring. **Bark:** Creamy white or gray, smooth, thin; becoming dark greenish-gray and furrowed. **Range:** Introduced from Europe and western Asia; hardy to Zone 3a.

Remarks: Shade-intolerant; fast-growing; short-lived. Attractive ornamental tree with many undesirable characteristics including roots that damage drains, sewers, and sidewalks.

White Poplar

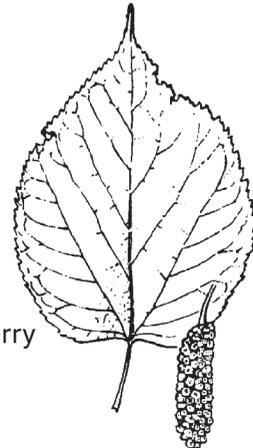


RED MULBERRY (*Morus rubra*)

Small tree, 18' tall; open, rounded crown; trunk, often divided low, up to 18" diameter. **Leaves:** Alternate, simple, 4" - 7" long, 2½" - 5" wide, *base often uneven*, sharp coarsely toothed margins, *sometimes with 2 or 3+ lobes*, *milky sap when crushed*, *rough surface* (*hairy below*), dark bluish-green; yellow in autumn. **Twigs:** Green to orange-brown, zigzags, *milky sap when broken*; buds, light brown, *dark brown scale margins*. **Fruit:** Multiple of drupes, reddish-black, mature in midsummer. **Bark:** Orange-brown, deeply fissured with scaly ridges. **Range:** Native, scattered and rare, southeastern Minnesota in the Mississippi and Minnesota River valleys (native populations probably extinct); hardy to Zone 4b.

Remarks: Moderately shade-tolerant; moderately fast-growing; short-lived. Mulberries are an important food source for many birds, which disperse the seeds in their dropping. Often used in wildlife plantings.

Red Mulberry

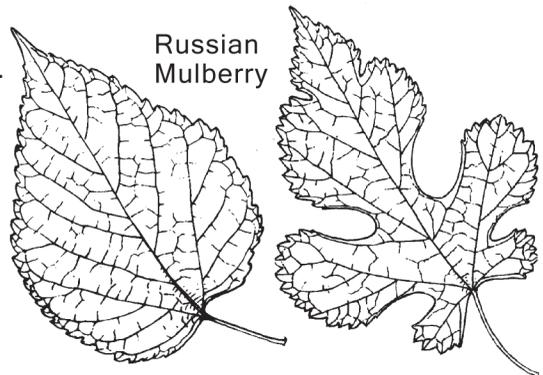


RUSSIAN MULBERRY

(*Morus alba* var. *tatarica*)

Small tree, similar to red mulberry. **Leaves:** Coarsely toothed margins, often irregularly lobed, smooth surface, shiny green (*hairy tufts below*). **Twigs:** Buds are reddish-brown with uniformly colored scale margins. **Range:** Introduced from Russia; hardy to Zone 3b.

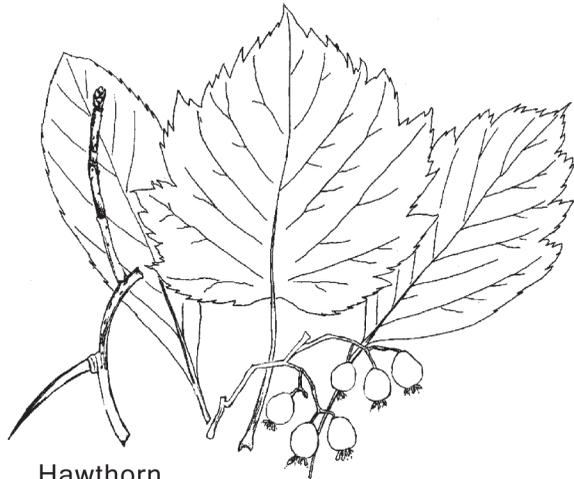
Russian Mulberry



Alternate-branching Trees with Simple, Doubly Toothed Leaves and Thorns (Hawthorn, Apples, Plums)

HAWTHORN or thornapple (*Crataegus* species)

Shrub or small tree, 15' - 30' tall; dense, broad, rounded or flat-topped crown; trunk, usually stout. **Leaves:** Alternate, simple, oval to egg-shaped, doubly toothed margins (often shallowly lobed), slightly hairy, variable color; red or orange in autumn. **Twigs:** Reddish-brown to gray, often much branched, zigzags slightly; *thorns, stiff, sharp, shiny*; buds, rounded, dark brown. **Fruit:** *Pome, small, applelike, yellow to red, fleshy, containing 1 - 5 hard pits*, mature in autumn. **Bark:**



Hawthorn

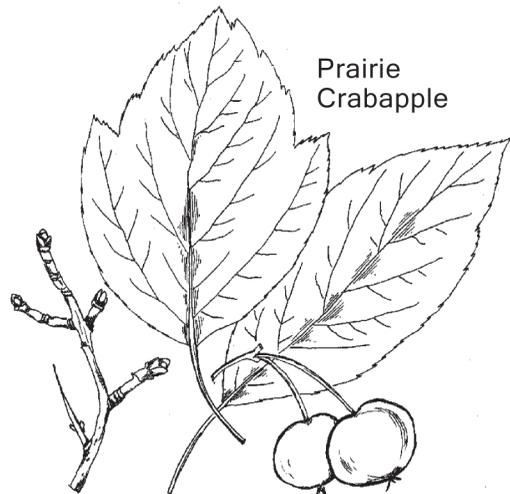
Reddish-brown to gray, scaly or shallowly fissured with narrow-shredded ridges. **Range:** 13 native species and numerous introduced species scattered throughout Minnesota; hardiness varies widely. **Remarks:** The hawthorn genus is poorly described because of the large number of species and the tremendous amount of variation within each species. Hawthorns usually are found on old fields, open or cutover forests, stream banks, and roadsides. They provide important escape cover and winter food (fruits) for wildlife. Shrikes, also known as butcher birds, store excess food (insects, small birds, mice) on the thorns. Thornless individuals or varieties exist.

PRAIRIE CRABAPPLE or Iowa crab (*Malus ioensis*)

Shrub or small tree, 10' - 30' tall; open, rounded crown with spreading branches; trunk up to 12" diameter. **Leaves:** Alternate, simple, 2½" - 4" long, 1" - 1½" wide, *doubly toothed margins (often shallowly lobed)*, dark green (*often hairy below*); yellow in autumn; *stalk often hairy*.

Twigs: Reddish-brown, often hairy, *thornlike spur shoots usually present on branchlets, thorns are rough with leaves or buds attached*; buds, reddish-brown, hairy. **Fruit:** *Pome, 1" - 1½" diameter, yellow-green, clustered on short spur shoots, leathery core, mature in late summer*.

Bark: Reddish-brown, scaly. **Range:** Native, southeastern and east-central Minnesota; hardy to Zone 3b. **Remarks:** Moderately shade-intolerant; slow-growing; moderately short-lived. Forms dense thickets along streams, forest edges, and prairie borders. Bitter fruits are an important food source for rabbits, squirrels, and several birds.



Prairie
Crabapple

FLOWERING CRABAPPLES, APPLES, AND PEARS (*Malus* species)

Shrubs or small trees; round, open crowns; trunk, short, often stocky. **Leaves:** Doubly or singly toothed, sometimes shallowly lobed, variable color (bright green to deep maroon or silvery-red).

Twigs: Branchlets with stubby, occasionally thornlike, spur shoots with leaves, buds and fruits attached. **Fruit:** Pome, round or pear-shaped, $\frac{3}{8}$ " - $3\frac{1}{2}$ " diameter, leathery core. **Remarks:**

Numerous species and varieties have been introduced to Minnesota. Varieties with white or light pink to rosy red flowers are available. The most common types are described by Dirr (1990) and Pellett et al. (1991) (see p. 84).

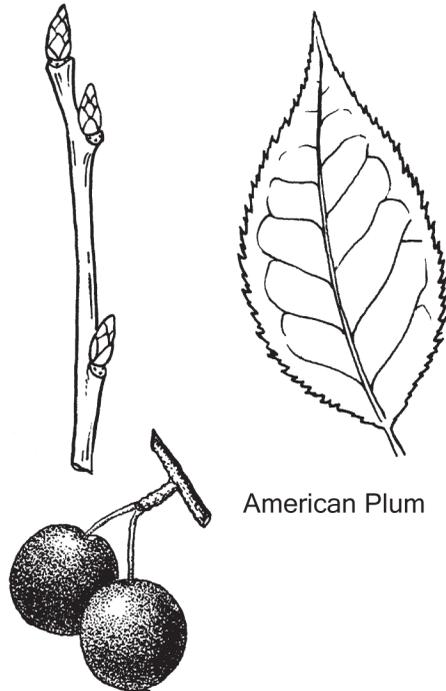
AMERICAN PLUM or wild plum

(*Prunus americana*)

Shrub or small tree, 15' - 25' tall; broad, spreading crown; trunk up to 10" diameter.

Leaves: Alternate, simple, 2" - 5" long, $1\frac{1}{4}$ " - 2" wide; long narrow tip, sharp doubly toothed margins; dark green (often hairy below); golden yellow in autumn. **Twigs:** Green to light brown, often hairy, bitter almond smell when broken, thornlike spur shoots usually present on branchlets, thorns are rough with leaves or buds attached, reddish-brown buds. **Fruit:** Drupe, $\frac{3}{4}$ " - 1" diameter; red, yellow, or orange; mature in late summer. **Bark:** Reddish-brown to dark brown, smooth; breaking into scales or thin plates.

Range: Native, southern, central, and northwestern Minnesota; hardy to Zone 3a. **Remarks:** Shade-intolerant; fast-growing; short-lived. Forms dense thickets from root sprouts following fire or clearing. Attractive ornamental with beautiful white flowers. Fruits prized for jellies and preserves.

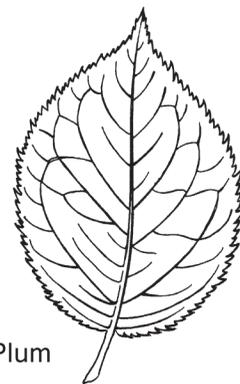


American Plum

CANADA PLUM (*Prunus nigra*)

Shrub or small tree similar to American plum.

Leaves: Light green, doubly toothed; 2 small, red swellings (glands) on leafstalk (usually missing on American plum). **Twigs:** Green to black with dark brown or gray buds. **Range:** Native to northern and eastern Minnesota; hardy throughout.



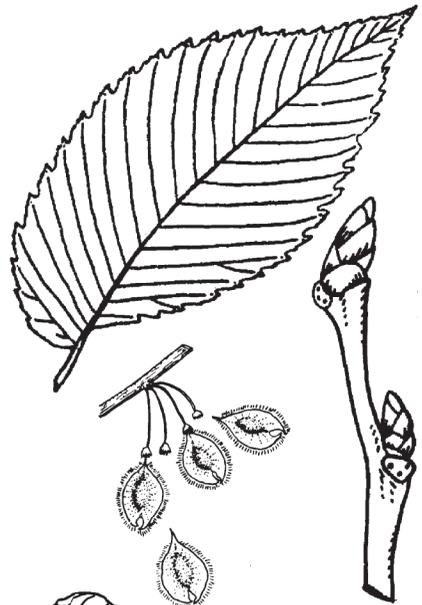
Canada Plum

Alternate-branching Trees with Simple, Doubly Toothed Leaves That Are Lopsided at the Base (Elms)

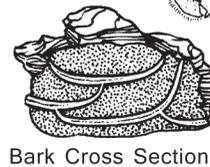
AMERICAN ELM or white elm (*Ulmus americana*)

Large tree, 50' - 70' (100') tall; broad, rounded or *vase-shaped* crown with branches drooping at the ends; buttressed trunk, often divided low, up to 48" diameter.

