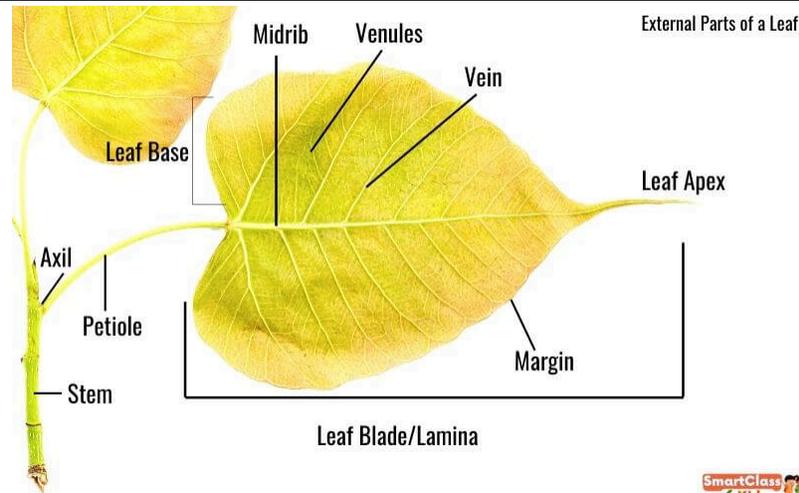


Vermont Tree ID and Anatomy Terms



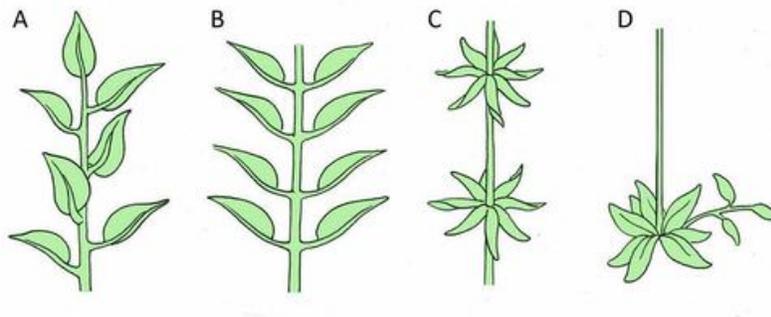
Leaf Structure

Leaf Blade/Lamina	Broad, flat part of the leaf, main function is capturing light for photosynthesis
Leaf Apex	Tip of the leaf blade
Midrib	Large strengthened vein along the center of the leaf
Margin	Edge of the leaf blade
Vein	Vascular tissues that transport water and minerals to and from the leaf
Venules	Fine, secondary veins in a leaf
Leaf Base	Lowermost part of the leaf where it attaches to the petiole
Petiole	Stalk that connects the leaf blade to the stem of the plant
Axil	Angle formed between upper side of leaf and its supporting stem



Leaf Arrangement

Alternate Branching (A)	Leaves positioned along the stem at staggered intervals
Opposite Branching (B)	Leaves positioned along the stem and grow in pairs directly across from each other
Whorls (C)	Circles of leaves along the stem at intervals
Basal Rosette (D)	Circle of leaves at the base of the plant stem.



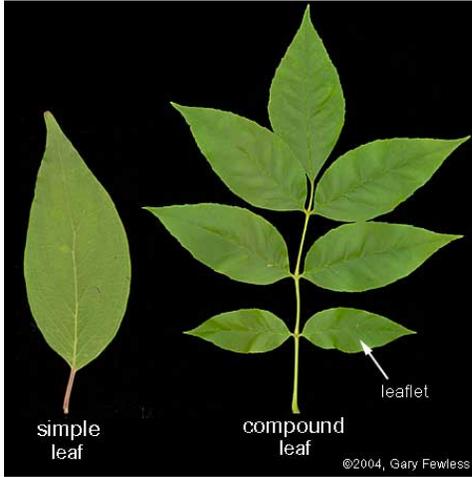
Leaf Types

Simple

Leaves are a single undivided blade attached to the plant stem by a petiole

Compound

Leaves are made up of two or more distinct parts called leaflets



Fascicle

Bundle of leaves growing crowded together like in pines



Palmately Compound

Leaflets radiate from a single point



Pinnately Compound

Leaflets are arranged along a central stalk which is an extension of the petiole called a rachis

