FirstEnergy® Compatible Species Handbook

Maintaining the Safe and Reliable Transmission of Energy
While Providing Enhanced Ecological Benefit
on FirstEnergy's Rights-of-Way

Privileged & Confidential

2023 Version 1

This Compatible Species Handbook was created by the FirstEnergy IVM Practices Team. February 2023

Our goal is to regularly update this guide to ensure it is as complete and useful as possible. Please share plant photos, additional compatible species suggestions, and other recommendations for future handbook revisions. Email support@growwithtrees.com with the subject line "FE Compatible Species Handbook."

Cover photo provided courtesy of Berks Nature

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About This Guide

Introduction

The purpose of this field guide is to provide FirstEnergy vegetation managers and contractors with information on Integrated Vegetation Management (IVM) and compatible species that, in addition to maintaining the safe and reliable transmission of energy, provide enhanced ecological benefit on FirstEnergy's rights-of-way.

Section I of this guide is intended to enhance specialist and work planner knowledge of IVM. Specifically, how IVM can contribute to enhanced ecological benefits on rights-of-way and how specialists and work planners can identify suitable locations for wire zone–border zones through use of a decision tree.

Section II is intended to help specialists, work planners, and VM crews identify potentially compatible vegetation in the field. Section II begins with an overview of leaf shapes and a key index designed to help users identify compatible vegetation. All compatible vegetation found within this guide is organized by leaf shape. The guide concludes with keys and identification materials for common compatible herbaceous plant families.

Note on Guide Completeness:

Compatible shrubs with a mature height over 15 feet are predominantly excluded from this guide due to border zone height restrictions. In some circumstances, and with permission from FirstEnergy Specialists, certain shrubs and small trees that exceed a mature height of 15 feet may be allowed within the border zone. See wire zone-border zone decision tree for more details on implementing wire zone-border zone outside of contractor specification.

Disclaimer

Compatible invasive species are not covered within this guide. Invasive species are often prolific seeders that produce large monocultures that do not provide enhanced ecological benefits. FirstEnergy does not favor the use of invasive species for biological control on its rights-of-way, but in many instances where off-right-of-way populations make invasive management impractical, their presence may be tolerated. Noxious weeds, on the other hand, are regulated by federal and state laws and must be addressed. Links to invasive and noxious weed information are provided to contractors on external FTPs. Please refer to the FTPs to educate yourself on all applicable species and laws that apply to your service territory.

Section I

IVM and Control Methods

Integrated Vegetation Management (IVM) is a system of managing plant communities in which compatible and incompatible vegetation are identified, action thresholds are considered, treatment methods are evaluated, and selected treatments are implemented to achieve specific objectives.[1]

Over time, when vegetation managers incorporate planning for both incompatible vegetation, plants that are inconsistent with management objectives, and compatible vegetation, plants that are consistent with management objectives (see Photo 1), Integrated Habitat Management (IHM) may result. IHM leads to enhanced ecological benefits that provide habitat value for important wildlife species. IVM defines five methods for controlling incompatible vegetation and promoting compatible vegetation.

Photo 1

Compatible Vegetation

Biological Control Methods involve establishment and conservation of compatible, stable plant communities using competition, allelopathy, animals, insects, or pathogens (see Photo 2). Prescribed Fire Control Methods involve the planned, controlled use of fire to meet management objectives. Cultural Control Methods are land uses that preclude the growth of incompatible vegetation; for example, agricultural systems such as crops and pastures, parks, and other managed landscapes.

Photo 2

Biological Control Method

[1] ANSI A300 (Part 7) - 2018 Integrated Vegetation Management Standard

Photo 3

Chemical Control Method

Chemical Control Methods manage incompatible vegetation using herbicides or plant growth regulators (see Photo 3). Chemical control methods are generally divided into two classes: broadcast and individual stem.

