

Topic 2. Woody Plant Recognition

More than any other group of organisms, woody plants shape our outdoor environment. Woods and forests, in turn, are shaped by their physical environment. The trees we find at a site are determined by various factors such as seasonal temperatures, rainfall, soils, and disturbances such as fire. A seed source is also necessary for a tree to colonize a site. By recognizing the trees in a forest, a keen observer can discern much about the climate and the past history of that location. In this activity, we ask that you learn the genus names of eighteen common woody plants that dominate sites on campus. We will begin by keying out each example using the field guide from our last lab. You will then consider each example noting the unique set of morphological characters for each genus.

Web Resources for Review at http://botit.botany.wisc.edu/botany_130/trees

1. *Quercus* (Oak)

There are well over a hundred species of oak. Their fruit is an **acorn**. Most, but not all, oaks have **pinnately veined and lobed leaves**. All oaks in Dane County are trees with pinnately veined and lobed leaves. Two groups are represented in Wisconsin. The **white oak group** has rounded lobes. The **black oak group** has bristle tipped lobes. Examples of the white oak group that you may encounter, are bur oak (*Q. macrocarpa*), and white oak (*Q. alba*); and, from the black oak group, black oak (*Q. velutina*) or northern red oak (*Q. borealis*).

Oaks are important members of the Wisconsin woodland and savannah communities. Their acorns are an important source of food for squirrels, deer and wild turkeys. Oak wood is hard and dense, and is excellent for furniture. There is a direct relationship between a wood's density and how much heat is released when burned, so oak, with its dense fiber-rich wood, has the reputation of being the best firewood available.



White Oak Leaf

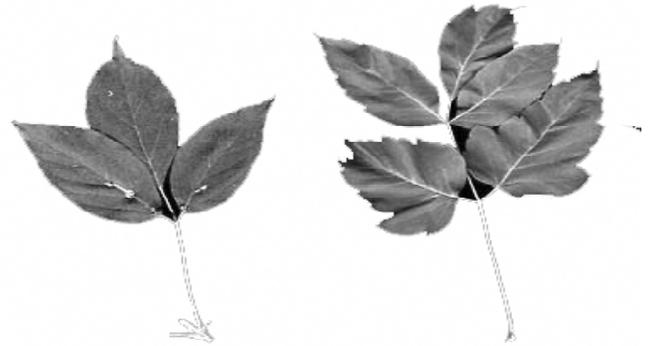
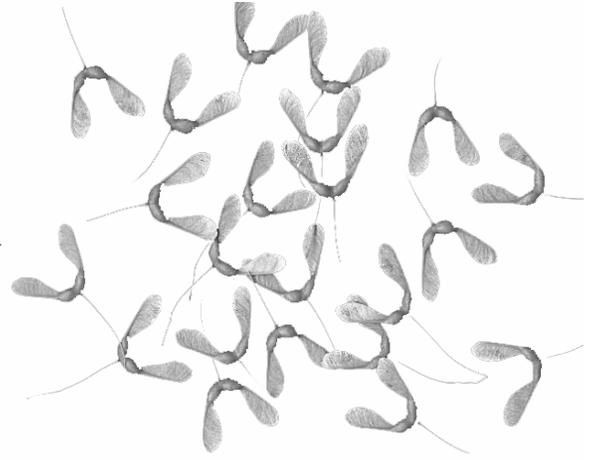
Character Set for *Quercus*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, pinnately veined and lobed	Alternate, but nodes are clustered at the tip of the twig	Tree that bears acorns

2. *Acer* (Maples and Box Elder)

Maples all have opposite leaves and winged fruits. Typically, like the sugar maple leaf on the Canadian flag, they have simple, palmately veined and lobed leaves. One important species on campus, however, box elder (*Acer negundo*), has compound leaves. These are either three parted like clover, or else pinnately compound. Both types of leaves can be found on the same branch. Box elder can be distinguished from ash (*Fraxinus*) as box elder's leafy twigs are grass green. Also, box elder leaves rarely have more than five leaflets where ash typically has more than five.