Leaves: Alternate, simple, 3" - 6" long, 1" - 3" wide, doubly toothed margins, *uneven base, smooth or slightly rough above (often fuzzy below)*, dark green; yellow in autumn. **Twigs:** Brown, often slightly fuzzy; buds, reddish-brown, pointed tip. **Fruit:** Samara, $\frac{3}{8}$ " - $\frac{1}{2}$ " diameter, oval wing, deeply notched tip, mature in spring. **Bark:** Brownish-gray, corky; becoming ash-gray and deeply furrowed with flat, interlacing ridges (sometimes scaly); *outer bark layers alternating white and reddish-brown in cross section*. **Range:** Native and hardy throughout Minnesota. **Remarks:** Moderately shade-tolerant; fast-growing; long-lived. This once dominant shade-tree species is being destroyed by Dutch elm disease, a vascular wilt introduced to the United States prior to 1930 on elm logs from Europe. Although large trees are becoming scarce, elms are not in danger of extinction because they are aggressive colonizers that produce seeds at an early age. Commonly found in moist, deciduous forests and floodplains.



American Elm



Bark Cross Section

SLIPPERY ELM or red elm, water elm (*Ulmus rubra*)

Medium to large tree, 50' - 70' tall; broad, open, flat-topped crown with ascending (not drooping) branches; trunk up to 30" diameter. **Leaves:** Alternate, simple, 4" - 7" long, 2" - 3" wide, doubly toothed margins, *uneven base, very rough above (rough or fuzzy below)*, dark green; yellow in autumn. **Twigs:** Brownish-gray to dark gray, hairy, *slimy when chewed*; buds, dark reddish-brown with conspicuous orange hairs. **Fruit:** Samara, $\frac{1}{2}$ " - $\frac{3}{4}$ " diameter, round wing, slightly notched tip, mature in spring. **Bark:** Reddish-brown and shallowly fissured with flat, nearly vertical ridges; *outer bark layers entirely reddish-brown in cross section*. **Range:** Native, southern and central Minnesota; hardy to Zone 3a. **Remarks:** Shade-tolerant; fast-growing; moderately long-lived. Common name derived from the species' slimy inner bark that was once chewed to quench thirst, soothe sore throats, and medicate minor wounds. Inhabits floodplain borders and dry, upland deciduous forests.



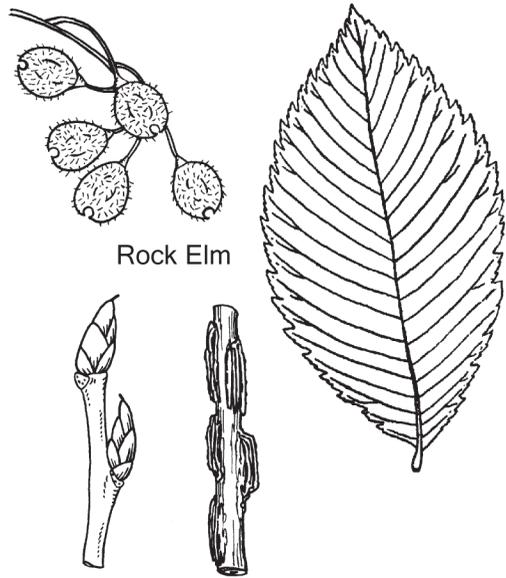
Slippery Elm



Bark Cross Section

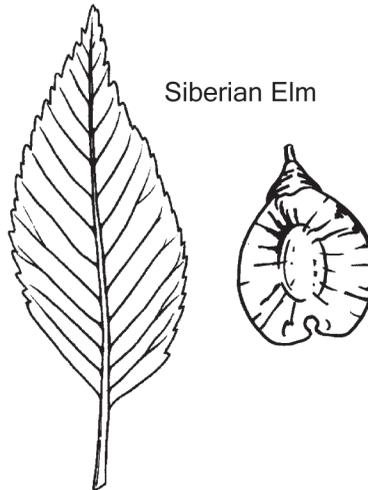


ROCK ELM or cork elm (*Ulmus thomasii*)
 Medium to large tree, 40' - 60' tall; cylindrical crown with drooping branches; trunk up to 48" diameter. **Leaves:** Alternate, simple, 2" - 4" long, $\frac{3}{4}$ " - 2" wide, doubly toothed margins, *base usually uneven*, deep green; yellow in autumn. **Twigs:** Reddish-brown to brown, slightly hairy, *corky wings (ridges)*; buds, brown, *sharply pointed tips*. **Fruit:** Samara, $\frac{3}{8}$ " - $\frac{3}{4}$ " diameter, *indistinct seed cavity*, *egg-shaped wing*, *shallowly notched tip*, mature in spring. **Bark:** Dark reddish-gray, rough; becoming dark gray and very deeply furrowed with broad, scaly, irregular or interlacing ridges (very rough); outer bark layers alternating white and brown in cross section. **Range:** Native, eastern (north to Duluth) and south-central Minnesota; scattered in Clearwater, Lake of the Woods, Beltrami, Cass, and Crow Wing counties; hardy to Zone 3a. **Remarks:** Moderately shade-tolerant; fast-growing; moderately long-lived. Common name, rock elm, may refer to rocky ridges and limestone bluffs the tree often inhabits or, more likely, to its rocklike wood formerly used to construct agricultural tools, wagon wheels, wheelchairs, and battleships.



Rock Elm

SIBERIAN ELM (*Ulmus pumila*)
 Small to medium tree. **Leaves:** $\frac{3}{4}$ " - 2" long, $\frac{1}{2}$ " - 1" wide, doubly (nearly singly) toothed margins, dark green. **Twigs:** Whitish-gray with reddish-brown buds. **Range:** Introduced from eastern Siberia and northern China; hardy throughout. **Remarks:** Tolerates many extreme site conditions and highly resistant to Dutch elm disease. Otherwise an undesirable tree that is subject to limb breakage and insect attack.



Siberian Elm

Alternate-branching Trees with Simple, Doubly Toothed Leaves (Birches, Ironwood, Blue-beech, Alder)

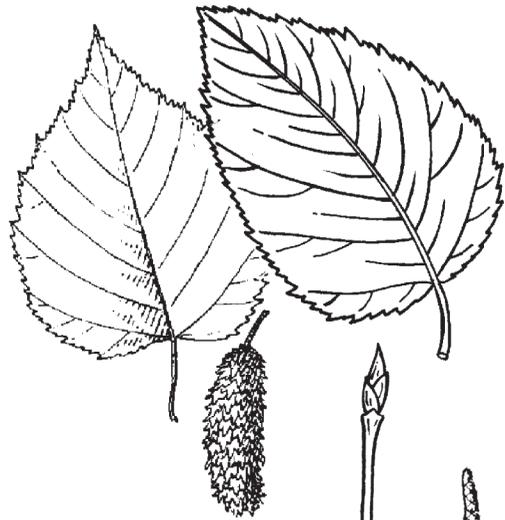
PAPER BIRCH or canoe birch

(*Betula papyrifera*)

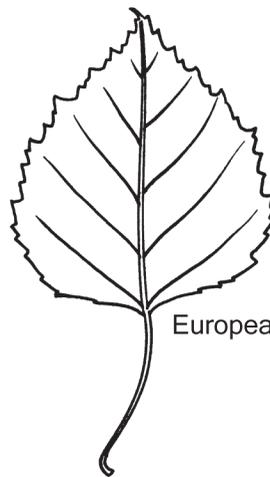
Medium to large tree, 40' - 60' tall; narrow, open, often conical crown with drooping or horizontal branches; trunk, 12" - 24" diameter. **Leaves:** Alternate, simple, 2" - 5" long, 1" - 2" wide, doubly toothed margins, tapered or rounded base, dull green; light yellow in autumn. **Twigs:** Reddish-brown with white or orange dots (lenticels), spur shoots on branchlets, slender male catkins often present in winter; buds, *dull reddish-brown*, 1/4" long, slender, pointed, often slightly resinous.

Fruit: Nutlet, winged; nutlets tightly grouped in a 1" - 1 1/2" long catkin, mature in late summer. **Bark:** Reddish-brown, smooth; becoming *chalky white with prominent dark lines (lenticels) and peeling, papery strips that often reveal an orange inner bark*; old branch scars often black and scaly.

Range: Native, northern and eastern Minnesota; hardy throughout. **Remarks:** Shade-intolerant; fast-growing; short-lived. Fire dependent species; its profuse windblown seeds rapidly germinate on exposed soils. Bark used by American Indians to construct canoes, wigwam covers, utensils, baskets, moose-calling horns, and snow goggles. Strong, lightweight wood used for toothpicks, spools, snowshoe frames, and veneer. The tree's sap can be boiled to produce a dark molasses-like syrup. Birches are attractive ornamental trees, but they should be planted in cool, moist sites. Stressed trees are susceptible to deadly bronze birch borer (insect) attack.



Paper Birch



European White Birch

EUROPEAN WHITE BIRCH

(*Betula pendula*)

Medium tree, very similar to paper birch.

Leaves: Doubly toothed (sometimes lobed).

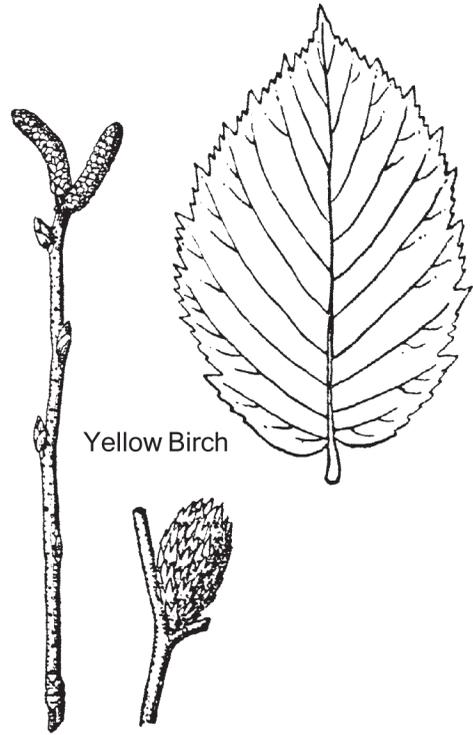
Twigs: Reddish-brown with tiny, resin-bearing glands and shiny, resinous buds. **Bark:**

Usually very clean looking, flaky and white.

Range: Introduced from Europe and Asia Minor; hardy to Zone 3a.

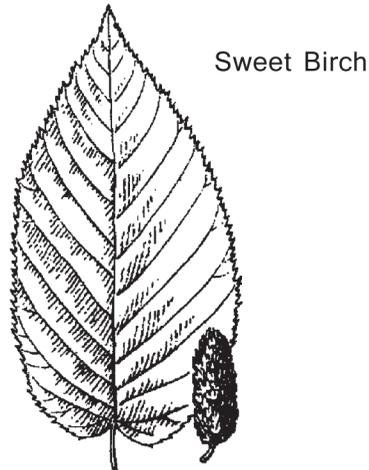
YELLOW BIRCH (*Betula alleghaniensis*)

Medium to large tree, 50' - 75' tall; broad, irregular, round-topped crown; trunk up to 36" diameter. **Leaves:** Alternate, simple, 3" - 5" long, 1½" - 2" wide, often hairy, doubly toothed margins, dull green; bright yellow in autumn. **Twigs:** Greenish-brown to yellow brown with raised, whitish dots (lenticels); *wintergreen odor when broken*, spur shoots on branchlets, slender male catkins often present in winter; buds, light reddish-brown, sharply pointed, hairy. **Fruit:** Nutlet, winged; nutlets tightly grouped in an erect, ¾" - 1" long catkin; mature in early autumn. **Bark:** *Bronze to yellowish-brown with prominent dark lines (lenticels)* and smooth, paper-thin, curly strips; later breaking up into reddish-brown plates. **Range:** Native, north-central and northeastern Minnesota; hardy throughout. **Remarks:** Moderately shade-tolerant; moderately fast-growing; moderately long-lived. Yellow birch seeds germinate on moist, exposed areas, including rotting stumps and logs, and moss-covered rocks. Attractive wood often used for flooring, paneling, furniture, and veneer. Twigs and leaves can be used to brew a wintergreen-tasting tea.