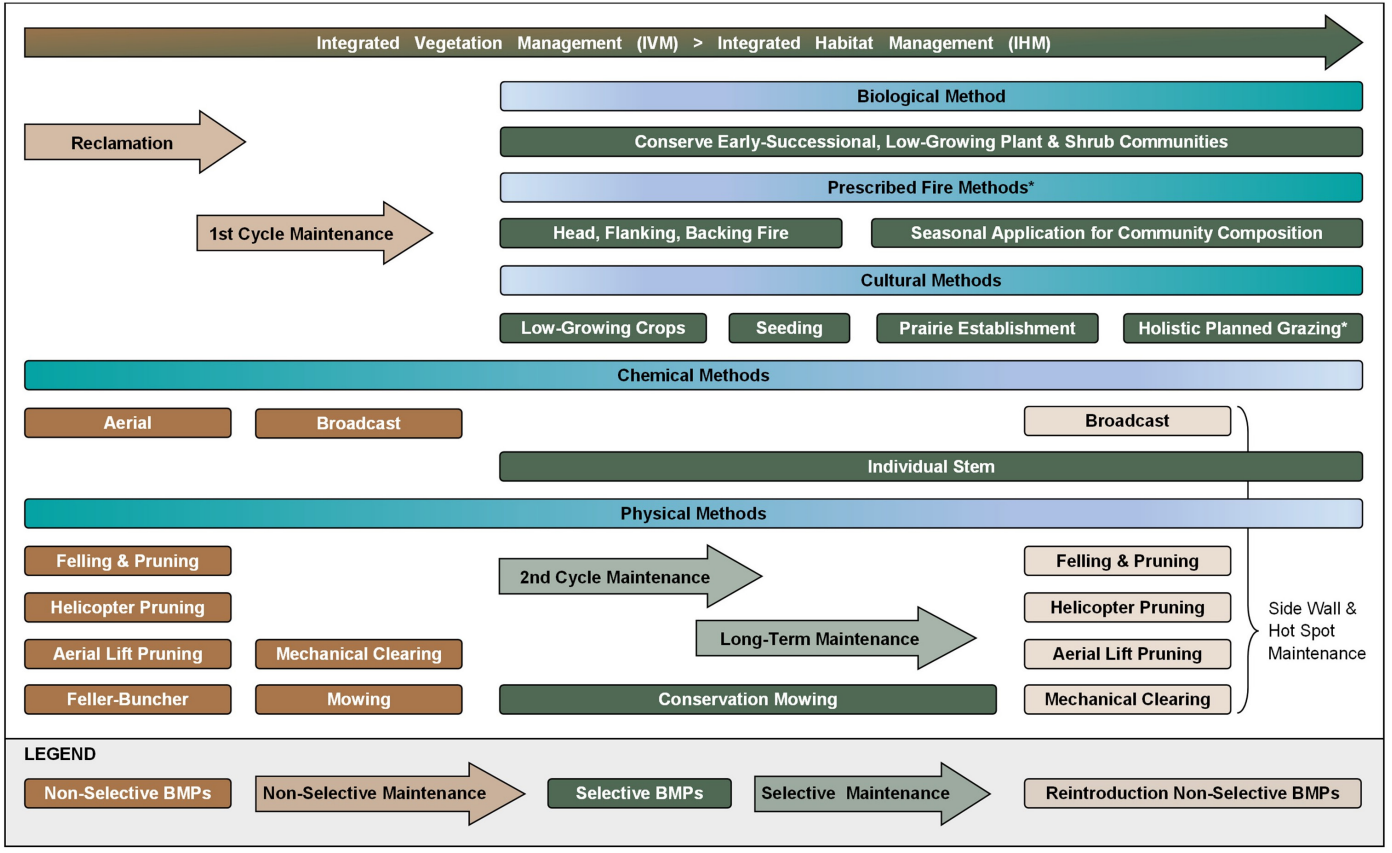
And finally, Physical Control Methods may discourage incompatible growth, and they may also stimulate compatible coverage (see Photo 4). Physical control methods are divided into two classes: manual, use of hand-operated tools, such as handsaws and small power tools, and mechanical, use of equipment-mounted saws and mowers.

Photo 4

Physical Control Method

Figure 1 depicts IVM/IHM through time from initial reclamation activities that include nonselective best management practices (BMPs) such as broadcast herbicides, felling, pruning, and brushing. Initial reclamation and first cycle maintenance may rely heavily on nonselective BMPs. Over time, nonselective BMPs give way to a greater variety of selective BMPs that include individual stem herbicide treatments and prairie establishment that promote biological control, or the conservation of compatible early-successional, low-growing plant communities.

Figure 1 Integrated Vegetation Management Through Time: Reclamation to Integrated Habitat Management



*FirstEnergy does not currently implement prescribed fire or holistic planned grazing