Sugar maple (*A. saccharum*), Norway maple (*A. platanoides*), silver maple (*A. saccharinum*) and box elder are common on campus. Sugar maple is a native woodland species with hard dense wood suited for furniture. Its wood is often called 'hard' maple. It is also economically important for the sap collected each spring used to make maple syrup. Silver maple is typically found in wet environments such as along river banks. Its wood is soft and has little or no commercial value. Norway maple, as the name denotes, is not a native species. It is planted all over campus as a street tree. Unlike sugar maple, these trees grow quickly, but, because their wood is soft, break down easily. Older trees frequently must be removed for safety considerations. Box elder is a native species that thrives in moist or wet environments. It is extremely prolific and difficult to kill. If you cut a tree down it will simply grow new spouts and regenerate itself.



Box Elder Leaves



Sugar Maple

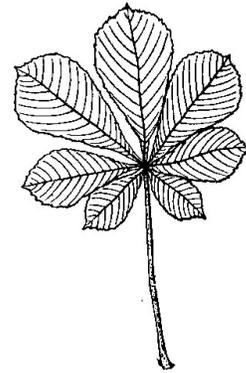
Character Set for *Acer*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, palmately veined and lobed (Maples), or trifoliate and pinnately compound (Box Elder)	Opposite	Trees that bear winged, helicopter-like fruits

3. *Aesculus* (Horse-chestnut and Buckeye)

Members of the genus, *Aesculus*, have oppositely arranged, palmately compound leaves. The genus includes native buckeyes (Ohio and yellow), but these are not planted on campus. On campus you will find two species of non-native buckeyes, horse-chestnut (*A.*

Hippocastanum) native to the Balkans, and bottlebrush buckeye (*A. parviflora.*) native to the southeastern United States. Horse chestnut grows into a handsome tree, and has showy flowers in the spring. Bottlebrush buckeye is a shrub. A mass planting exists along the steps on the west side of Birge hall. It also has showy flowers. It spreads vegetatively to form clumps.



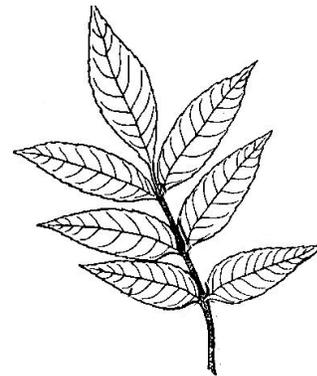
Character Set for *Aesculus*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Palmately compound	Opposite	Tree(Horse-chestnut Ohio buckeye) or shrub (Bottlebrush buckeye)

4. *Fraxinus* (Ash)

Ashes have oppositely arranged, pinnately compound leaves. Green ash (*F. pennsylvanica*) and the less common, white ash (*F. americana*) are important members of Wisconsin's woodland community. Ash wood is light and strong which makes it good for making baseball bats, and tool handles. On campus, both green and white ash are common. Green ash is one of the most common trees in Bascom Woods.

Fraxinus can be distinguished from box elder as its leafy twigs are grey. Further, ash has a well developed conical apical bud and, generally, the leaves have more than five leaflets. Ash fruits are winged, but are quite different from the helicopter-like maple fruits of box elder. Tragically, an introduced beetle species, the emerald ash borer, seems fated to wipe out all our native ash species. Trees in both Michigan and Ohio are already effected and the pest has recently been found in Wisconsin.



Green Ash

Character Set

Leaf	Leaf Arrangement	Habit/Distinctive characters
Pinnately compound, usually with more than 5 leaflets	Opposite	Tree/ Twigs are gray with a well developed apical bud/ Fruits are winged

5. *Carya* (Hickory)

Carya includes hickory trees and pecans. All members of the genus have alternately arranged, pinnately compound leaves. Two species are native to Wisconsin, shagbark hickory (*C. ovata*), and bitternut hickory (*C. cordiformis*). Both are on campus but shagbark hickory is more common. Hickories are important woodland species, and are an important source of food for wildlife. The tree, in turn, is dependent on squirrels to disperse its seed. The wood is tough and durable and used to make handles for garden tools. When burned in a grill or smokehouse, the wood imparts a distinctive flavor to meat.



Shagbark Hickory

Character Set

Leaf	Leaf Arrangement	Habit/Distinctive characters
Pinnately compound	Alternate	Tree, shagbark hickory has a distinctive bark and sweet nuts.