SWEET BIRCH (*Betula lenta*)

Medium tree. **Twigs:** Dark brown, wintergreen odor when broken. **Bark:** Smooth, shiny brownish-red to black, later breaking up into scaly plates (like black cherry). **Range:** Introduced from the eastern United States; hardy to Zone 3b.



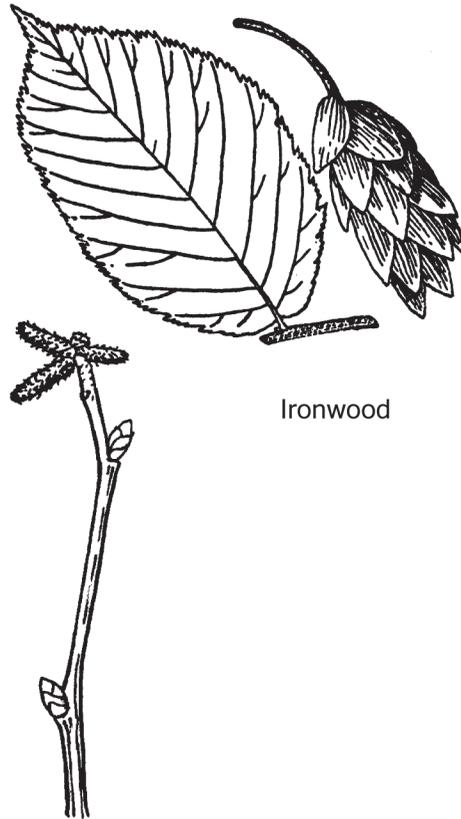
RIVER BIRCH or red birch (*Betula nigra*)
 Medium tree, 40' - 60' tall; broad, spreading, irregular to pyramidal crown; trunk up to 24" diameter. **Leaves:** Alternate, simple, 1½" - 3" long, 1" - 2¼" wide, *tapered base*, doubly toothed margins, yellowish-green (whitish and hairy below); yellow in autumn. **Twigs:** Reddish-brown with white dots (lenticels), shiny, slender male catkins often present in winter; buds, bright reddish-brown, hairy. **Fruit:** Nutlet, winged, clustered in an erect, 1" - 1½" long catkin; mature in early summer. **Bark:** *Light reddish-brown to salmon pink* with shaggy, papery curls. **Range:** Native, southeastern Minnesota in Mississippi and Root River valleys; hardy to Zone 3b. **Remarks:** Shade-intolerant; moderately fast-growing; short-lived. Common name, river birch, refers to its principal habitat, which also includes lakeshores, streams, and floodplains. Desirable species used in erosion control projects and ornamental plantings. Only native birch resistant to the bronze birch borer.



IRONWOOD or hop-hornbeam

(Ostrya virginiana)

Small tree, 25' - 45' tall; broad, rounded or conical crown of slender, spreading branches; trunk up to 12" diameter. **Leaves:** Alternate, simple, 2" - 5" long, 1" - 2" wide, thin; *sharp doubly toothed margins*, dark yellowish-green; dull yellow in autumn. **Twigs:** Light brown to reddish-brown, *very slender*, zigzags, slender male catkins often present in winter; buds, rounded, *brown, green scale tips*. **Fruit:** Nutlet, *enclosed in a swollen papery sac*; 4 - 10 nutlets loosely grouped in a 2" - 4" long, *cone-shaped catkin (resembles hops)*; mature in early autumn. **Bark:** Grayish-brown; *becoming fibrous with narrow ridges or strips that sometimes spiral around trunk*. **Range:** Native throughout Minnesota, but scattered or absent near western border; hardy to Zone 3b. **Remarks:** Very shade-tolerant; slow-growing; moderately long-lived. Common understory tree found in upland deciduous forests. Attractive ornamental tree, but limited availability and difficult to transplant. Common name, ironwood, refers to its extremely tough wood, which is used for tool handles, wedges, fence posts, and tent poles.



Ironwood

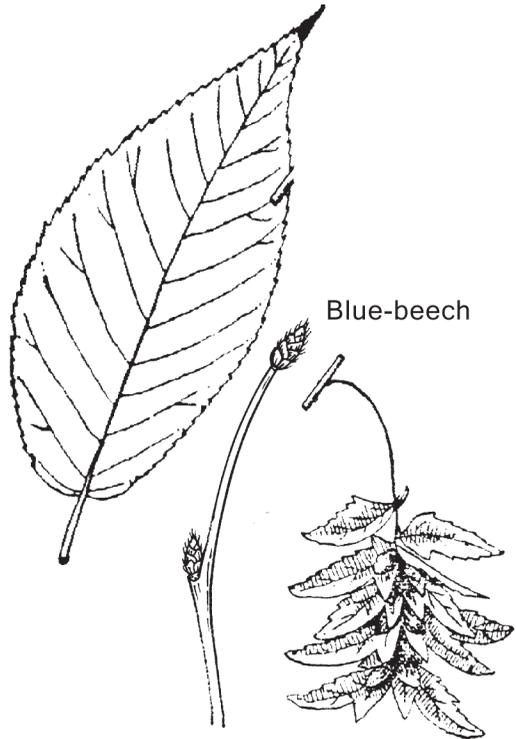
BLUE-BEECH or muscle-wood or hornbeam

(*Carpinus caroliniana*)

Small tree, 15' - 25' tall; rounded or flat-topped crown of slender, spreading branches; trunk, *fluted in cross section*, up to 12" diameter. **Leaves:**

Alternate, simple, 2" - 5" long, 1" - 2½" wide, *thin, sharp doubly toothed margins*, dark blue-green; red or orange in autumn. **Twigs:** Reddish-brown, *very slender; zigzags, slender male catkins absent in winter*; buds, reddish-brown, whitish scale tips, *4-sided in cross section*. **Fruit:** Nutlet; attached to a 1" long, 3-lobed, leaflike bract; nutlets loosely grouped in 4" - 6" long catkins, mature in late summer.

Bark: *Bluish-gray, smooth with musclelike ridges*. **Range:** Native, southeastern and east-central Minnesota, scattered in Clearwater and Becker counties; hardy to Zone 3b. **Remarks:** Very shade-tolerant; slow-growing; moderately short-lived. Understory tree found in rich, lowland deciduous forests. Attractive ornamental used in screening or background plantings. Wood has uses similar to ironwood, but decays quickly in a moist environment.



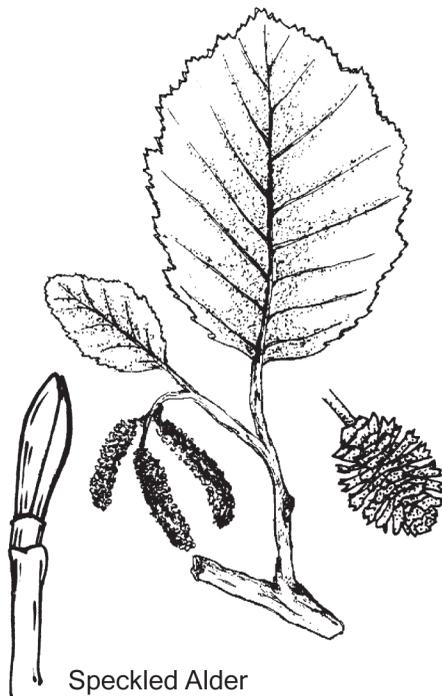
SPECKLED ALDER (*Alnus rugosa*)

Shrub or small tree, 15' - 25' tall; sparse, irregular crown often with several stems rising from the base; trunk, often bent or curved, up to 6" diameter. **Leaves:** Alternate, simple, 2" - 5" long, 1¼" - 3" wide, doubly toothed margins, *leathery, veins sunken in surface*, dull green (paler below and often hairy); yellowish-brown in autumn.

Twigs: Reddish-brown with whitish spots (lenticels), *triangle-shaped pith*, slender male catkins often present in winter; buds, reddish-brown, perched on a small stalk, 2 (rarely 3) scales.

Fruit: Nutlet; borne in a woody, pineconelike, ½" - 5/8" long catkin; mature in autumn.

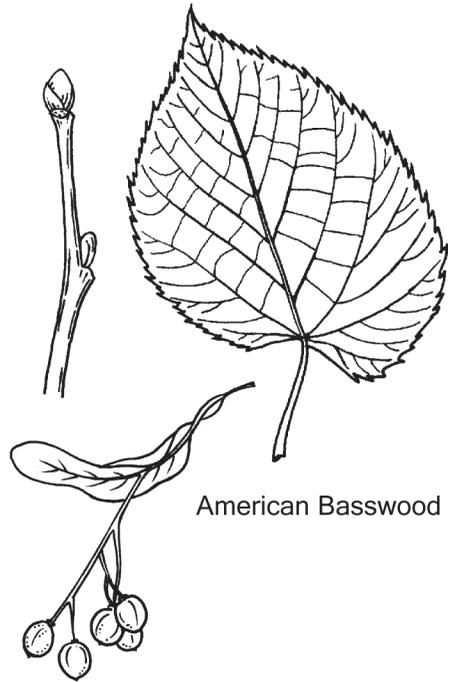
Bark: Dark reddish-brown or gray with *whitish or slightly orange lenticels, smooth*. **Range:** Native, northern and eastern Minnesota; hardy throughout. **Remarks:** Shade-tolerant; moderately fast-growing; short-lived. Common lowland species often forming dense thickets along lakes, streams, and rivers. Desirable species for wildlife cover, erosion control, and shading cold-water trout streams in summer. Bacteria in the roots fix nitrogen, improving soil fertility.



Alternate-branching Trees with Simple, Singly Toothed, Heart-shaped Leaves That Are Lopsided at the Base (Lindens, Hackberry)

AMERICAN BASSWOOD or American linden (*Tilia americana*)

Large tree, 50' - 75' (90') tall; dense, broad, oval or round crown often with drooping branches; trunk, often with two or more stems, sounds hollow when struck lightly with a tool handle, up to 36" diameter. **Leaves:** Alternate, simple, heart-shaped, uneven base, 3" - 7" long, nearly as wide, sharp coarsely toothed margins, yellowish-green; yellow to orange in autumn. **Twigs:** Reddish-gray to dark gray, zigzags; buds, red or green, fat, slimy when chewed. **Fruit:** Drupe (nutletlike), pea-shaped, clusters attached to a narrow leaflike wing, mature in autumn. **Bark:** Light gray, smooth; becoming dark gray and deeply fissured with narrow, often flat, vertical ridges. **Range:** Native throughout Minnesota; hardy to Zone 3a. **Remarks:** Shade-tolerant; moderately slow-growing; long-lived. Common deciduous forest tree that is widely planted in urban locations. Soft, lightweight wood used for carvings, crates, pulp, interior trim, and yardsticks. Fibrous inner bark formerly woven by American Indians into ropes and mats. Nectar from basswood flowers produces a high-grade bee honey.



LITTLE-LEAF LINDEN (*Tilia cordata*)

Medium tree similar to American basswood but crown more compact and cone-shaped. **Leaves:** 1½" - 2½" long. **Range:** Introduced from Europe; hardy to Zone 3b.



HACKBERRY (*Celtis occidentalis*)

Medium to large tree, 40' - 60' (75') tall; rounded crown of spreading, slightly drooping branches, *large U-shaped branch crotches*; trunk up to 30" diameter. **Leaves:** Alternate, simple, 2" - 5" long, 1½" - 2½" wide, *uneven base*, sharply toothed margins, pale green; yellow in autumn; *wartlike mite galls often present*. **Twigs:** Reddish-brown, zigzags; *pith white, finely chambered throughout or only below the buds*; buds, dark brown, hairy. **Fruit:** Drupe, ¼"- ⅜" diameter, green to dark purple (often wrinkled), mature in autumn. **Bark:** Light gray or tan with *corky warts or deep, narrow ridges*. **Range:** Native, southern and central Minnesota; hardy to Zone 3a. **Remarks:** Moderately shade-tolerant; moderately fast-growing; moderately long-lived. Commonly planted ornamental naturally found in floodplains, but also survives on dry sites. Fruit is an important winter food for several wildlife species. Rapidly sprouts from the stump or root collar following fire or harvesting. Edible fruits can be dried, ground, and boiled into a coffeelike beverage.