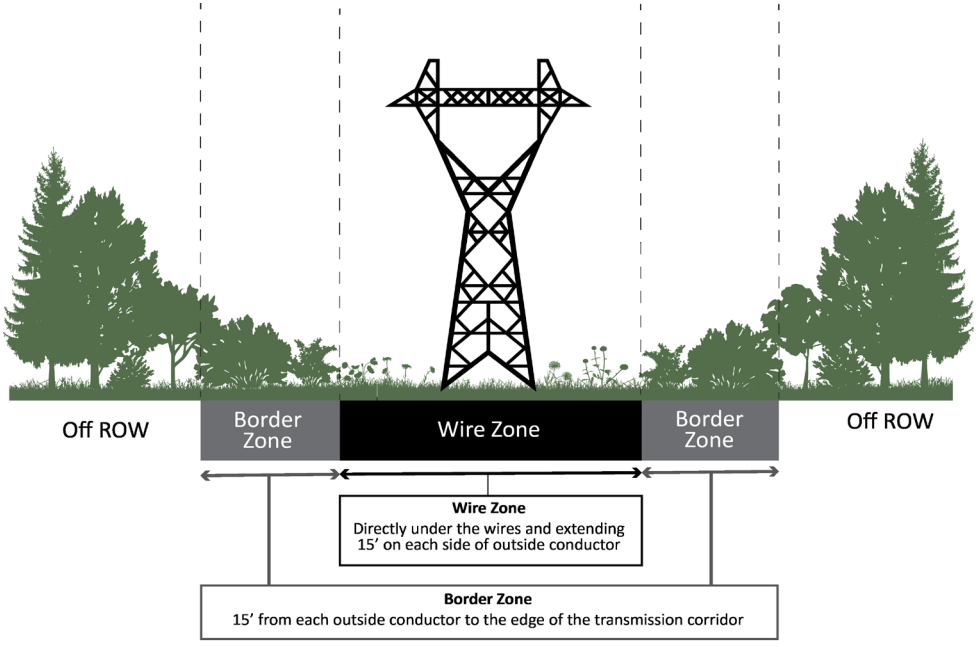
Wire Zone–Border Zone

Wire Zone–Border Zone (WZBZ) is a management practice often prescribed to promote biological control on electric transmission rights-of-way. WZBZs divide an electric right-of-way into three zones: two* border zones and one wire zone. These two unique areas are defined below and depicted in Figure 2:

Wire Zone – section of a utility transmission corridor directly under the wires, and extending to 15 feet on each side of the wires.[2]

Border Zone – section of a utility transmission corridor that extends from 15 feet outside the wires to the right-of-way edge.[2]

Figure 2 Wire Zone-Border Zone Diagram



*In some cases, as with roadside and shared ROW, only one border zone may be present.

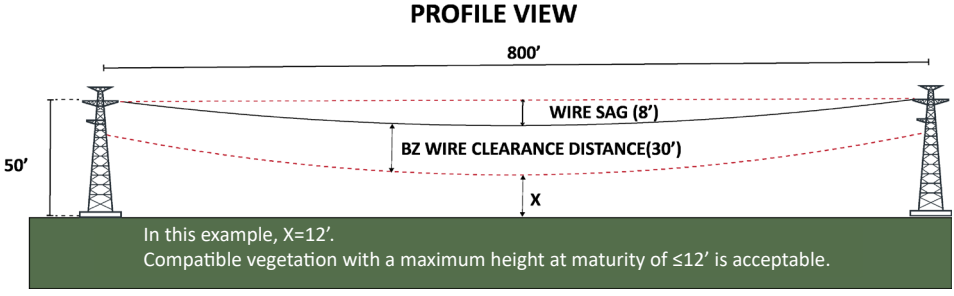
[2] FE TVM Contractor Specification 2017_FinalV3 (always refer to most current version of contractor specifications)

Compatible wire zone plant communities include low-growing grasses, forbs, ferns and, if feasible, very low-growing shrubs (3 to 5 feet tall). Compatible border zone vegetation includes grasses, forbs, ferns, and low- to medium- growing shrubs and small trees. According to contractor specification, border zone vegetation height should be kept at or below 15 feet. In most cases, managing for border zone vegetation that reaches a mature height of 15 feet or less would meet these criteria. In addition to border zone vegetation height, a minimum distance between vegetation canopy and wire must be maintained. See Table 1 for specifications that define border zone wire clearance by voltage. See Figure 3 for an example of Table 1.

Table 1 Border Zone Wire Clearance by Voltage

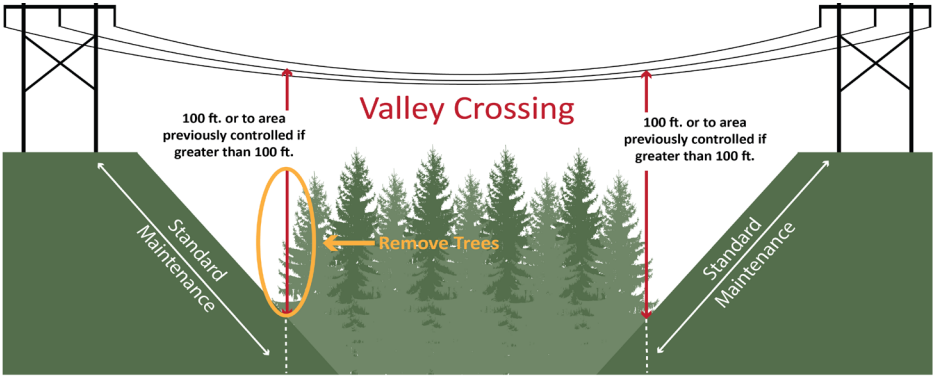
Voltage (kV)	Min. Distance (Feet) From Ground Up	Min. Distance (Feet) from Wire to Canopy	Communication
500 kV	Brush Conditions Meet Border Zone Wire Clearance, Brush Height ≤ 15'	Greater than 40'	None Required
345 kV		Greater than 30'	
230 kV		Greater than 30'	
138 kV & 115 kV		Greater than 25'	
69 kV		Greater than 15'	
500kV	Brush Conditions Meet Border Zone Wire Clearance; However, Brush Height > 15'	Greater than 40'	Consult with FE TVM Local Specialist
345kV		Greater than 30'	
230kV		Greater than 30'	
138 kV & 115 kV		Greater than 25'	
69 kV		Greater than 15'	

Figure 3 Example of Table 1 for a 230 kV line



FirstEnergy contractor specification states that WZBZs are only to be used on corridors 200 kV and above that have a minimum ROW width of 100 feet and under valley crossing conditions (see Figure 4). However, there may be additional locations that do not conform to specifications where WZBZs are appropriate; for example, rights-of-way that are less than 200 kV and less than 100 feet wide, provided that wire heights are sufficient to support low- to medium- growing shrub communities. Consult with your local FirstEnergy TVM Specialist for guidance when WZBZs would not conform to specifications.