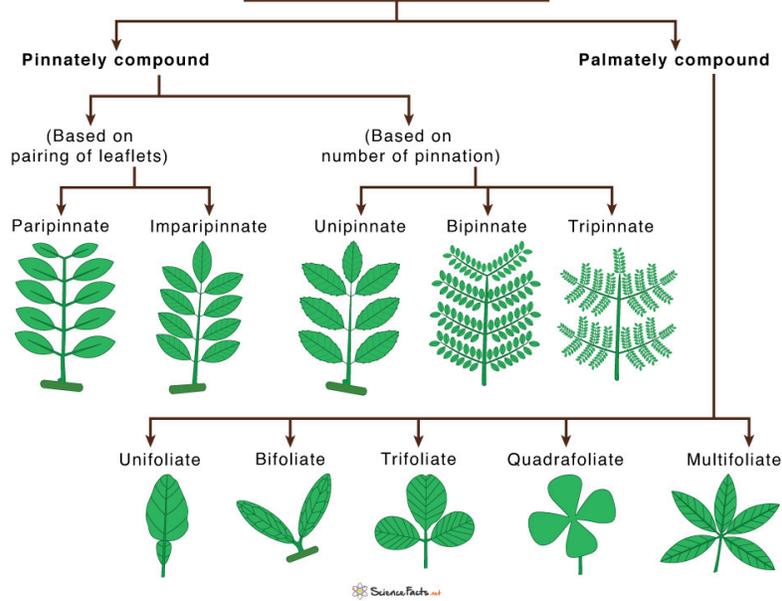


Bi-pinnately (Doubly) Compound

Pinnately compound leaves whose leaflets further pinnately divide



Compound Leaf



Leaf Margin Types

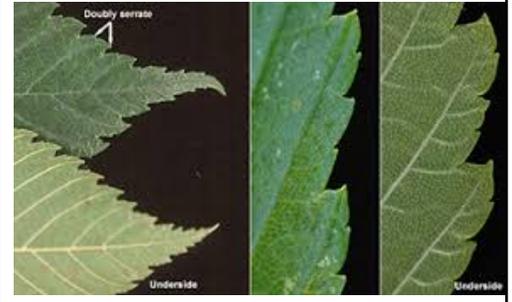
Entire
Smooth edge



Serrate
Saw-like with sharp forward pointing teeth



Doubly Serrate
Larger teeth that are also serrated with smaller teeth



Lobed
Large rounded projections or indentations

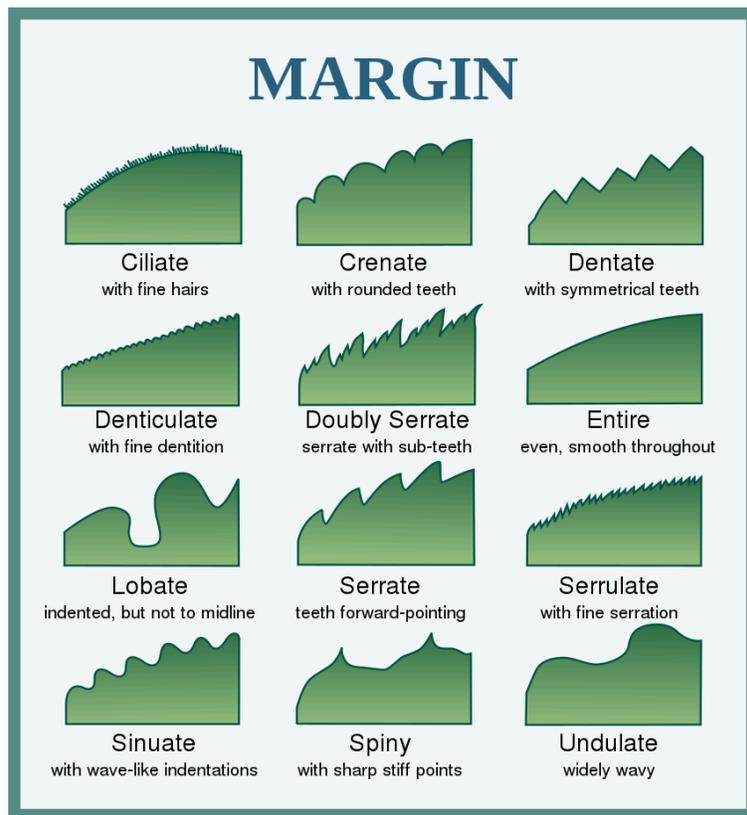


Ciliate
Edges with hair-like projections



Dentate
Teeth that point outwards (not forwards)