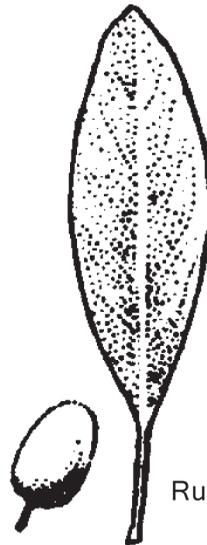


Hackberry

Alternate-branching Trees with Simple, Narrow Leaves (Russian-olive, Willows)

RUSSIAN-OLIVE (*Elaeagnus angustifolia*)

Shrub or small tree, 15' - 20' (30') tall; low, open crown with several erect branches; trunk, often crooked or leaning, up to 6" diameter. **Leaves:** Alternate, simple, 1½" - 3¼" long, ⅜" - ¾" wide, pointed or blunt tip, *nearly smooth margins, grayish-green (silvery below with brown dots)*; brown in autumn. **Twigs:** *Silvery to brown, scaly*, often thorny, salmon-colored pith; buds, grayish-brown with silvery scales. **Fruit:** Drupe, ⅜" - ½" long, *olive-shaped, yellow to brown with silvery scales*, mature in early autumn. **Bark:** Dark brownish-gray with shallow, orangish fissures that *often spiral around trunk*. **Range:** Introduced from Europe and Asia; hardy to Zone 3b. **Remarks:** Moderately shade-intolerant; moderate- to fast-growing; short-lived. Popular ornamental also used in farm shelterbelts. Grows well on most soils that are well drained.

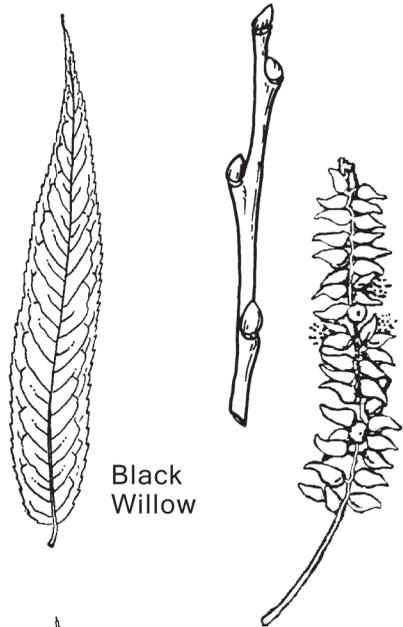


Russian-olive



BLACK WILLOW (*Salix nigra*)

Small to medium tree, 30' - 60' (80') tall; broad, irregular crown; trunk, often twisted and leaning, up to 30" diameter. **Leaves:** Alternate, simple, 3" - 6" long, 1/2" - 3/4" wide; finely toothed margins, shiny green on both sides; light yellow in autumn; short leafstalk, often with conspicuous leaflike appendages (stipules) at base. **Twigs:** Reddish-brown to yellowish-green, brittle at base (easily detached); buds, small, single scale. **Fruit:** Capsule, 1/4" long, containing numerous seeds with cottony hairs; capsules grouped in 1 1/2" - 3" long catkins. **Bark:** Grayish-brown to brownish-black, fibrous, deeply furrowed with slightly scaly ridges. **Range:** Native, southeastern and east-central Minnesota; hardy to Zone 4a. **Remarks:** Very shade-intolerant; fast-growing; short-lived. Lowland species often growing near the water's edge. Broken branches, carried by wind or water, develop roots when caught in a muddy shoreline. Wood is used for boxes, crates, charcoal, toys, and artificial limbs.



Black Willow

PEACHLEAF WILLOW (*Salix amygdaloides*)

Small to medium tree. **Leaves:** 5 1/2" long, 1/2" - 1 1/2" wide, finely toothed margins, often curved at tip, light green (whitish below). **Twigs:** Yellow to orangish-brown, hairless, somewhat drooping. **Range:** Native, southern and western Minnesota; hardy throughout.



Peachleaf Willow

PUSSY WILLOW (*Salix discolor*)

Shrub or small tree. **Leaves:** 2" - 5" long, 1/2" - 1 1/2" wide, irregularly toothed margins, shiny green (bluish-white below), often with conspicuous leaflike appendages (stipules) at leafstalk base. **Twigs:** Dark reddish-purple with scattered orange dots (lenticels). **Range:** Native, eastern and west-central Minnesota; hardy to Zone 3a.



Pussy Willow

BEBB WILLOW (*Salix bebbiana*)

Shrub or small tree. **Leaves:** 1" - 3" long, 1/2" - 1" wide, irregularly toothed (or smooth) margins, dull green (bluish-white below with distinctly meshed veins and wooly hairs). **Twigs:** Reddish-purple to orangish-brown with green or gray hairs.

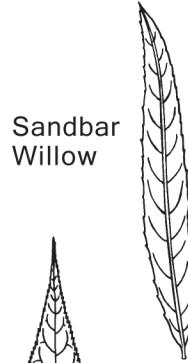
Range: Native, eastern and northwestern Minnesota.



Bebb Willow

SANDBAR WILLOW (*Salix exigua*)

Shrub or small tree. **Leaves:** 2" - 6" long, 1/8" - 1/4" wide, irregularly toothed (or smooth) margins, teeth widely spaced, yellowish-green (lighter below). **Twigs:** Yellowish-brown, sometimes hairy. **Range:** Native and hardy throughout Minnesota.



Sandbar Willow

SHINING WILLOW (*Salix lucida*)

Shrub or small tree. **Leaves:** 2" - 5" long, 1/2" - 1 1/2" wide, finely toothed margins, shiny green, two distinct swellings (glands) on leafstalk, leaflike appendages (stipules) at the leafstalk base. **Twigs:** Dark orangish-brown, shiny, brittle at the base (easily detached). **Range:** Native, northern and east-central Minnesota.



Shining Willow

HEARTLEAF WILLOW

(*Salix eriocephala*)

Small tree. **Leaves:** 2 1/2" - 6" long, 3/4" - 1 1/2" wide, base often heart-shaped, finely toothed margins, dark green (whitish below), scattered hairs on both sides, conspicuous leaflike appendages (stipules) at the leafstalk base. **Twigs:** Reddish-brown to brown, often with white or gray hairs. **Range:** Native throughout Minnesota, except in the northeast.



Heartleaf Willow

LAUREL WILLOW (*Salix pentandra*)

Medium tree. **Leaves:** 1 1/2" - 5" long, 3/4" - 2" wide, finely toothed margins, very shiny, dark green (duller below), yellow midrib (aromatic when crushed). **Twigs:** Brownish-green, shiny, hairless. **Range:** Introduced from Europe; hardy to Zone 3a.



Laurel Willow

WHITE WILLOW (*Salix alba*)

Large tree. **Leaves:** 1 1/2" - 4" long, 1/4" - 5/8" wide, toothed margins, bright green (whitish below), fuzzy on both sides. **Twigs:** Yellowish-green, smooth, slightly drooping. **Range:** Introduced from Africa and Asia; hardy to Zone 3a. **Remarks:** Golden weeping willow (*Salix alba* "Tristis") is among the most commonly seen varieties of white willow. It can be identified by its golden yellow, drooping branchlets.



White Willow



Alternate-branching Trees with Simple, Singly Toothed Leaves and Bitter Almond Smelling Twigs when Broken (Cherries, Plums - See Page 56)

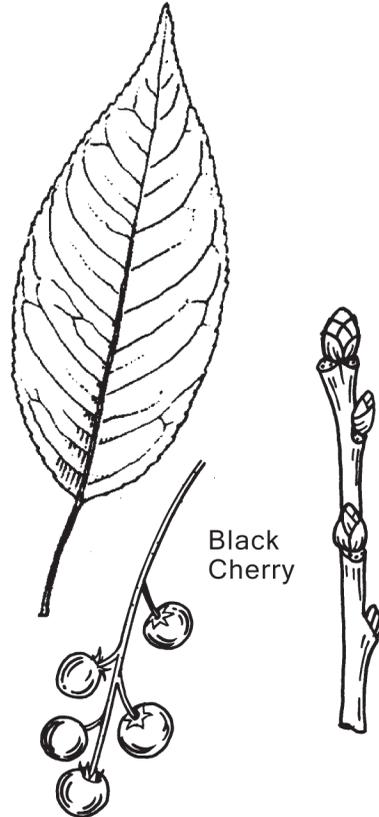
BLACK CHERRY or wild cherry

(*Prunus serotina*)

Medium to large tree, 40' - 60' (80') tall; rounded crown; trunk, often crooked, up to 24" diameter.

Leaves: Alternate, simple, 2" - 6" long, 1" to 1 $\frac{3}{5}$ " wide, finely toothed margins, shiny, deep green (*white or brown hairs often on veins below*); yellow to yellowish-red in autumn; usually 1 or 2 reddish-black dots (glands) near leaf base. **Twigs:** Reddish-brown with *white dots (lenticels)*, *bitter almond smell when broken*; buds, bright reddish-brown, pointed scales, blunt or pointed tip. **Fruit:** Drupe, $\frac{3}{8}$ " diameter, reddish-purple, mature in late summer. **Bark:** Reddish-brown to black with prominent horizontal lines (lenticels), smooth; breaking up into *scaly plates (burned potato chip appearance)*. **Range:** Native, southern and central Minnesota, often absent near western border; hardy to Zone 3b.

Remarks: Shade-tolerant when young, shade-intolerant when mature; moderately fast-growing; moderately long-lived. Edible fruit, though somewhat tart, is used in jellies and wines, and consumed in large numbers by many birds and small mammals. Beautiful, reddish-brown wood, used for furniture and veneer, makes an excellent, fragrant firewood. Sprouts rapidly from the stump or root collar following fire or timber harvesting. Hydrogen cyanide in the wilted leaves and twigs is poisonous to livestock.



FLOWERING CHERRIES, APRICOTS, AND PLUMS (*Prunus* species)

Shrubs, small to medium trees. **Leaves:** Doubly or singly toothed. **Twigs:** Often with a bitter almond smell when broken; branchlets occasionally with stubby or thornlike spur shoots.

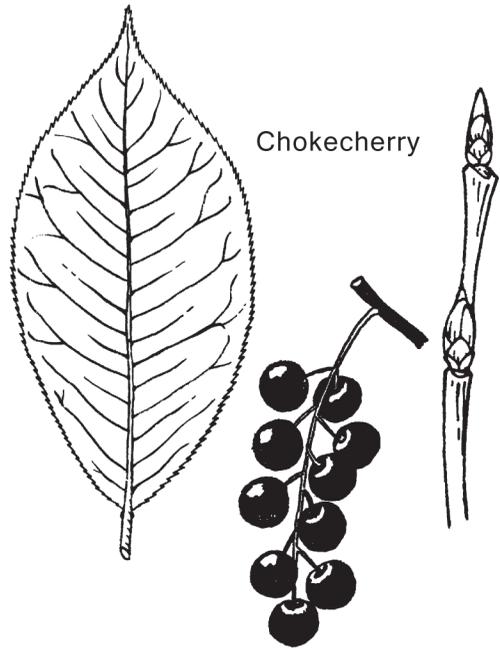
Fruits: Drupe, often juicy, containing one relatively large stone or pit (seed is inside pit).

Bark: Marked with prominent horizontal lines (lenticels), smooth or scaly, often peeling in horizontal strips. **Remarks:** Numerous species and varieties have been introduced to Minnesota. Varieties with white or light to dark pink flowers are available. Some varieties produce double flowers with two rings of petals instead of one. Descriptions of the most common types are given by Dirr (1990) and Pellett et al. (1991) (see p. 84).