Figure 4 Valley Crossing Diagram (As Observed)



When deciding whether WZBZs are appropriate within corridors and spans, it is important to consider landscape ecology, local habitat type (or potential vegetation), and local site productivity. These elements are described in greater detail in the next section, and a WZBZ decision tree is provided to assist in site-specific determination of WZBZ appropriateness.

For information about advanced WZBZ concepts, see Appendix 1.

The WZBZ decision tree provided in Figure 5 divides the decision process into two groups: pre-planning considerations and planning considerations.

Pre-Planning Considerations

Pre-planning considerations begin at the landscape level with an evaluation of landscape context (ecoregion) that a corridor is found within.

FirstEnergy's service territory spans five ecoregion provinces defined by Bailey (USDA Forest Service).[3] Figure 6 provides an overview of FirstEnergy's ecoregion provinces from west to east. They are: eastern broadleaf forest (continental), eastern broadleaf (oceanic), Laurentian mixed forest, central Appalachian broadleaf forest-coniferous forest-meadow, and southeastern mixed forest.

After considering landscape context, it is important to consider local habitat type (potential vegetation). For example, given site conditions, what is the climax community that this site can support (e.g., hardwood forest, pine forest, or shrubland/grassland). And finally, after local habitat type, estimates of span productivity help managers make span-specific determinations of species appropriateness.

Site index is an important forestry metric that helps managers understand average tree height and basal area for commercial timber species. Similarly, a site index value of productivity for compatible woody species (small trees and shrubs) has been estimated for FirstEnergy's rights-of-way. The span productivity index (SPI) was developed to assist vegetation managers evaluate TVM corridors and spans for expected maximum compatible woody vegetation height at maturity and level of community competition. SPI values are derived from a geospatial model that incorporates solar radiation hours, soil water accumulation from contributing uphill slopes, soil water-retention capacity, and soil fertility.

[3] Bailey, Robert G. 2016. Bailey's ecoregions and subregions of the United States, Puerto Rico, and the U.S. Virgin Islands. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0003

SPI values are low, low-medium, medium-high and high. Spans with high SPI values are most likely to demonstrate taller compatible vegetation heights at maturity, faster plant growth rates, and higher basal area values, while the opposite is expected for spans exhibiting low SPI values.

Two forms of the SPI model are available: (1) a span-level numerical value representing the average site productivity per span, and (2) a finer interspan productivity grid of 10 x 10 meters that can be used to evaluate site productivity variations within each span.

Planning Considerations

Planning considerations begin by identifying whether a border zone (BZ) is appropriate for the site or not. If a BZ is appropriate, the decision then splits between whether a BZ adheres to FirstEnergy contractor specifications or not. If not, a BZ may still be planned provided that work planners obtain permission from local FirstEnergy specialist. If BZs are not appropriate or permission to implement outside of contractor specification is not provided, then follow steps for wire zone (WZ) only. If BZ permission is obtained, then follow steps for both WZ and BZ.