6. *Lonicera* (Honeysuckle)

The genus, *Lonicera* includes both woody vines and shrubs. The examples on campus are all shrubs. These are a product of hybridization between various non-native species that were originally planted as ornamentals. Honeysuckle produces red berries that are eaten by birds which spread seeds everywhere. Honeysuckle is a pest that displaces native, more desirable species.



Honeysuckle

Character Set

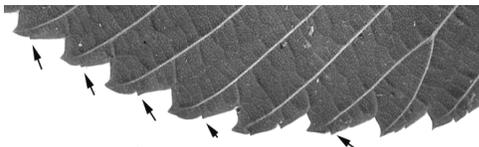
Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, pinnately veined with entire margins	Opposite	Shrub/has axillary red fruits

7. *Ulmus* (Elm)

Bascom Hill has numerous large American elm trees (*U. americana*). These were a common sight on campuses and in small towns until the middle of the last century. Since then, American elm has suffered a huge die-off due to the introduced fungal disease, **Dutch Elm Disease**. The trees on Bascom Hill survive only because heroic measures are made to ensure their survival. As they die, they are being replaced with other trees that require less maintenance. The enjoyment we get from these trees is bittersweet as your grandchildren won't enjoy the experience. Elm can be distinguished from *Tilia* as the leaves are more narrow and the margins are doubly toothed. The trees on Bascom Woods produce seed profusely and young trees are common in the woods on campus.



Elm



Leaf Margin of Elm

Character Set for *Ulmus*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, pinnately veined, doubly toothed margin	Alternate	Tree with asymmetric leaves and winged fruits

8. *Tilia* (Basswood and Linden)

Basswood, *Tilia americana*, is an important woodland species here in Wisconsin. It can be found growing naturally in the woods on campus. In this class, we will study sections of basswood stems and roots to learn about how trees grow in girth. The name basswood is derived from **bast wood**. Bast are plant fibers harvested in the production of rope. As you will see later, the bark of the tree is rich in fibers and indeed was used for rope production. Little leaf linden, (*Tilia cordiformis*), a European species, is commonly planted as a street tree on campus. Basswood has bee pollinated flowers, and honey made from its nectar commands a higher price.



Like *Ulmus*, *Tilia* has simple, toothed, asymmetrical leaves, that are alternately arranged. The leaves, however, are much broader than those of elm and the margins are not doubly toothed.

Character Set of *Tilia*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, pinnately veined, asymmetrical, toothed margin	Alternate	Tree often with suckers at the base/ fruits born on shoots with bracts/ buds lack a terminal bud.

9. *Betula* (Birch)

All birches have distinctive bark. Paper birch and river birch are planted extensively in suburban settings. Both occur naturally in Northern Wisconsin. Paper birch is a disturbance species. Much of the regrowth forests of the northern Wisconsin forest after logging in the nineteenth century, were almost pure stands of paper birch. This is a short-lived tree which cannot reproduce in the deep shade of an old forest. In contrast to paper birch, yellow birch, along with sugar maple and hemlock, dominate the Northern Mesic Forest of Northern Wisconsin. This species can reproduce in deep shade.



Yellow Birch Bough with Dwarf Shoots



Paper Birch

Like *Ulmus*, *Betula* has simple, toothed, asymmetrical leaves that are alternately arranged. The trees bear dwarf shoots, and each species has its own distinctive bark.