CHOCKECHERRY (*Prunus virginiana*)

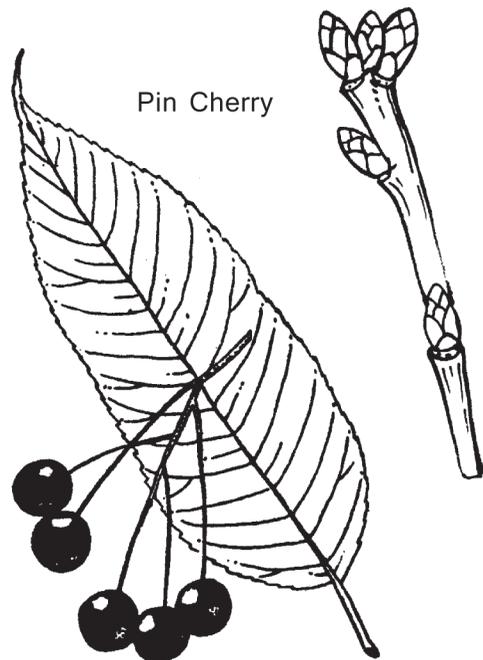
Shrub or small tree, 15' - 20' (35') tall; irregular to rounded crown; trunk, often crooked or leaning, up to 8" diameter. **Leaves:** Alternate, simple, oval, 2" - 4" long, 1" - 2" wide, finely toothed margins, shiny dark green; yellow in autumn; *leafstalk often with 2 small, wartlike swelling (glands) near leaf base.* **Twigs:** Reddish-brown, *strong bitter almond smell when broken;* buds, pale brown, brownish-black scale tips, pointed tip. **Fruit:** Drupe, $\frac{1}{4}$ " - $\frac{3}{8}$ " diameter, *dark purple*, mature in mid- to late-summer. **Bark:** Dark brown to gray, smooth; becoming scaly or slightly fissured. **Range:** Native and hardy throughout Minnesota. **Remarks:** Intermediate in shade tolerance; moderately fast-growing; short-lived. Widespread species with a transcontinental range, found in clearings, open forests, and along streams and forest edges. Once pitted, bitter fruits often are used in jellies, preserves, and syrups.



PIN CHERRY or fire cherry

(*Prunus pennsylvanica*)

Small tree, 10' - 30' (45') tall; rounded crown; trunk up to 8" diameter. **Leaves:** Alternate, simple, *clustered at twig ends, long pointed tips*, 2" - 5" long, $\frac{3}{4}$ " - $1\frac{1}{2}$ " wide, finely toothed margins, shiny yellowish-green or green; bright yellow in autumn; *leafstalks often with 2 small, wartlike swellings (glands) near leaf-base.* **Twigs:** Shiny red with *orange dots (lenticels)*, *spur shoots often present on branchlets*, *bitter almond smell when broken;* buds, reddish-brown, *clustered at twig ends.* **Fruit:** Drupe, $\frac{1}{4}$ " diameter, *bright red*, smooth, mature in mid- to late-summer. **Bark:** *Reddish-gray with prominent orange lines (lenticels);* breaking into thin, gray, papery layers. **Range:** Native and hardy throughout Minnesota except southwestern corner. **Remarks:** Shade-intolerant; fast-growing; short-lived. Sometimes called fire cherry because the tree sprouts back vigorously from the roots to form dense thickets following fire or clearing. Fruits are used in jellies and preserves, and provide important food for several songbirds.



Alternate-branching Trees with Simple, Singly Toothed Leaves with Flattened Leafstalks or Sticky Buds (Poplars, White Poplar - See Page 54)

BALSAM POPLAR or balm of Gilead

(*Populus balsamifera*)

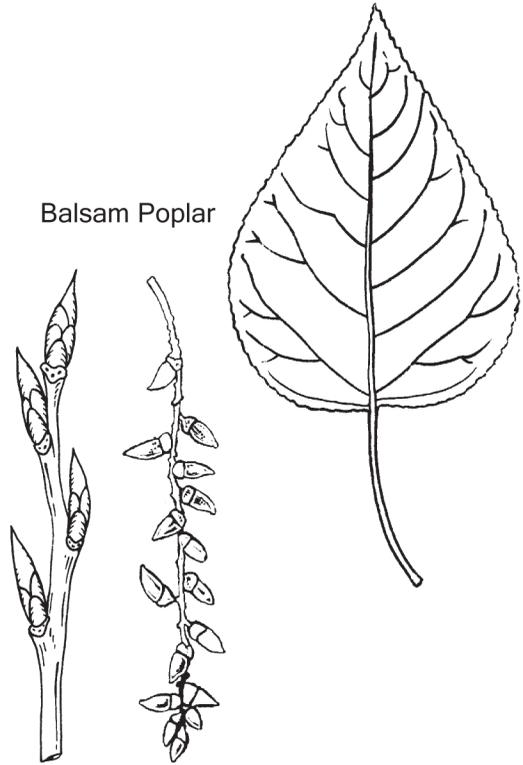
Medium to large tree, 40' - 70+' tall; open crown of ascending branches; trunk up to 24" diameter.

Leaves: Alternate, simple, 3" - 6" long, half as wide, blunt finely toothed margins, *shiny green* (silvery green below with rusty blotches); yellow in autumn; *leafstalk round*. **Twigs:** Reddish-brown with bright orange dots (lenticels), star-shaped pith; *terminal buds, reddish-brown, 1" long, pointed, sticky, strong balsam odor*.

Fruit: Capsule, splits into 2 parts; contains numerous seeds with cottony hairs; capsules grouped in 4" - 6" long catkins, mature in late spring. **Bark:** Greenish-brown to light brown, smooth; becoming grayish-black and deeply furrowed with flat ridges. **Range:** Native, northern and central Minnesota; hardy throughout.

Remarks: Shade-intolerant; fast-growing; short-lived. Common lowland species in northern areas where it often forms dense stands. Transcontinental range extends above the Arctic Circle to become the northernmost deciduous tree in North America. Alternative common name, balm of Gilead, refers to the alleged medicinal properties of the species' resinous buds.

Balsam Poplar



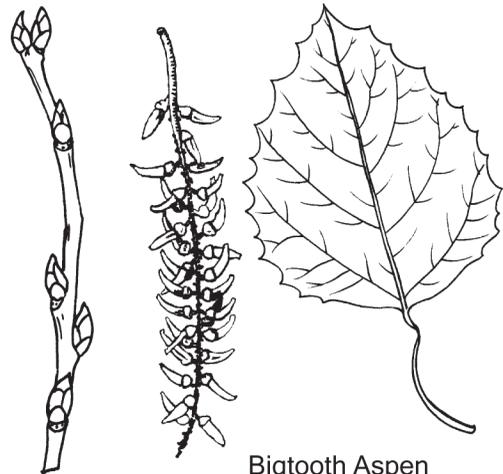
BIGTOOTH ASPEN (*Populus grandidentata*)

Medium to large tree, 40' - 60' (90') tall; open,

rounded crown; trunk up to 24" diameter. **Leaves:** Alternate, simple, 2" - 6" long, 1" - 3" wide, firm, waxy, *coarsely toothed margins, teeth often distinctly curved*, yellow-green; yellow in autumn; leafstalk flattened.

Twigs: Greenish-gray to orangish-brown with scattered orange dots (lenticels), hairy, star-shaped pith; buds, gray, slightly pointed, *hairy, lateral buds point away from twig*. **Fruit:**

Capsule, splits into 2 parts; contains numerous seeds with cottony hairs; capsules grouped in 3" - 6" long catkins, mature in late spring. **Bark:** Olive-green, smooth; becoming bronze-green to gray and deeply furrowed with broad, flat ridges; upper trunk smooth and *olive-green*.



Bigtooth Aspen

Range: Native and hardy throughout Minnesota except near western border. **Remarks:** Shade-intolerant; very fast-growing; short-lived. Pioneer species; its numerous windblown seeds and root sprouts allow the tree to quickly colonize cut-over and burned-over sites. Important Minnesota timber species used for pulp and paper, waferboard, and oriented-strandboard. Foliage, bark, twigs, and buds are an important food source for many wildlife species including grouse, deer, moose, rabbits, and beavers.

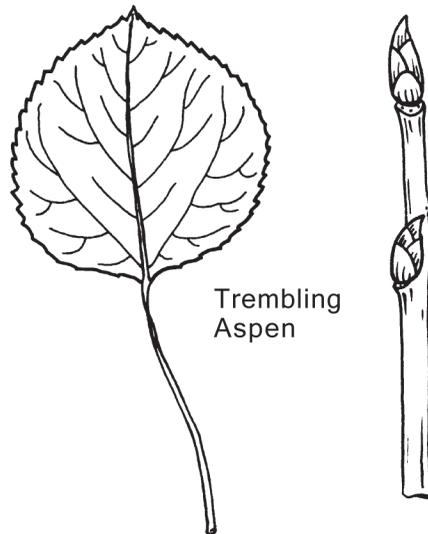
TREMBLING ASPEN or quaking aspen
(*Populus tremuloides*)

Medium to large tree, 40' - 60' (90') tall; open, rounded crown; trunk up to 24" diameter.

Leaves: Alternate, simple, *round or egg-shaped*, 2" - 6" long, 1" - 2½" wide, waxy; *very finely toothed margins*; yellow-green to blue-green; bright yellow in autumn; leafstalk flattened.

Twigs: Reddish-brown with scattered light orange dots (lenticels), *very shiny*, star-shaped pith; terminal buds, reddish-brown, slender, pointed, *lateral buds often hug twig*. **Fruit:** Capsule, splits into 2 parts; contains numerous seeds with cottony hairs; capsules grouped in 3" - 4" long catkins, mature in late spring.

Bark: Pale green to cream-colored, smooth; becoming grayish and warty or deeply furrowed; grayish-white on upper trunk. **Range:** Native and hardy throughout Minnesota except near western border. **Remarks:** Shade-intolerant; fast-growing; short-lived. Most widely distributed tree species in North America. Pioneer species that sprouts from the roots following a fire or timber harvest. One aspen grove in Utah occupied 107 acres and contained 47,000 trees originating from the same root system. Common name, trembling aspen, refers to the tree's small leaves, which flutter in the breeze. Wood products are similar to bigtooth aspen. Leaves and bark of aspen (and some willows) contain salicin, the chemical compound in aspirin.



EASTERN COTTONWOOD

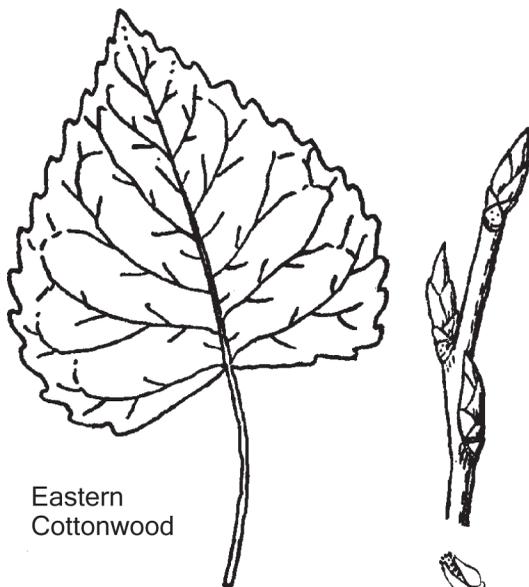
(*Populus deltoides*)

Large tree, 60' - 80' tall; broad, symmetric crown; trunk up to 96" diameter. **Leaves:** Alternate, simple, *triangle-shaped*, 3" - 7" long, nearly as wide, thick, waxy, coarsely toothed margins, *teeth distinctly curved*, shiny green; yellow to yellowish-orange in autumn; leafstalk flattened. **Twigs:** Yellowish-brown with pale dots (lenticels), often 4-sided, star-shaped pith; terminal buds, *red to yellowish-brown*, $\frac{3}{4}$ " long, angled, sharply pointed, slightly sticky, *not aromatic*, lateral buds point away from twig. **Fruit:** Capsule, *splits into*

3 or 4 parts; contains numerous seeds with cottony hairs; capsules grouped in 4" - 8" long catkins, mature in late spring. **Bark:** Yellowish-gray, smooth; becoming ashy-gray and *deeply furrowed with whitish troughs*.