Figure 5 Wire Zone-Border Zone Decision Tree

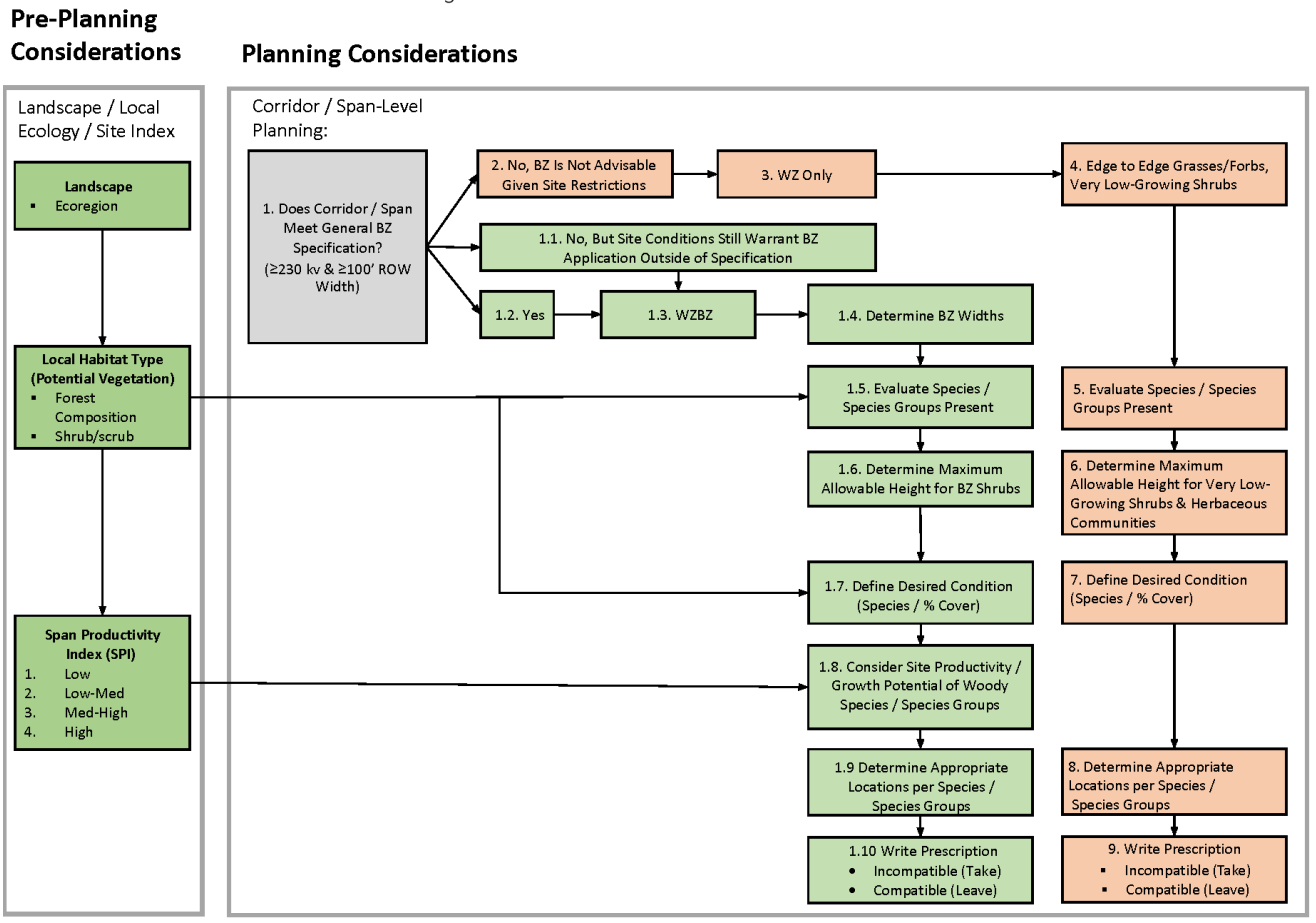
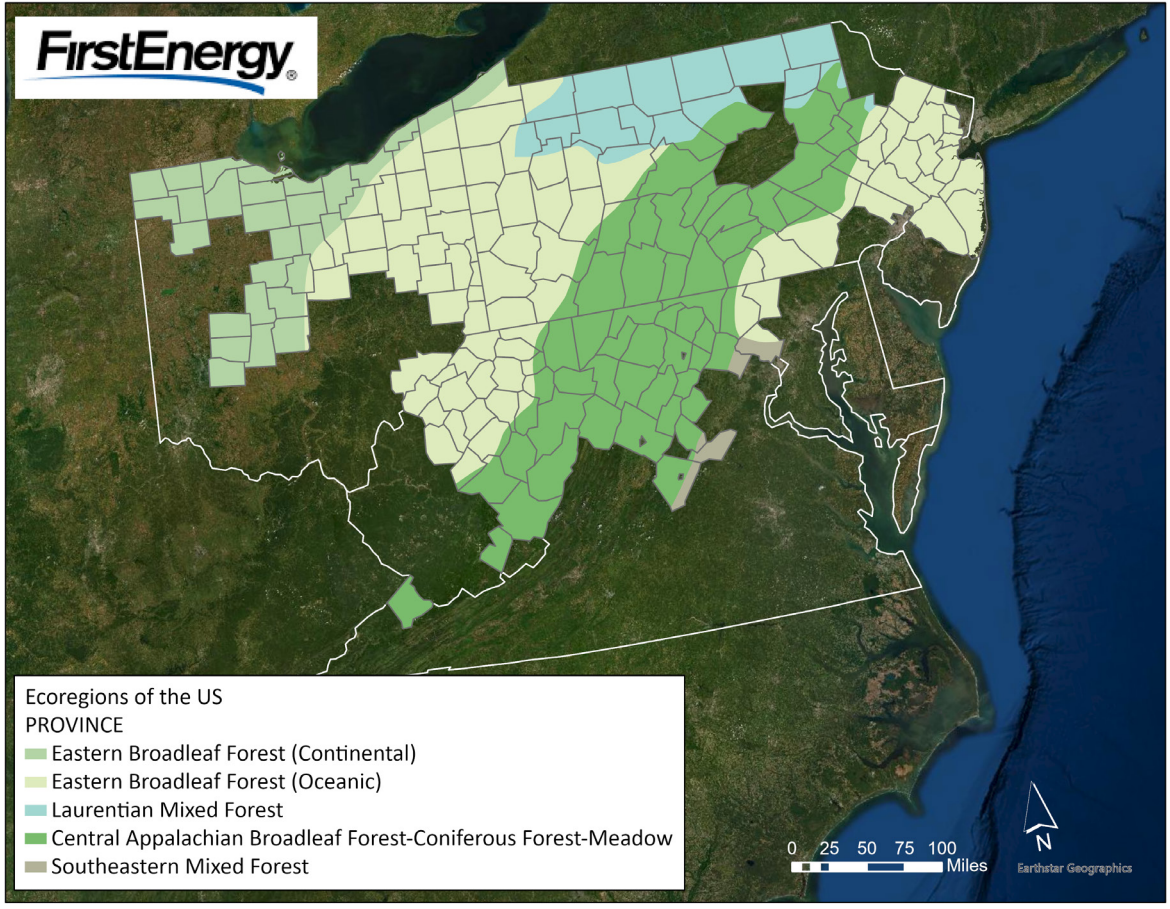