Sugar Maple

A flowering, deciduous tree. Sugar maple is Vermont's state tree, and it is the primary source for maple syrup. Sugar maples can grow in a variety of environments, but they prefer slightly acidic, moist, well-drained soils

Leaves: simple, oppositely branched leaves with five lobes and smooth u-shaped margins between each point.

Bark: younger trees have smooth, gray-brown bark while older trees have rough, vertical plates.

Seeds: pairs of winged seeds that fall in a helicopter-like manner.

Other characteristics: leaves turn bright, distinctive shades of red, yellow, and orange in the fall. In winter and early spring, buds on branch tips are pointed, slender, and brown with three or more scales.



Red Maple

A flowering, deciduous tree. It is recognized as one of the most common trees in eastern North America. Red maples can also be tapped for maple sugar production, but their sap has a lower sugar content.

Leaves: simple, oppositely branched leaves with five coarsely toothed lobes and sharp, v-shaped margins between each lobe.

Bark: younger trees have smooth, gray bark while mature trees have layers of long, brown vertical plates.

Seeds: pairs of winged seeds that are typically red

Other characteristics: leaves turn bright red in fall. In winter and early spring, buds on branch tips are plump and reddish in color.



Red Oak

A flowering, deciduous hardwood tree. Red oaks are relatively fast growing for an oak species, and can reach 50-70 feet in height. Red oaks can grow in a variety of conditions, but they prefer sites with full sun and well-drained, slightly acidic soils.

Leaves: simple, alternatively branching leaves with 7 to 11 lobes that are each tipped with a small hair-like bristle. Areas between the lobes dip to about halfway between the tip and center of the leaf.

Bark: smooth, dark gray when young which becomes furrowed with flat-topped ridges as the tree ages.

Seeds: acorns take two years to mature on the tree and are round with a shallow cap.

Other characteristics: buds are pointed, smooth, and clustered at the tips of twigs.



White Oak

A flowering, deciduous hardwood tree. White oaks are long-lived with some individuals reaching over 450 years old. They are named for the undersides of their leaves which are lighter in color.

Leaves: simple, alternately branching leaves with 7 to 10 rounded lobes that have deep rounded sinuses between each lobe.

Bark: Light gray and sometimes blocky on the lower trunk, while bark is typically flaky or shaggy on the upper trunk and limbs.

Seeds: acorns take one year to mature and are oblong with a bumpy cap that covers roughly 1/3 of the nut.

Other characteristics: red-brown buds are smaller with rounded tips.



Shagbark Hickory

A flowering, deciduous tree. Shagbark hickories are known for their characteristically flaky bark and nuts. Historically, these nuts were eaten by Native Americans, and the word hickory was adapted from the Virginia Algonquian word *pawcohiccora*, a name for the meat and milk of the hickory nuts.

Leaves: pinnately compound, alternately branching leaves with five leaflets (tree leaflets at the end of the leaf are larger). Margins of each leaflet are finely toothed.

Bark: the tree's most prominent feature. The bark is light gray and separates into thick vertical strips that are only slightly attached to the tree.

Seeds/Fruit: large round nut with thick husk that splits into four sections when ripe

Other characteristics: winter buds are large, blunt-pointed with papery, loose outer scales.



Bitternut Hickory

A flowering, deciduous tree. Bitternut Hickory is the shortest lived of the hickory species with the oldest individuals reaching over 200 years in age. It typically grows in areas with moist soils along streambanks and in swamps, although it can also be found on dry sites.

Leaves: pinnately compound, alternatively branching leaves with 7-11 narrow leaflets. Margins of each leaflet are finely toothed.

Bark: gray with a slight yellow tinge. Older trees have thin, plate-like scales or ridges.

Seeds: small nut with sharply pointed tip and thin husk that breaks into four sections when ripe.

Other characteristics: winter buds are bright yellow.