Range: Native, southern, central, and north-western Minnesota; hardy to Zone 3a.

Remarks: Shade-intolerant; very fast-growing; short-lived. Floodplain species that also survives on dry sites once established. Extensively planted ornamental with many undesirable characteristics including the huge number of cottony seeds the tree produces. Several seedless or columnar-shaped varieties are available. Fast-growing hybrids often are used in farm shelterbelts and biomass plantations.



Eastern
Cottonwood

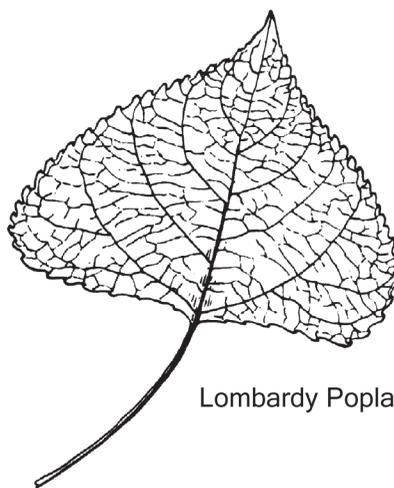


LOMBARDY POPLAR

(*Populus nigra* 'Italica')

Large to medium tree with a narrow, columnar crown of upright branches. **Leaves:** 2" - 4" long, often wider, finely toothed margins, dark green (paler below). **Twigs:** Yellowish-brown with $\frac{1}{2}$ " long, shiny brown terminal buds.

Range: Introduced from Italy; hardy to Zone 3a. **Remarks:** Although commonly planted, better columnar poplar varieties exist; this one is very short-lived and subject to canker diseases.

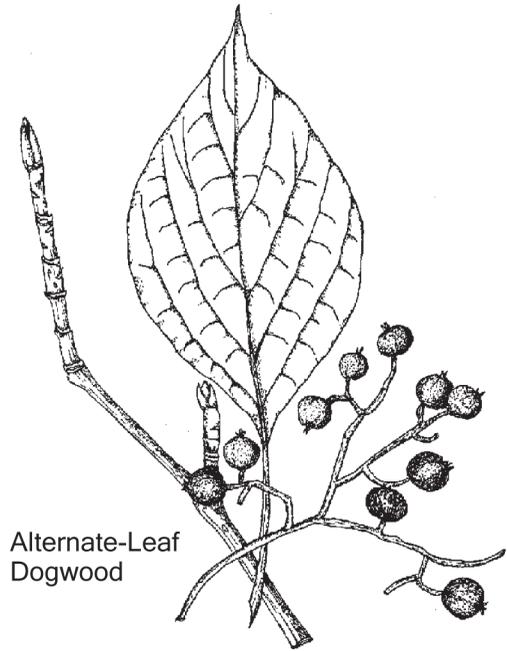


Lombardy Poplar



Miscellaneous Alternate-branching Trees with Simple, Singly Toothed or Smooth Leaves (Dogwood, Serviceberries, Some Apples - See Page 55)

ALTERNATE-LEAF DOGWOOD or pagoda dogwood (*Cornus alternifolia*)
Shrub or small tree, 8' - 25' tall; broad, flat-topped crown of horizontal branches *arranged in irregular whorls*; trunk up to 6" diameter.
Leaves: Alternate, simple, *clustered at twig ends*, 2½" - 4½" long, 2" - 3" wide, wavy or smooth margins, dark green (paler and hairy below); reddish-purple to reddish-yellow in autumn; *5 or 6 lateral veins on each side, distinctly curved, nearly parallel the margins at the ends*. **Twigs:** Yellowish- to purplish-green, smooth, *tips curved upward*; terminal buds, light brown, *2 scales*, pointed tip.
Fruit: Drupe, ¼" diameter, bluish-black, red stalk, mature in mid-autumn. **Bark:** Dark gray to brown, smooth or divided with shallow fissures. **Range:** Native, eastern and central Minnesota; hardy to Zone 3a. **Remarks:** Shade-tolerant; slow to moderately slow growing; short-lived. Common understory species usually found in association with maples and basswoods. With the exception of alternate-leaf dogwood, all other dogwoods (*Cornus* species) found in Minnesota have opposite arrangements and tend to be shrubs, rarely trees. Other dogwoods can be identified by their leaves, which have distinctly curved lateral veins that tend to parallel the margins, and by their opposite buds, which have two scales.



Alternate-Leaf
Dogwood

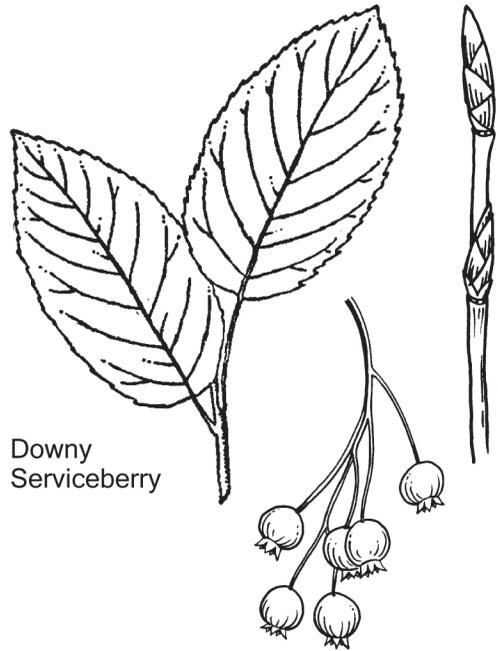


DOWNY SERVICEBERRY or Juneberry

(*Amelanchier arborea*)

Shrub or small tree, 6' - 25' tall; narrow, rounded crown; trunk up to 10" diameter. **Leaves:** Alternate, simple, 1½" - 4" long, 1" - 2" wide; *pointed tip*, tapered or heart-shaped base, sharp finely toothed margins, 11 - 17 lateral veins on each side; dark green (*silvery-white hairs below*); yellow to red in autumn. **Twigs:** Reddish-brown, often hairy; *terminal buds, yellowish-green to pinkish-brown (tip often black), ¼" - ½" long, slender, sharply pointed*. **Fruit:** Pome, ¼" - ⅜" diameter, bright red to dark purple, mature in summer. **Bark:** *Light gray to brown, smooth; becoming darker and shallowly fissured with narrow, vertical, whitish stripes (ridges)*.

Range: Native, eastern and central Minnesota; hardy to Zone 3a. **Remarks:** Shade-tolerant; slow-growing; moderately long-lived. Common understory tree. Edible fruits are an important wildlife food. Serviceberry is a corruption of the Roman name sarviss (or sorbus) describing the tree's fruit. During pioneer times, the name *serviceberry* may have become associated with the tree's beautiful spring flowers that marked the time when soils could be dug to bury people who died during the winter. Several serviceberries are native to Minnesota, but the genus is poorly described due to natural variations and crossbreeding between species.



Downy Serviceberry

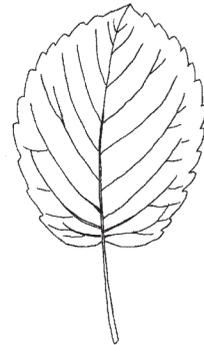
ROUNDLEAF SERVICEBERRY

(*Amelanchier sanguinea*)

Shrub or small tree. **Leaves:** Dull green (hairy when young), coarsely toothed, broadly oval, blunt to rounded tips, 12 - 15 lateral veins on each side.

Twigs: Bright red to reddish-brown. **Range:** Native to northeastern, north-central, and southeastern Minnesota; hardy to Zone 3a.

Roundleaf Serviceberry



SASKATOON SERVICEBERRY

(*Amelanchier alnifolia*)

Shrub or small tree. **Leaves:** Dull green (hairy when young), oval, round or nearly square tips, 7 - 9 lateral veins on each side, sharp coarsely toothed margins above the middle (smooth below).

Twigs: Reddish-brown. **Range:** Native to western Minnesota; hardy throughout.



Saskatoon Serviceberry

Key to Trees without Leaves

- 1a. Branches, buds, or leaf scars opposite or whorled.
 - 2a. Terminal buds false or absent.
 - 3a. Twigs slender, tips often armed with a small spine; leaf scars occasionally alternate near twig ends **Buckthorn, p. 38**
 - 3b. Twigs stout (usually 1/3" diameter or more), tips not armed with a small spine; leaf scars always opposite or whorled.
 - 4a. Leaf scars opposite or whorled in groups of 3, buds perched above leaf scar; twig pith white **Catalpa, p. 38**
 - 4b. Leaf scars opposite, nearly to entirely encircling buds; twig pith brown **Corktree, p. 32**
 - 2b. Terminal buds true.
 - 5a. Terminal buds covered with 2 visible scales.
 - 6a. Leaf scars narrow, much raised **Dogwoods, p. 73**
 - 6b. Leaf scars U- or V-shaped, barely raised.
 - 7a. Twigs and buds covered with numerous velvety hairs; terminal buds red, about 1/4" long **Mountain Maple, p. 36**
 - 7b. Twigs and buds slightly hairy or hairless; terminal buds yellowish- to brownish-gray, usually more than 3/4" long, base often bulb-shaped **Nannyberry, p. 39**
 - 5b. Terminal buds covered with 4 or more visible scales.
 - 8a. Terminal buds 1/2" - 1 1/2" long **Buckeye, p. 33**
 - 8b. Terminal buds less than 1/2" long.
 - 9a. Twigs or branchlets 4-sided or 4-lined; leaf scars with 1 bundle scar; fruit a 4-celled, pinkish capsule with red seeds **Wahoo, p. 39**
 - 9b. Twigs or branchlets nearly round; leaf scars with 3 or more bundle scars; fruit a samara (often absent).
 - 10a. Buds woolly-brown or black; leaf scars with numerous tiny bundle scars arranged in a U- or O-shape **Ashes, p. 30-31**
 - 10b. Buds whitish, scaly-brown, green or bright red; leaf scars with 3 (rarely 5) bundle scars **Maples, Including Boxelder, p. 32, 34-37**
 - 1b. Branches, buds or leaf scars alternate, never opposite or whorled.
 - 11a. Trunk or branchlets armed with thorns or spines. (11b on p.76)
 - 12a. Thorns or spines paired at leaf scars.
 - 13a. Buds conspicuous, fuzzy, red; twigs lemonlike smell when broken **Prickly-ash, p. 42**
 - 13b. Bud inconspicuous (sunken in leaf scar), reddish-brown; twigs do not smell lemonlike **Black Locust, p. 42**
 - 12b. Thorns or spines scattered, never paired at leaf scar.

(continued on next page)



- 14a. Thorns smooth, shiny, without buds or leaf scars.
 - 15a. Buds inconspicuous (3 or more sunken in leaf scar), brownish; thorns often 3-forked; fruit a legume **Honeylocust, p. 41**
 - 15b. Bud conspicuous, rounded, dark brown or red; thorns not forked; fruit a pome **Hawthorn p. 55**
- 14b. Thorns rough, often with leaf scars or buds attached.
 - 16a. Twigs silvery, scaly; fruit a yellow to brown, olive-shaped drupe with silvery scales **Russian-olive, p. 65**
 - 16b. Twigs reddish-brown to black; fruits lack silvery scales.
 - 17a. Fruit a drupe (usually absent); twigs bitter almond smell when broken; thorns less than 1" long **Plums, p. 56**
 - 17b. Fruit a pome (often present); twigs lack bitter almond smell; thorns often greater than 1" long **Apples, Pears, p. 55-56**
- 11b. Trunk or branchlets not armed with thorns or spines.
 - 18a. Branchlets with stubby or wartlike spur shoots covered with several leaf scars.
 - 19a. Spur shoots numerous, wartlike; leaf scars nearly joined and clustered at the tip, fewer than 3 bundle scars; seeds borne exposed in a drupelike structure or cone.
 - 20a. Seeds borne in woody cones (often present); previous year's dead leaves are needlelike and often present on ground; leaf scars with 1 bundle scar **Larches, p. 10**
 - 20b. Seeds borne in a drupelike structure (usually absent); previous year's dead leaves are fan-shaped and rarely present on the ground; leaf scars with 2 bundle scars **Ginkgo, p. 48**
 - 19b. Spur shoots scattered, narrow; leaf scars separated, 3 or more bundle scars; fruit a pome, drupe, or nutlet.
 - 21a. Terminal buds absent or false (except on spur branchlets); slender male catkins often present; twigs with or without a distinct wintergreen smell when broken **Birches, p. 59-61**
 - 21b. Terminal buds true; slender male catkins absent; twigs lack wintergreen smell when broken.
 - 22a. Twigs smell bitter almond when broken; fruit a drupe (often absent) **Cherries, p. 68-69**
 - 22b. Twigs smell otherwise; fruit a pome (often present).
 - 23a. Leaf scars narrow and curved, 4 or more bundle scars; trunk bark marked with horizontal lines (lenticels) **Mountain-ashes, p. 46-47**
 - 23b. Leaf scars with 3 bundle scars; trunk bark marked with or without dots (lenticels)..... **Apples, Pears, p. 55-56**
 - 18b. Branchlets without stubby or wartlike spur shoots.