Figure 6 Ecoregion Provinces Across FirstEnergy's Service Territory



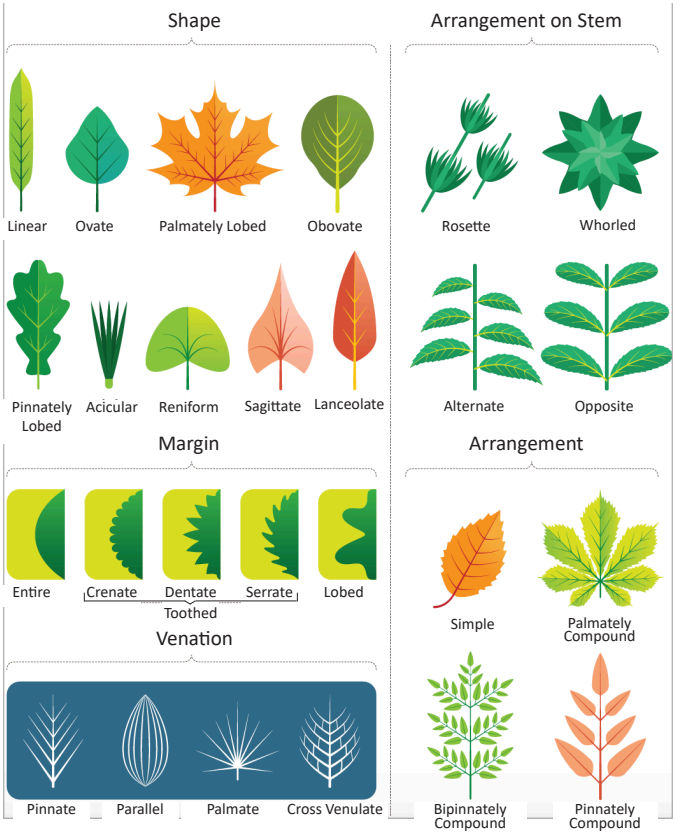
Section II

Compatible Woody Shrubs

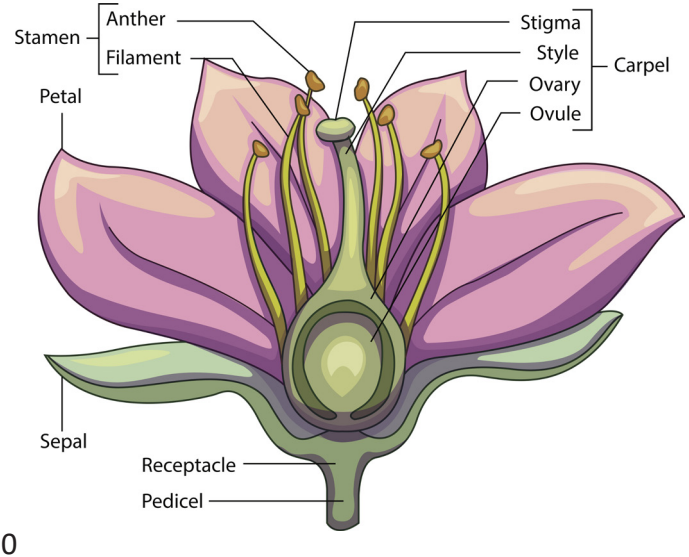
Shrubs, by definition, are perennial, multi-stemmed woody plants that typically reach a maximum height of less than 25 feet. Section II of this guide provides identification information for more than 40 low-growing shrubs that, in most cases, will not exceed FirstEnergy's contractor specification height of 15 feet at maturity.

Low-growing woody shrubs provide enhanced ecological benefit to wildlife species–browsing, and food and cover for mammals, birds and insects. Similar to compatible herbaceous plants, described in Section III of this guide, the presence of diverse low-growing shrub cover can hinder germination and growth of incompatible tall-growing woody species that are undesirable on rights-of-way. When located within border zones or effective border zones (see Appendix 2), many of the low-growing woody shrubs found within this guide will not breach FirstEnergy's target clearance distances. For these reasons, low-growing shrubs are a desirable component of FirstEnergy's vegetation management program.