Bigtooth Aspen

A flowering, medium sized deciduous tree. Bigtoothed aspen are fast growing. It is a pioneer tree, meaning it is one of the first trees to grow in a recently disturbed area (after a blowdown, fire, or logging). These trees are relatively short lived, only living 60 to 70 years on average.

Leaves: simple, alternatively branching leaves with characteristic large, coarse teeth on the margins. Petioles are flat which causes the leaves to flap or flutter in the wind.

Bark: green-gray and smooth. Bark turns white-gray and furrowed at the base of the tree as it matures, while upper leaves and branches remain smooth with lighter bark.

Seeds: seeds are tiny, white, and covered with fluffy cotton-like hairs. They are typically dispersed in late May and June.

Other characteristics: flowers are borne in drooping, tan colored catkins that appear in early spring before leaves emerge.



Quaking Aspen

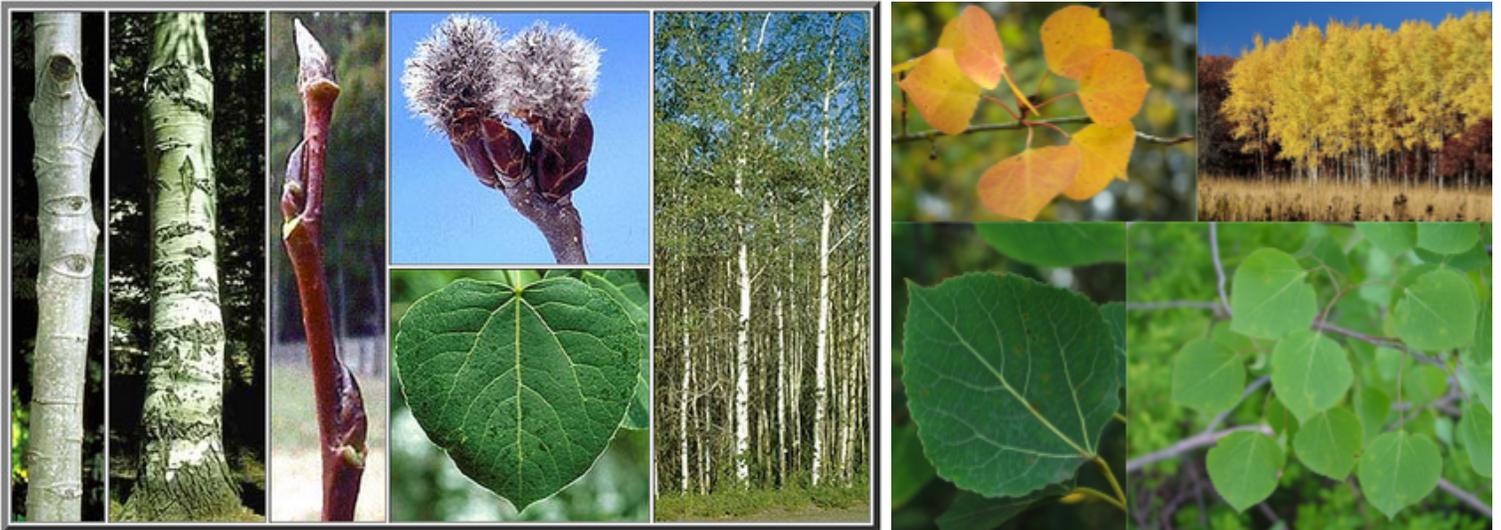
A deciduous, flowering tree commonly referred to as popple. Quaking Aspen typically grow in large clonal groves that share one root system. It is the widest ranging tree in North America, with its range spanning from Canada to Mexico.

Leaves: simple, alternatively branching, oval-shaped leaf with finely toothed margins. The petiole is flat causing the connecting leaf to 'quake' or tremble in the wind.

Bark: characteristic smooth, pale bark that can become gray and furrowed in the lower portion of the tree as it ages. The upper trunk and branches typically remain pale and smooth.

Seeds: seeds are very small embedded in cotton-like hairs that are dispersed by the wind

Other characteristics: Small, fuzzy gray catkins emerge in early spring.