- 24a. Twig pith chambered (look carefully below the buds if the pith is white).
- 25a. Twigs zigzag, slender, small leaf scars, false terminal bud
 **Hackberry, p. 65**
- 25b. Twigs straight, stout, large monkey-face leaf scars,
 true terminal bud **Walnuts, p. 44-45**
- 24b. Twig pith solid or spongy, never chambered.
- 26a. Lateral buds sunken in twig or nearly to entirely encircled by
 U-shaped leaf scar.
- 27a. Twig sap milky, pith light brown; fruit a cone-shaped multiple of
 red drupes, covered with numerous hairs
 **Sumacs, p. 47**
- 27b. Twig sap clear, pith otherwise colored; fruit a legume, hairless.
- 28a. Twigs slender, reddish-brown, shiny, pith white; legume thin,
 or appearing scaleless.
- 28b. Twigs stout, grayish, dull, pith salmon-colored; legume thick,
 never twisted **Coffeetree, p. 40**
- 26b. Lateral buds not sunken in twig or encircled by leaf scar.
- 29a. Buds covered with 1-3 exposed scales or appearing scaleless.
- 30a. Buds covered with a single caplike scale or sheath
 **Willows, p. 66-67**
- 30b. Buds covered with 2 - 3 scales.
- 31a. Leaf scars with 3 or fewer bundle scars or bundle
 scar groups.
- 32a. Leaf scars clustered at ends of upturned twigs;
 fruit a drupe; slender male catkins absent
 **Alternate-leaf
 dogwood, p. 73**
- 32b. Leaf scars not clustered at ends of upturned twigs;
 fruit a nutlet; slender male catkins often present.
- 33a. Nutlets grouped in a woody, pinecone-like catkin
 (often present); buds with 2 scales meeting at
 their edges, perched on a small stalk; twig pith
 triangular in cross section, lacks wintergreen
 odor **Alder, p. 63**
- 33b. Nutlets grouped in a nonwoody catkin (usually
 absent); buds with 2 - 3 overlapping scales,
 flush with twig; twig pith round or flattened in
 cross section, with or without wintergreen odor
 when broken **Birches, p. 59-61**

(continued on next page)



- 31b. Leaf scars with 4 or more bundle scars or bundle scar groups.
 - 34a. Buds yellow, slender; fruit a husked nut
..... **Bitternut Hickory, p. 43**
 - 34b. Buds red or green, fat, slimy when chewed; fruit a nutletlike drupe attached to a leaflike wing
..... **Lindens, p. 64**
- 29b. Buds covered with 4, 6, or more overlapping scales.
 - 35a. Leaf scars with 4 or more bundle scars.
 - 36a. Bundle scars arranged in a U-shaped line or a narrow curved line.
 - 37a. Fruit a red or orange pome (often present); buds fuzzy, white or red, and gummy, true terminal bud; leaf scars narrow and curved
..... **Mountain-ashes, p. 46-47**
 - 37b. Fruit a samara (usually absent); buds brown and not gummy, false terminal bud; leaf scars nearly as wide as long **Elms, pp. 57-58**
 - 36b. Bundle scars scattered or otherwise grouped.
 - 38a. Buds clustered at twig tips; fruit an acorn.
 - 39a. Terminal bud tip pointed; inner surface of acorn shell is fuzzy **Red Oak Group, p. 52-53**
 - 39b. Terminal bud tip blunt or nearly blunt; inner surface of acorn shell is hairless
..... **White Oak Group, p. 49-51**
 - 38b. Buds not clustered at twig tips; fruit not an acorn.
 - 40a. Twig sap milky; false terminal bud, often absent **Mulberries, p. 54**
 - 40b. Twig sap clear; true terminal bud, greater than 1/2" long **Shagbark Hickory, p. 44**
 - 35b. Leaf scars with 3 or fewer bundle scars.
 - 41a. Slender, cigar-shaped male catkins present.
 - 42a. Trunk bark white, yellow, black, gray, or pinkish with prominent horizontal lines (lenticels), often peeling in horizontal paperlike curls
..... **Birches, p. 59-61**
 - 42b. Trunk bark grayish-brown with inconspicuous lenticels, vertically fissured with narrow ridges, ridges sometimes curl at ends
..... **Ironwood, p. 62**



- 41b. Male catkins absent.
 - 43b. Terminal buds false (often absent).
 - 44a. Trunk fluted in cross section, bark smooth and gray with musclelike ridges; buds angled or 4-sided in cross section, 10 or more scales in 4 rows **Blue-beech, p. 63**
 - 44b. Trunk nearly round in cross section, bark often deeply furrowed; buds nearly round, 4 to 8 scales in 2 rows **Elms, p. 57-58**
 - 43a. Terminal buds true.
 - 45a. Twig pith star-shaped in cross section; lowest scale of lateral buds centered directly over leaf scar **Poplars, p. 70-72, 54**
 - 45b. Twig pith round in cross section; lowest scale of lateral buds not centered over leaf scar.
 - 46a. Buds egg- or cone-shaped, sometimes clustered at twig ends; twigs distinct bitter almond smell when broken; trunk bark with horizontal lines (lenticels) or scaly **Cherries, p. 68-69**
 - 46b. Buds long and slender, sharply pointed; twigs smell otherwise; trunk bark marked with vertical stripes **Serviceberries, p. 74**



Section Four:

YOUTH PROJECTS

The following activities provide opportunities to practice identification skills and share knowledge with others. The activities were designed for elementary-age children, but can be easily adapted for use with younger or older learners.

Activities

1. During the summer, collect leaves from 25 different Minnesota trees; identify and mount according to instructions.
2. Collect fruits or seed cones from 10 different Minnesota trees. Identify the fruits or seed cones, label them, and make a case in which they may be attractively displayed.
3. Select a large tree near your home that you can study. Keep records on its appearance and growth during the year.
4. Exhibit your leaf collection, fruit collection, project report, and record of activities at a 4-H club meeting, a community exhibit, or a county fair. Use a scrapbook or display box.
5. During the winter, collect, identify, and mount twigs from 12 Minnesota trees. Exhibit these with your leaf collection.
6. Make an educational forestry exhibit and display it in a local store window, county fair, or community exhibit. Exhibits encouraging forest protection, tree planting, or forest management are recommended.
7. Make a collection of 15 leaf prints of Minnesota trees and shrubs. Identify and label them.
8. Certain trees have characteristic leaf colors in the fall. List at least 15 trees and indicate the fall color of each tree.
9. Write an essay on a subject of interest to you that might be used as a newspaper article or a talk. You might want to write about our state tree and how it was chosen, or about your favorite tree and why you selected it as your favorite.

Suggested Presentations

1. Identifying trees by leaf characteristics.
2. Collecting, pressing, and mounting tree leaves.
3. Making leaf prints.
4. Using a plant key to identify trees.
5. Making a display box for exhibiting fruits.

Leaf Collection

When you go out to collect leaves, take along a newspaper or a large magazine. Put the leaves between the pages to keep them from drying out too fast and to protect them from being torn or broken. Press the leaves as soon as you can. If you need to, ask for help in identifying leaves. But before you ask for help, try to do it yourself using the keys in this book. Remember, there is great satisfaction in doing a good job by yourself.

Tips on Collecting Leaves

1. Do your collecting in early to mid summer so you will get mature leaves.
2. Collect leaves mainly from native forest trees rather than introduced species.
3. Select good leaves. Avoid insect-eaten or torn leaves.
4. Most important: Make sure you have the whole leaf and not just a leaflet when collecting specimens from trees such as walnut, honeylocust, or others that have compound leaves.
5. When collecting leaves, carry a newspaper with you and slip the leaves you collect between the pages. Be sure they are flat. This will prevent the leaves from curling and becoming difficult to press.

Instructions for Pressing Leaves

1. Lay your leaves flat between sheets of newspaper or other porous paper.
2. Place heavy weights such as bricks on top so your leaves are pressed flat. Don't try to press too many leaves at one time.
3. Change the papers every two days and use plenty of dry newspapers. Otherwise your leaves may mildew.
4. While drying, place your collection in an area where there is good air circulation.

Mounting Tree Leaves

After pressing, mount leaves on cardboard and label each to show: (1) common name, (2) scientific name, (3) where it was found, (4) date collected, and (5) name of the collector. Be careful when mounting the leaves to prevent damage. Use rubber cement or another appropriate adhesive to fasten the leaves to the cardboard. Make your arrangements neat and attractive.

Example: Common name: American Elm
 Scientific name: *Ulmus americana*
 Where found: University of Minnesota, St. Paul Campus
 Date: October 28, 1995
 Collected by: Carrie Turner

Leaf Prints

You can make a permanent collection of leaf shapes by making leaf prints. All that you need are an ink pad (the larger the better), white paper (typewriter paper is fine), newspapers, and your leaves.

Press the leaves for an hour between newspapers. This will flatten them and make them easier to print. Then place each leaf, undersurface down, on the ink pad. Cover the leaf with one thickness of newspaper and rub it firmly to get ink on the margin, the stem, and the veins. If the leaf is larger than the ink pad, you will have to move the leaf around to get ink over the entire undersurface.

Place the inked leaf on your paper. Cover the leaf with one thickness of clean newspaper and rub thoroughly. Be sure to rub the entire leaf and do not let it slip or you will spoil the print. When you remove the leaf from your paper, the ink print will remain. Label your pages neatly and bind them into a notebook.

You also can make leaf prints on fabric for tablecloths or t-shirts. Paint the underside of the leaf with fabric paint using a small ink roller or sponge. Use more than one color for depth if you wish. Carefully place the leaf paint side down on the cloth and cover it with one thickness of clean newspaper. Use a roller to evenly press the leaf paint onto the fabric. Remove the leaf from the cloth, being careful not to smudge the ink.

Fruit and Seed Cone Display Box

Tree fruits and seed cones are very irregular in size and are best mounted in a display box. Use a shoe box, or a box of similar size, cut to a depth of about 2 inches. Place a layer of cotton in the box and arrange the fruits neatly on the cotton. Any number of fruits or seed cones may be put in the box as long as they are arranged neatly and are not too crowded. Place a name tag near each specimen for identification (see the example above under “Mounting Tree Leaves”). The appearance of your box may be greatly improved by covering the outside with cloth, wallpaper, or a similar attractive material. Its strength may be increased by reinforcing the corners with tape. Cover the box with plastic wrap or another clear material.