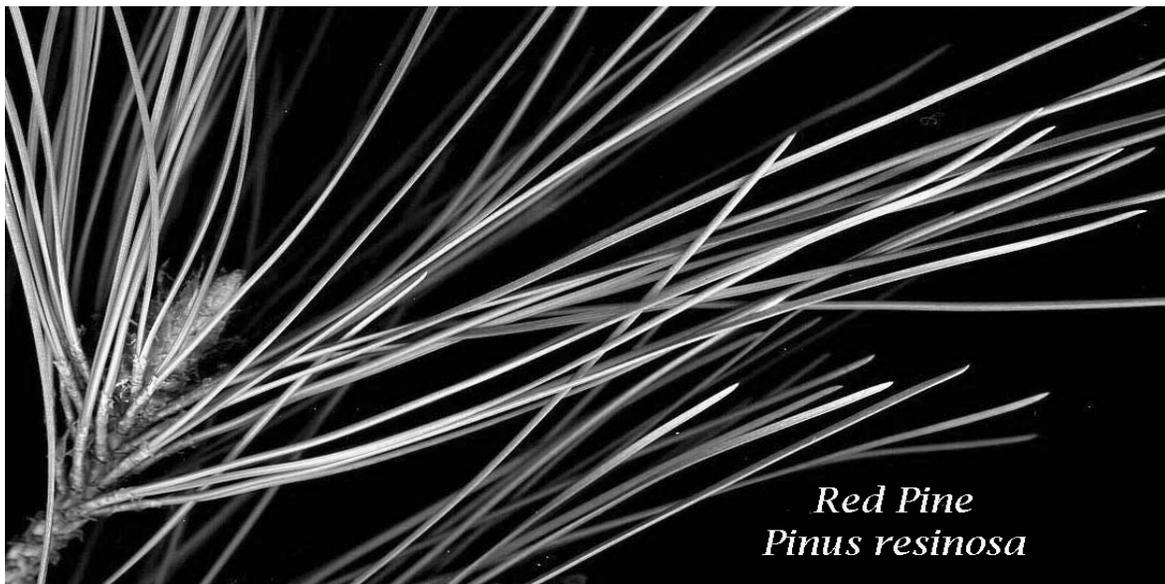
Character Set of *Betula*

Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple, pinnately veined, doubly toothed margin	Alternate	Trees with distinctive peeling bark/ branches with spur shoots

10. *Pinus* (Pine)

Pine is an evergreen conifer with needle-like leaves. Pine is unique among the conifers in that its leaves are all born in fascicles which are in reality little dwarf branches. There are two groups of pine, hard pines and the soft pines. Hard pines have two or three leaves per fascicle and includes red, scotch and jack pines. We only have one species of soft pine in Wisconsin and that is White pine (*Pinus strobus*).

No pine is shade tolerant, and they all depend on disturbance to become established. However, pines can be long-lived. White pine can live up to four hundred years. The lumber industry in northern Wisconsin in the late nineteenth century was dependent on old growth stands of white pine. Much of this was shipped out west to build towns such as Dodge City, Tombstone and Deadwood. Not surprisingly this industry has collapsed as four-hundred year old trees are not really renewable from a human cultural perspective. The same fate awaits the lumbering industry in the Pacific Northwest as it depends on ancient trees which may have more value if left alone.



Character Set of *Pinus*

Leaf	Leaf Arrangement	Habit
Needle-like	born in fascicles of two to seven leaves	Pyramidal-shaped Trees

11. *Celtis* (Hackberry)

Celtis occidentalis is common in the woods on campus. Like elm, the leaves are simple, pinnately veined and alternately arranged, with toothed margins. Unlike elm, hackberry (*C. occidentalis*) leaves have a long tapered tip. The bark is warty, and the twig zig zags between internodes. The leaf margins have simple teeth



Character Set - *Celtis*

Leaf	Leaf Arrangement	Habit/ Distinctive characters
Simple leaves, pinnately veined,, toothed, Tapered tip	Alternate	Tree/Warty bark/ Twig forms zig zags between nodes.

12. *Populus* (Poplar)

Populus includes cottonwood (*P. deltoides*), and quaking aspen (*P. tremuloides*). The leaves are simple, pinnately veined and alternately arranged with toothed margins. The petioles are flattened and this is a good distinguishing character as this can be discerned by rolling the petiole between two fingers. Poplars have distinctive tapered buds, and a distinctive white bark similar to paper birch. Older trees have deeply furrowed bark. Poplars tend to form shoots from their root systems and one tree can generate a large clump. It is economically important as a source of wood pulp in Wisconsin. After clear-cutting, a poplar woods will regenerate itself. Poplar wood is weak. Cottonwoods will grow to immense size only to collapse under their own weight. The genus is uncommon on campus but extremely common along stream banks and lake shores in Dane county.