Yellow Birch

A deciduous, medium sized (average 60-80 feet), flowering tree. Yellow Birch is the largest species of birch in North America. It prefers well-drained soils, and grows best at lower elevations in Vermont and on north-east facing slopes. This is a mid-successional tree, meaning it appears after pioneer species are established. Seeds require some light and soil disturbance to germinate.

Leaves: simple, alternately branching leaves have a pointed tip, serrated margins, and rounded, indented leaf base.

Bark: distinctive silvery-bronze to golden bark that peels in fine papery strips.

Seeds: seeds are tiny and winged and are contained in a cone shaped catkin before they are dispersed by wind.

Other characteristics: twigs and inner bark give off a wintergreen scent when crushed.



White Birch

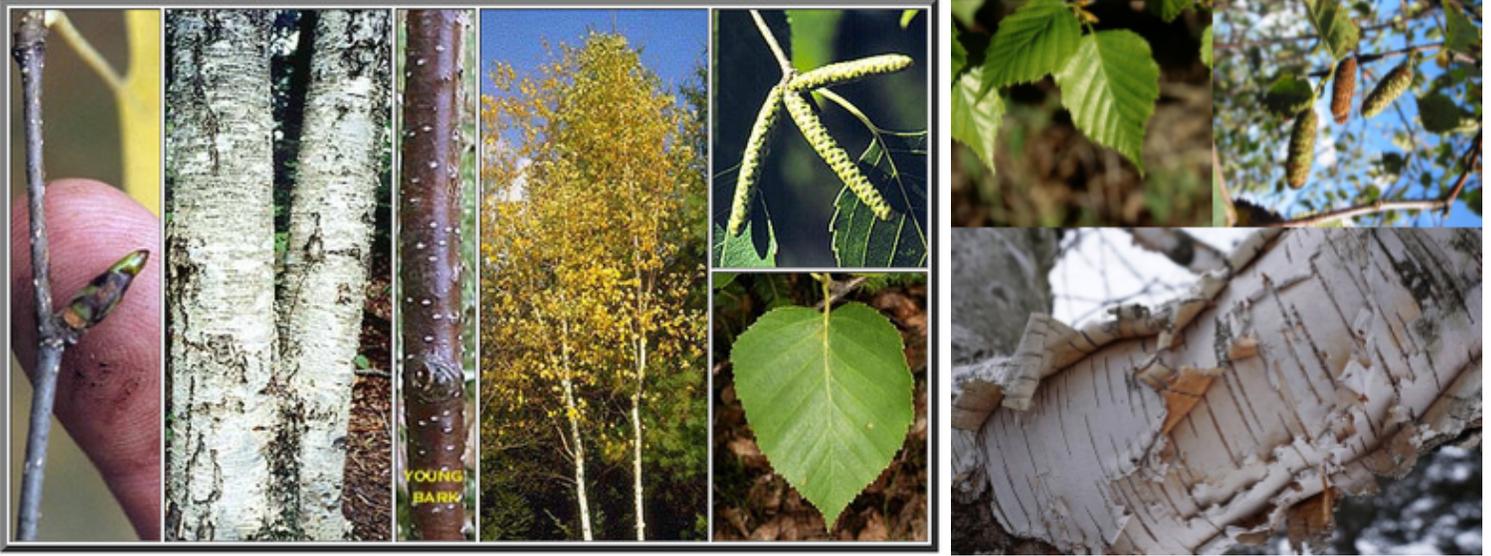
A flowering, deciduous tree, also commonly known as paper birch. Its distinctive white bark peels off in large strips and is relatively water proof and an excellent fire starter. White Birch bark was utilized by many native tribes across the northeast as a building and crafting material. Perhaps its most well known use is in birch bark canoes.

Leaves: simple, alternatively arranged leaves that are egg-shaped with a pointed tip and doubly serrated margins.

Bark: smooth, chalky and white. The bark peels off in thin, paper-like sheets. On mature trees, the bark becomes almost black and deeply furrowed on the lower trunk.

Seeds: develops in a cone-like structure containing tiny, winged seeds that are dispersed in the fall.

Other characteristics: winter buds are small, elongated, and cone-shaped. They can range from dark brown to green-brown in color.



Red Spruce

Coniferous evergreen tree that is found throughout the northern Appalachian Mountains and grows at higher elevations in the southern Appalachians. Red spruce are a long lived species and can grow to more than 350 years. They are known to be a valuable lumber tree. Its wood is known for its resonance quality, so it is often used to make pianos and other stringed instruments.