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SPECIES INDEX AND CHECKLIST

* denotes species native to Minnesota

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when: _____

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when: _____

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when: _____

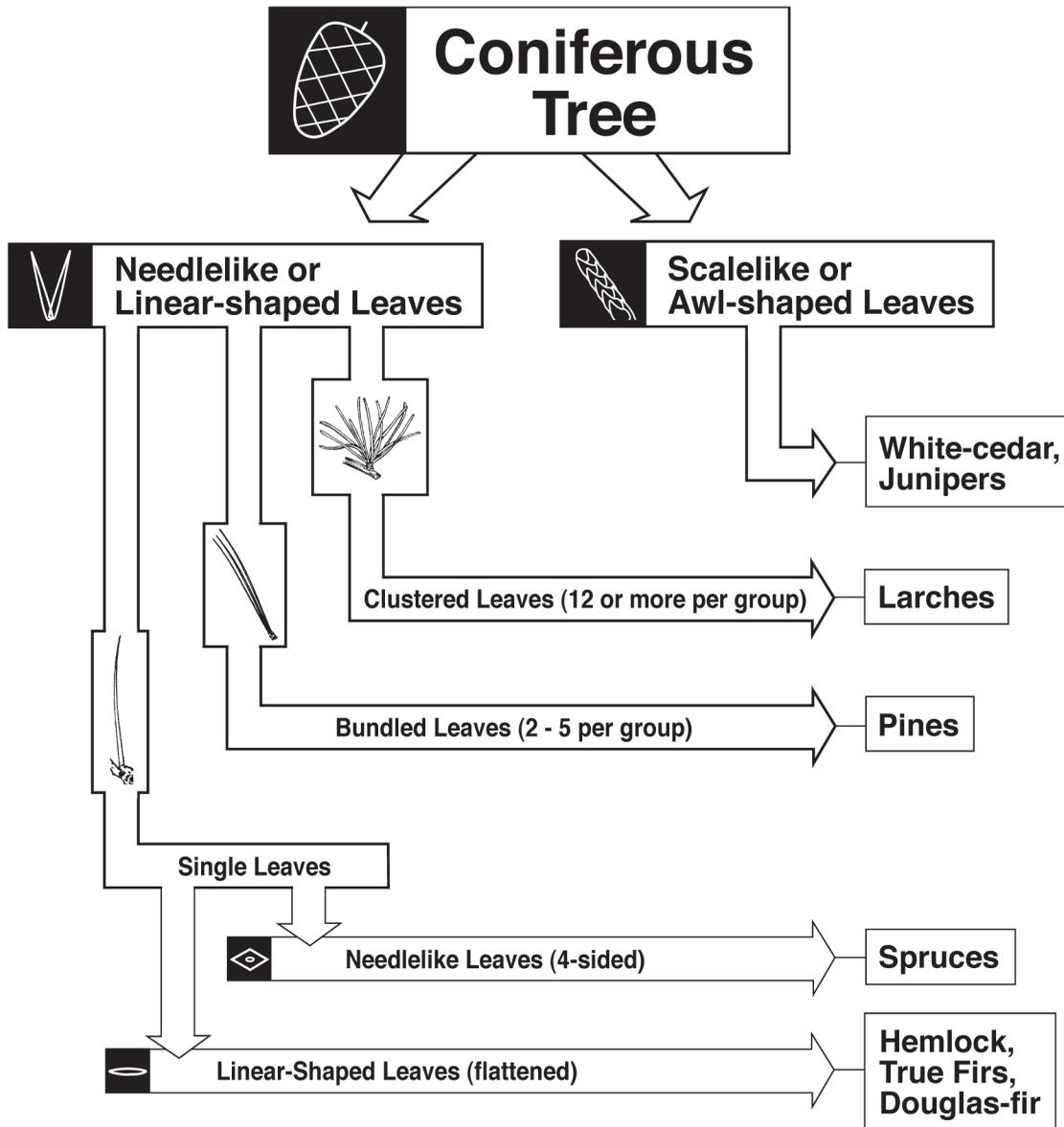
Sandbar Willow*
where: _____
when: _____

Shining Willow*
where: _____
when: _____

White Willow
where: _____
when: _____

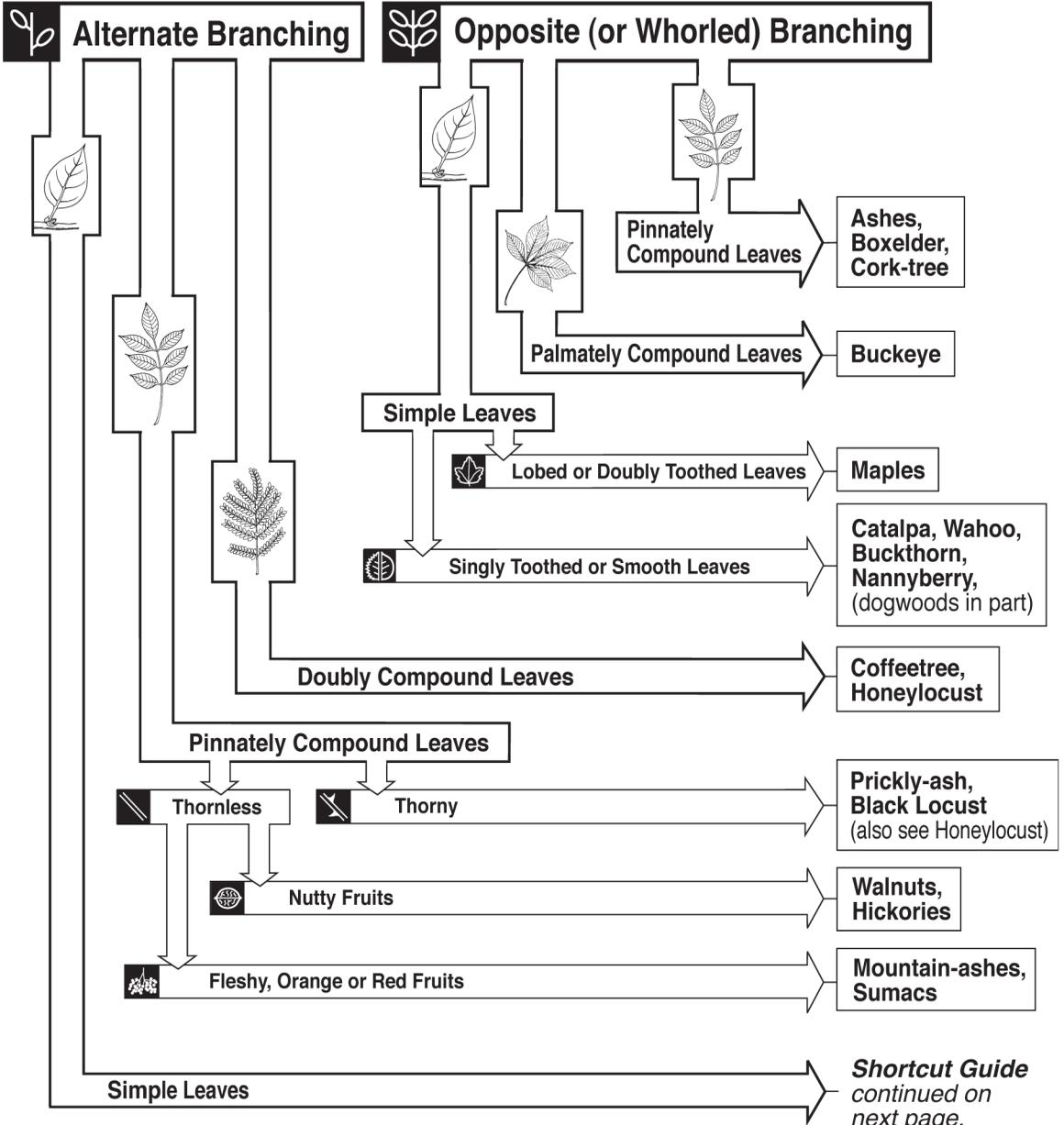
Shortcut Guide to Minnesota Trees

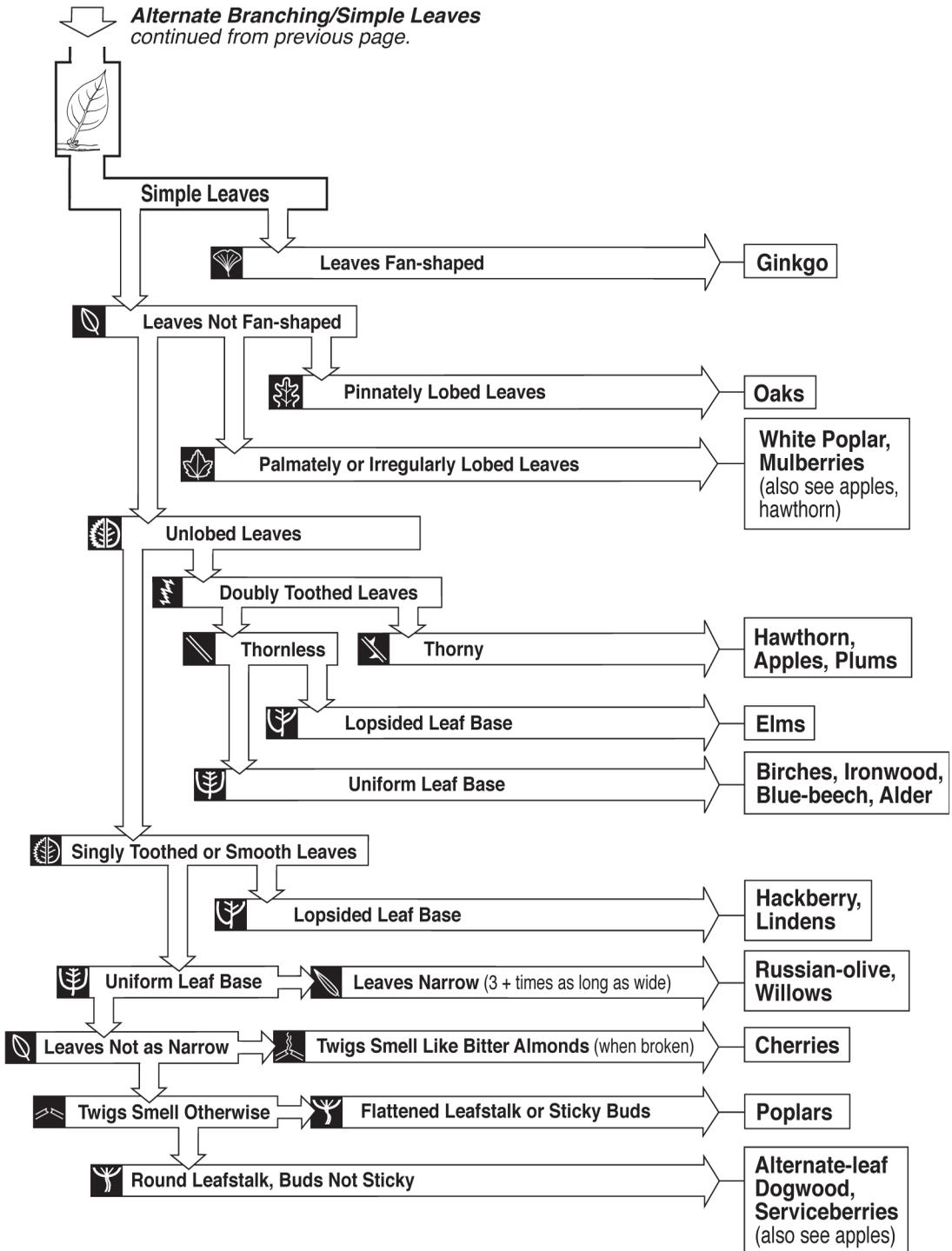
You can use the following chart as a guide when identifying trees. Begin with the coniferous or deciduous page, then follow the arrows, branching as appropriate according to the characteristics of the tree in question. Please note, however, that this brief guide does not cover all identifying traits or options. Refer to the keys on pages 8, 25, and 75 and to the individual species descriptions to confirm and complete your “shortcut” identification.



Shortcut Guide continued on next page.

Deciduous Tree





NOTES



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REFERENCE TAB DESCRIPTIONS

CONIFEROUS TREES

- introduction and key

- scalelike leaves

- leaves in groups

- leaves in singles

DECIDUOUS TREES

- introduction and key

Opposite-branching

- compound leaves

- simple, lobed leaves

- simple, smooth/singly toothed leaves

Alternate-branching

- compound leaves

- simple, lobed leaves

- simple, doubly toothed leaves

- simple, smooth/singly toothed leaves

TREES WITHOUT LEAVES

-key

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