Leaf Morphology + Parts of a Flower

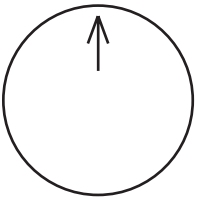


In this guide, compatible woody shrubs are grouped by leaf arrangement and margin. Familiarizing yourself with the following leaf morphology terms will assist in your plant identification skills.

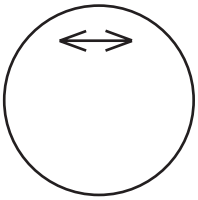


In this guide, compatible herbaceous plants are grouped by plant families. Familiarizing yourself with the parts of a flower will assist in your plant identification skills.

Symbol Index



Height



Spread

Host plant

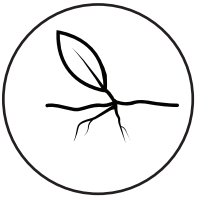
Browse mammals

Suitable for growth in the wire zone and the border zone.

Suitable for growth in the border zone. Caution in wire zone.

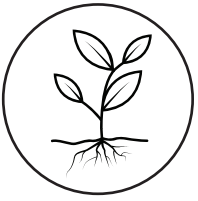
Suitable for growth in the border zone. Do not grow in wire zone.

Food source for birds

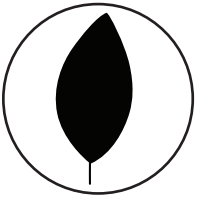


Slow growth rate

Medium growth rate



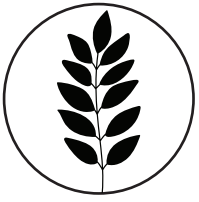
Fast growth rate



Entire leaves

Lobed leaves

Toothed leaves



Compound leaves

Table of Contents by Species

If you know the name of the species you are looking for, you can find it on this page. To identify a plant by leaf arrangement and margin, please refer to the Table of Contents by Leaf Arrangement and Margin on page 23.

Table of Contents by Leaf Arrangement and Margin

To use this table of contents: First determine whether your specimen has a simple or compound arrangement. If the arrangement is compound, go directly to that section below. If your leaf arrangement is simple, look at the margin of the leaf. Is it lobed, toothed, or entire? Refer to the chart on page 20 for more information about leaf taxonomy. To find a plant by maximum height, refer to Appendix 2.

Compound

a leaf of a plant consisting of several or many distinct parts (leaflets) joined to a single stem.

Lobed

a leaf having lobes or divisions extending less than halfway to the middle of the base.

Toothed

a leaf margin with a serrated or tooth-like edge.

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Entire

a leaf margin that has a smooth undivided outline.

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False Indigo Bush *(Amorpha fruticosa)*

Physical Description: Woody perennial that forms thickets of clonal plants. Spread is greater than height. Bark is thin and smooth, peeling easily. Brown to reddish with white lenticels.

Leaves: Leaves are compound and alternate. 11–25 leaflets per leaf. Leaves are oval and rounded at both ends. Olive to dark green. Margins are smooth.

Flowers: Narrow spiked clusters occurring at the ends of branching stems. Individual flowers are tubular and deep purple to reddish brown. Each tube is one rolled up petal. 10 yellow-tipped stamens extend past the petals. Blooms June–July. Very fragrant.

Fruit: Each flower produces a dry legume that splits to release small, smooth seeds.

Habitat: Found on wet ground along rivers, streams, ponds and ditches, and occasionally in open wet woods. Full sun preferred. Life span around 10 years.

Propagation: Spreads readily by suckers and seeds. Encouraged by some disturbance.

Additional Information: Indigo pigment can be used to make a blue dye. A Chinese folk remedy made from the roots for topical use was used on burns and eczema. Provides food for various butterfly caterpillars, including the silver spotted skipper and the gray hairstreak. Planted as windbreaks and to help prevent soil erosion.

Dormant Season Identification: Twigs brown to red with white lenticels. Alternate sessile buds have 2–3 scales whose edges meet or overlap.

WZ ✗
BZ ✓

4–12'

6–15'

Fragrant Sumac *(Rhus aromatica)*

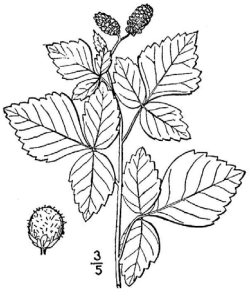
Other common names: Aromatic Sumac

Physical Description: Upright to rambling dense stemmed deciduous shrub. Dioecious, separate male and female plants. Leaves and twigs aromatic when rubbed. Spread is greater than height.
Caution: Look-alikes include poison oak and poison ivy (both toxic).

Leaves: Alternate arrangement. Trifoliate leaflets on very short to no stalks. Margin smooth at base and widely toothed from middle to tips. Orange to reddish purple color in autumn.

Flowers: Appear before leaf-out in the spring at the terminal ends of branches. Female flowers occur in short, spiked clusters. Blooms late April through late May. Male catkins persist through winter.