Leaves: sharp needles grow individually along twigs. They are short, square in cross section, and yellowish-green in color.

Bark: gray-brown and flaky, may resemble burned corn flakes.

Seeds: seeds are contained within small (1-1 ½ inch) cones that hang downward from branches

Other characteristics: Twigs are hairy and are a dark reddish color. Small twigs and needles give off a fruity, citrusy scent when crushed.



White Spruce

Large, evergreen conifer that grows across northern North America. It is a climax tree species, meaning it becomes established long after an area has recovered from a disturbance like logging or wildfire.

Leaves: sharp needles grow individually along twigs. They are short, square in cross section, and blueish-green in color with a waxy, white coating.

Bark: gray-brown and flaky

Seeds: seeds are contained within cones which hang down from branches. Cones are slightly larger in size (1.5-2.5 inches long).

Other characteristics: Twigs are hairless (after first year) and are lighter in color (yellowish brown to gray). Small twigs and needles give off a pungent smell similar to cat urine or skunk when crushed.



Eastern Hemlock

An evergreen conifer. Eastern Hemlock are long lived, with some individuals growing for more than 500 years. They prefer to grow in areas with cool, humid conditions. The species is threatened by the hemlock woolly adelgid which is spreading rapidly across hemlock's range. The woolly adelgids are a sap sucking bug introduced from east asia and can cause decline and death on infested trees.

Leaves: blunt tipped needles grow individually along twigs. Needles are short ($\frac{1}{2}$ inch long) and flat with two white stripes on the underside.

Bark: Reddish-brown to gray with narrow rounded ridges covered in thick, flat scales.

Seeds: seeds are contained within small ($\frac{1}{2}$ in long), egg-shaped cones that hang down from the tips of twigs.

Other characteristics: Mature hemlocks have an open, feathery shape with branches that appear almost droopy.



American Elm

A deciduous flowering tree species. In the 19th and 20th century, American Elm was commonly planted as a street and park tree, but it is affected by Dutch Elm Disease (fungal disease) which has caused large die-offs across its range.

Leaves: simple, alternatively arranged leaves are oval with pointed tips, doubly serrated edges, and an asymmetrical leaf base where one side is slightly broader than the other. Veins are prominent and straight.

Bark: dark grey-brown with deep furrows and flattened, interlacing ridges.

Seeds: papery, flat, and round with a single seed in the center. Dispersed in the spring.

Other characteristics: open grown trees are vase-shaped with a straight trunk that divides into large arching branches. Twigs may show a zig-zag pattern because of leaf arrangement.



American Beech

Large, flowering deciduous tree. In open areas, the crown may grow in a rounded or oval shape. American Beeches can grow to be 50-80 feet tall with large trunks which can be 2-3 feet in diameter. Leaves turn golden in the fall and will stay on the tree well into the winter months.

Leaves: simple, alternatively arranged, oval-shaped leaves with pointed tips. Their margins are toothed, and veins are straight, running parallel from mid-rib to margin.

Bark: smooth, light gray and thin.

Seed/Fruit: small, spiny husk that contains a nut.

Other characteristics: winter buds are thin and long, roughly resembling cigars.



White Ash

Flowering, deciduous tree that prefers rich, moist soils. White ash are tall and fast growing and are, therefore, a significant hardwood timber tree. They are currently threatened by the emerald ash borer, an invasive wood-boring beetle, which has the potential to devastate ash populations across eastern North America.

Leaves: pinnately compound, alternatively arranged, leaves with 5-9 leaflets (typically 7). Leaflets have a slightly serrated edge and are dark green on top with slightly paler underside.

Bark: gray to brown in color with deep narrow ridges that join to form a diamond or x-shaped pattern

Seeds: winged seed with a paddle-like shape

Other characteristics: leaves, when removed, leave a u-shaped scar on the stem.



Northern White Cedar

An evergreen conifer that grows as a shrub or medium sized (40-70 feet in height) tree. In some areas, cedars grow in dense, nearly impenetrable thickets. They prefer to grow in cool, moist nutrient rich areas such as swamps, along lakes and rivers, and uplands with calcareous (limestone-rich) soils.