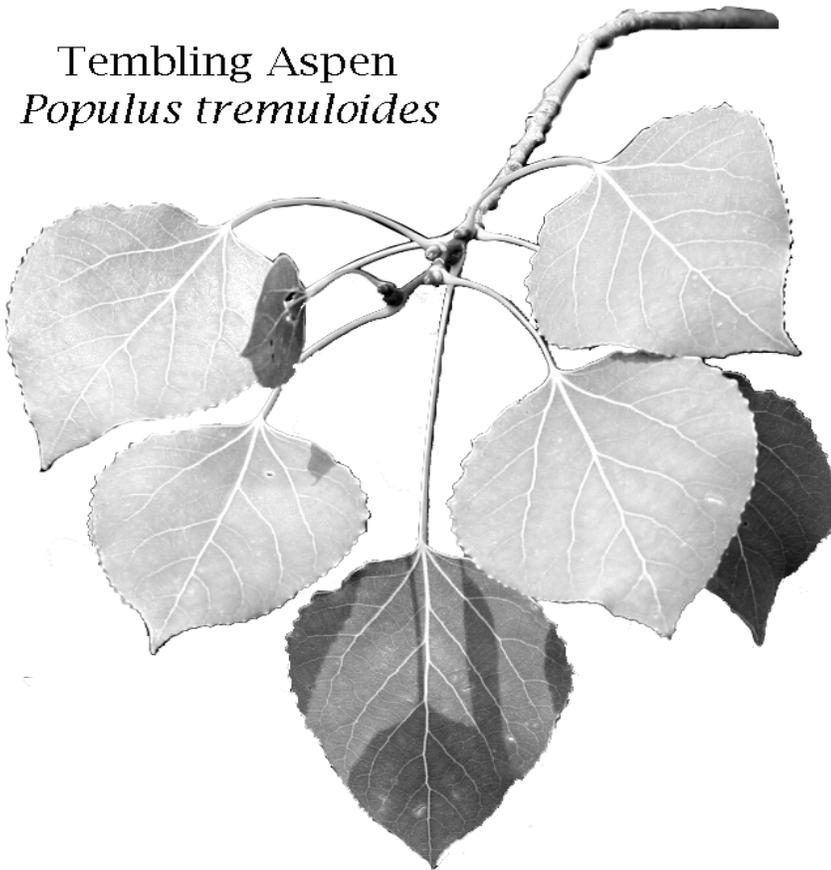


Populus deltoides

Character Set - *Populus*

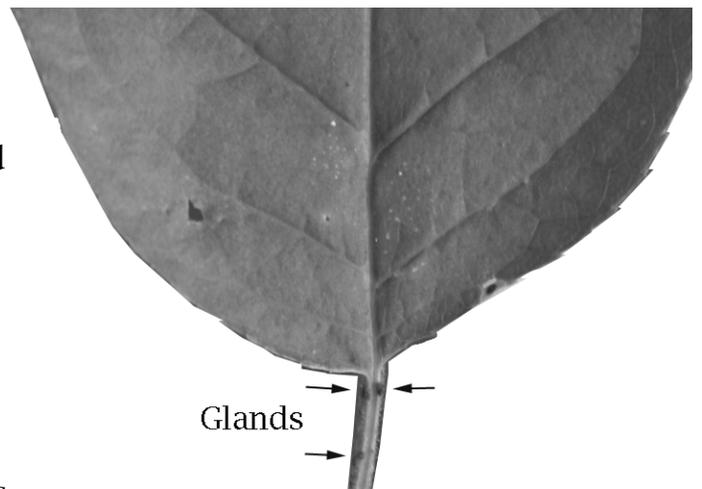
Leaf	Leaf Arrangement	Habit/Distinctive characters
Simple triangular leaves, pinnately veined, toothed, tapered tip	Alternate	Tree/White bark when young furrowed when old/ Tends to form clumps/flattened petioles

Tembling Aspen
Populus tremuloides



13. *Prunus* (Cherry or plum)

Prunus is a large genus that includes cherries, plums, peaches, and almonds. Three common species in Wisconsin are black cherry (*Prunus serotina*), choke cherry (*Prunus virginiana*), and wild plum (*Prunus americana*). The leaves are simple, pinnately veined and alternately arranged, with toothed margins. Twigs when crushed may smell of almonds. The best field character, for native species, is that they all have small glands on the petiole just below the blade. Black cherry is a disturbance species. It has edible fruits that are dispersed by birds and can spread quickly to sites when openings are generated. It cannot reproduce in woodland shade and depends on disturbances



for survival. Black cherry has beautiful wood that is economically important for furniture. It has a distinctive scaly bark. Chokecherry grows as a large shrub or small tree and is a smaller version of black cherry. Wild plum forms shoots from its roots and one plant will spread to form a large clump. Its fruits are edible.