Leaves: distinctive, scale-like and flat. Small branches have a feathery, fan-shaped appearance and are typically yellowy-green in color.

Bark: gray to reddish brown, fibrous and can be peeled away in long vertical strips. Diamond-shaped patterns are often created by grooves in the bark.

Seeds: cones are small, oblong, and grow upright on ends of branches. They turn light brown when ripe.

Other characteristics: Leaves have a pleasant, aromatic odor when crushed.



Black Cherry

A flowering, deciduous tree or shrub in the rose family. Black cherry is fast growing and can often be found in old field or open clearings with lots of sunlight. Its fruit is enjoyed by a wide range of wildlife from birds to bears.

Leaves: simple and alternatively arranged the leaves are oval in shape with a finely toothed margin and a shiny upper surface. There are often rusty-colored hairs along the mid-vein on the underside of the leaf.

Bark: young trees have smooth, reddish bark with horizontal pale lines, while mature trees have dark reddish-brown to black bark that breaks into small, scaly plates (like burnt potato chips)

Seeds: small, round fruit containing a hard pit that are dark purple when ripe.

Other characteristics: white, 5 petaled flowers that bloom in drooping clusters in the spring.



Pin Cherry

Flowering, deciduous shrub or small tree. Pin Cherry have a short lifespan of 20-40 years and quickly establish after disturbances like logging or fire. It is an important food source for birds and other wildlife.

Leaves: simple, alternatively arranged leaves are long and narrow in shape with a pointed tip and finely serrated edges. Their upper surface is shiny and dark green.

Bark: smooth, thin, reddish-brown on young trees, and becomes darker and may peel as the tree matures. Bark has light colored horizontal lines.

Seeds: small, red, fruit that mature mid-summer and grow on individual stalks.

Other characteristics: white flowers bloom in early spring in clusters of 5-7.



Balsam Fir

A small to medium sized evergreen conifer. Balsam fir typically grow in a characteristic narrow, cone-shape. They

prefer to grow in cool moist sites including high-elevation forests and wetlands. Wildlife use the tree for food and shelter in winter months.

Leaves: needles are individually attached to stems and are flat with a blunt or notched tip and two pale bands on the underside.

Bark: young trees have thin, smooth, gray bark with resin blisters, while mature trees have darker, rough bark.

Seeds: seeds are contained within cones that sit upright on branches. They are typically 2-4 inches long and are dark purple before they mature.

Other characteristics: needles and twigs give off a strong Christmas-tree scent when crushed.



American Basswood

A flowering, medium to large sized (an average of 60 to 80 feet in height) deciduous tree. American Basswood typically grow in well-drained soils, and rarely grows in clumps of pure basswood, instead they mainly grow in mixed stands.

Leaves: simple, alternately branching, large (5-6 inches long and 3-5 inches wide) leaves which are heart shaped with coarsely toothed margins and an asymmetrical base.

Bark: light brown to gray with deep furrows and flat topped ridges. It may form an “xy” pattern with ridges.

Seeds: dry, round nutlet (¼ inch long) that is covered in brown hairs and occurs in August to October.

Other characteristics: often have suckers or small sprouts around the base of the tree. They bloom in early summer with clusters of small, pale yellow flowers.



Butternut

A flowering, deciduous tree typically growing 40–60 feet tall. Butternut prefer moist, rich soils and areas with full sun. They are more often found in open fields or forest edges. Butternuts have become more rare in Vermont due to the spread of a non-native fungus known as butternut canker which causes cankers within the tree's bark, eventually girdling the tree.

Leaves: pinnately compound, alternatively branching leaves with 11 to 17 oblong leaflets. Leaflets have serrated margins.

Bark: gray with diamond-pattern ridges.

Seeds: roughly lemon shaped husk that is green and sticky. The interior nut is sharply ridged.

Other characteristics: Monkey faced leaf scar (on stem after leaf is broken off). Leaves and nuts have a distinct lemony-scent.



Eastern Hophornbeam

A flowering, slow growing deciduous tree. Eastern Hophornbeam is a relatively small (20–50 feet) understory tree typically found in lowland and foothill forests. Its seeds, buds, and catkins are important food sources for birds like the ruffed grouse.