Character Set - *Prunus*

Leaf	Leaf Arrangement	Habit
Simple leaves, pinnately veined,, toothed, petioles with two small glands	Alternate	Black cherry is a tree with distinctive scaly bark/ chokecherry is a large shrub/ Wild plum is a shrub that forms large clumps



Black Cherry

14. *Morus* (White Mulberry)

Morus alba (white mulberry) is not a native species, but has a long history in North America. The species was introduced as early as 1733 in Georgia to encourage the establishment of a silk industry in the colony. Mulberry leaves are an indispensable food for silk worm larvae. The trees are now widespread and constitute somewhat of a weed both on and off campus. In the summer, the female trees bear purple fruit that are enjoyed by birds but not car owners. The leaves are toothed and alternately arranged. Leaf morphology is highly variable. The same tree will bear leaves with no lobes, one lobe or three lobes. The one distinguishing feature is that all leaves are palmately veined in that they have three major veins emanating from the juncture with the petiole. Otherwise their leaves appear pinnately veined.



White Mulberry

Character Set

Leaf	Leaf Arrangement	Habit
Simple, toothed, Some leaves are lobed, three veins emanating from petiole	Alternate	Tree

15. *Vitis* (Grape)

Vitis riparia, the river bank grape, is extremely common on campus. Like all grapes, it is a vine with simple leaves that are palmately veined and lobed, and alternately arranged on the stem. Unlike Boston Ivy (*Parthenocyssidis tricuspidata*), grape leaves have finer teeth, and Boston ivy has only three lobes. The fruit is edible but contains more seed than pulp. The commercial grape of vintners of Europe and California is *Vitis vinifera*. The commercial slip-skin grapes such as Concord and Niagara are *Vitis labrusca*.



Character Set

Leaf	Leaf Arrangement	Habit
Simple, palmately lobed (variable), palmately veined, toothed margin	Alternate	Vine

16. *Parthenocissus* (Virginia Creeper/Boston Ivy)



Virginia Creeper



Boston Ivy

See the last page for another graphic.

True ivy is in the genus *Hedera* which isn't winter hardy here and cannot survive the winter. The ivy you see climbing on the walls and through the windows of Birge Hall is Boston ivy, *Parthenocissus tricuspidata*. This is the same vine climbing on the walls of Harvard and Yale and from which the name 'Ivy League' is derived. Boston ivy have simple palmately veined and tri-lobed leaves which are alternately arranged. It can be distinguished from *Vitis* as the leaf margins have coarser teeth and the leaves are clearly three-lobed (rarely you will find palmately compound leaves on this plant).

Virginia creeper (*P. quinquefolia*) is another species of *Parthenocissus* on campus. It is native and grows wild in Bascomb woods. *Parthenocissus quinquefolia* is a vine with palmately compound leaves that are oppositely arranged. While these are in the same family as grape, and have fruits similar to grape, their fruits are not edible.

Character Set *Parthenocissus*

Leaf	Leaf Arrangement	Habit
Palmately lobed simple leaves (Boston Ivy), or palmately compound (Virginia Creeper)	Alternate	Vine with roots used to cling to their substrate

17. *Robinia* (Black Locust)

Black locust (*R. pseudoacacia*) is a common tree along the boundaries of the woods on campus. It is highly invasive as it will form new shoots from the roots and tends to form clumps when grown in the open. It has pinnately compound leaves that are alternately arranged. It can be distinguished from hickory by the shape and number of its leaflets. Further, unlike hickory, the axillary buds are hidden by the petiole. The wood is dense, brittle and rot resistant. It is suited for fence posts and firewood. In the spring it flowers profusely and in the fall it bears numerous bean-pod like fruits (legumes).



Black Locust

Character Set of *Robinia*

Leaf	Leaf Arrangement	Habit
Pinnately Compound, buds are hidden by the petiole	Alternate	Tree, young growth frequently has thorns

18. *Rhamnus cathartica* (Buckthorne)

Buckthorne is an escaped cultivated shrub. It has seeds that birds distribute far and wide. It can be found all over campus.

Character Set of *Rhamnus*

Leaf	Leaf Arrangement	Habit
Simple leaves with a smooth margin	Alternate/opposite. Alternate but almost opposite.	Shrub, terminal growth with a thorn

Rhamnus cathartica - Buckthorne



Parthenocissus