Leaves: simple, alternate branching, leaves are oblong with pointed tips and doubly toothed margins. The tops of their leaves are dark green and dull while the underside is paler and often hairy.

Bark: young trees have smoother bark with horizontal lines, while mature tree's bark develops a shaggy or platy appearance with age.

Seeds: appear in clusters of papery sacs which resemble hops (used in beer brewing). Each sac contains a single, hard nutlet.

Other characteristics: has male and female catkins. Male catkins are present throughout the winter and grow at the end of each branch. Female catkins appear in spring.



Striped Maple

A flowering, slow growing, deciduous understory tree or large shrub. Striped Maples will often split into several branches near the base of the trunk. They are a significant browse plant for wildlife including snowshoe hares, red squirrels, eastern chipmunks, porcupines, deer, and moose.

Leaves: simple, oppositely branching, large leaves with tree pointed lobes that have a goose foot-like shape. Margins have finely serrate edges.

Bark: young tree's bark is smooth, green, and marked with long white or pale green horizontal stripes. These stripes darken to a brownish color as the tree ages.

Seeds: paired winged seeds (similar to other maple species) that grow in hanging clusters.

Other Characteristics: Twigs are green or red and buds are red-tipped in winter. Blooms in late spring or early summer. Flowers are yellow-green, bell shaped, and grow in drooping clusters.



Black Birch

A medium sized (40-75 feet) flowering, deciduous tree. Individual trees can be long lived with some documented to be upwards of 350 years old. Black birches can produce many seeds and can quickly colonize recently disturbed open areas.

Leaves: simple, alternately branching leaves with finely toothed margins. The leaves are dark green and shiny, and their veins are distinct and parallel, stretching from the leaf's center to the margin.

Bark: young trees have smooth, dark, shiny bark with prominent horizontal stripes. Mature trees have rougher bark with deep fissures and scaly plates.

Seeds: found within small, cone-like structures that mature in late summer/fall. Seeds are very small with tiny wings to help with wind distribution.

Other features: Twigs give off wintergreen scent when broken. Leaves turn bright yellow in the fall.



Gray Birch

A small, flowering, deciduous tree. Gray birch typically reach 20 to 30 feet in height. These are fast growing trees that are one of the first species to colonize open, disturbed sites and prefer dry sites with full sun.

Leaves: simple, alternately branching leaves that are triangular in shape with sharply pointed tips. The margins are doubly serrated, and the bottom of each leaf is slightly paler in color than the tops.

Bark: Chalky-white to gray, smooth, and does not peel. There are typically black, triangular patches where branches join the trunk.

Seeds: Fall from cone-like structures in late autumn and winter. Seeds are very small and flat with two wings that aid in wind dispersal.

Other characteristics: They typically grow in clumps with multiple stems.



Eastern Serviceberry

A flowering, deciduous small understory tree or shrub. Eastern Serviceberry typically grows 15 to 30 feet tall. They are often found growing in wetlands, lowlands, and thickets. They are an important wildlife tree, benefiting pollinators in early spring and birds in summer when their fruit ripens.

Leaves: Simple, alternately branching leaves which are oval in shape with finely serrate edges. Young leaves may be hairy, while mature leaves are dark green occasionally with a purplish tint.

Bark: Smooth and gray with vertical streaks. On older trees, bark on the lower trunk may flake slightly

Seeds: Small berry-like fruit that ripens from red to a dark purple in early summer.

Other characteristics: Often grows in multi-stemmed clumps. Flowers in early spring with white, fragrant, multi petaled flowers.



American Larch

A characteristically deciduous, conifer tree. Often found in bogs, fens, and wetland areas. They range from 50 to 75 feet in height, but trees growing in wet areas are often much smaller and grow more slowly due to low nutrient availability in these environments.

Leaves: short ($\frac{1}{2}$ long) needles grow in clumps of up to 30. Needles are bright green in spring, and turn bright yellow in fall before the tree drops them for winter months.

Bark: reddish-brown to scaly, may be flaky.

Seeds: contained within small ($\frac{1}{2}$ long), egg shaped cones. Cones are pinkish in color when young but mature to brown, and they remain on the tree for several years after the seeds are distributed.

Other characteristics: Trees often have a conical or pyramidal shape.