Fruit: Bright red and densely hairy. Flesh chalky with a center drupe or stone seed. Fruit persist through winter, although losing color over time. Taste is astringent to tart. Fruiting begins early July through early September.

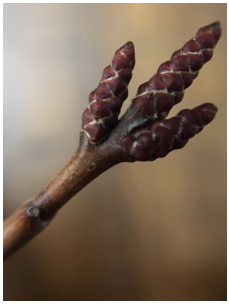


Habitat: Found on cliffs, balds, ledges, ridges, and woodlands. Adaptable to various soils, dry rocky or clay, but often found where soil is well drained. Drought and salt tolerant. Full sun to part shade. Life span 5–20 years.

Propagation: Can be spread through stem tip or root cuttings taken in summer to fall, seeds collected and planted in autumn, and layering of branches. Sprouts and forms small thickets within a few years following fire. Sprouting can occur 12–16 feet from original stem. Sprouting frequency is reduced by frequent disturbance.

Additional Information: Berries can be eaten raw or dried but are most popular as a tea or sumac-ade beverage, made as a cold infusion, sweetened and served hot or cold. Roots and shoots are also peeled and can be eaten raw during the spring. Provides cover and a food source for small mammals and birds. Flowers attract butterflies, luna moths and various pollinators.

Dormant Season Identification: Stems are gray to reddish brown and smooth overall. Twigs are highly branched, hairy and slender. Leaf scars are circular and conspicuously raised. Alternate leaf buds are sessile, naked, no scales. Terminal flower buds are longer and have many overlapping scales.



Rosa species

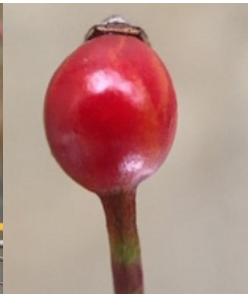
Meadow Rose *(R. blanda),* Swamp Rose *(R. palustris),*
Carolina Rose *(R. Carolinia),* Virginia Rose *(R. Virginiana)*

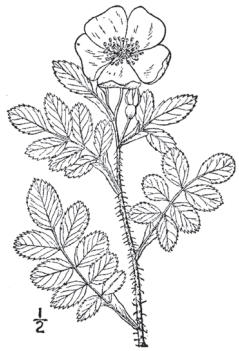
Physical Description: Broadly rounded to arching mounded multi-stemmed thicket-forming shrub. Moderately thorny in appearance. *Rosa blanda* is a smooth-stemmed rose, having larger thorns only near the base of stems and none on young twigs.
Caution: Look-alikes include multiflora rose (invasive).

Leaves: Alternate leaf arrangement, oddly pinnate, with 7–9 leaflets. Prominent stipules present below leaf attachment. Dark green in color, glabrous with toothed margins.

Flowers: Consist of 5 light to dark pink, round, separate, petals surrounded by 5 pointed sepals. Stamens are many. Flowers borne singly at the ends of branches. Bloom from late spring to early summer.

Fruit: Bright red hips containing many bristled seeds develop in early autumn and persist throughout winter. Flesh is dry and tart or astringent.





Habitat: Generally prefer well drained sites ranging from sandy to rocky to clay and loam soils. Roses can tolerate some shade but grow best in open, sunny locations. Can be found inhabiting disturbed areas, along roads and railways, meadows, fields, glades, pastures, open woods, and rocky slopes.

Propagation: Seeds planted in fall to winter germinate the following spring. Plants can be cloned by separating suckers attached to rhizomes and transplanted, or semi-hardwood cuttings can be stuck in the soil during dormancy. Long, arching stems can be layered. Vigorous sprouting occurs after cutting in fall or winter.

Additional Information: Hips are high in vitamin C, antioxidants, oils, and minerals. Traditional medicine to treat scurvy and infections and to aid in digestion. Hips can be collected in the fall and made into jams and jellies or brewed as tea. Larval host for various moths and butterflies. Hips provide winter food for birds. Roses provide nesting material for native bees and are of special value to bumblebees.

Dormant Season Identification: Twigs are reddish to brown and smooth textured. Two prominent thorns present below each bud. Often, hips will be present until late winter at twig ends. Leaf buds alternate, with three overlapping scales that are red and shiny.

Photos courtesy of Luke Poling

WZ ⚠
BZ ✓

+

3–6'

2–8'

Rubus species

Allegheny Blackberry (*R. allegheniensis*), Black Raspberry (*R. occidentalis*), Flowering Raspberry *(R. odoratus)*

Physical Description: Multi-stemmed brambles that form dense thickets of thorny canes. Erect canes arise from a central crown and curve back towards the ground, becoming trailing. Spread is greater than height.

Leaves: Alternate arrangement. Pinnately compound with 3–5 egg-shaped to oval leaflets that terminate at pointed tips. Margins are coarsely toothed. Color is lime to dark green with sparse hairs on top, and fuzzy and pale below. Leaflet midrib often has a few smaller thorns on undersides.

Flowers: 5 separate rounded petals of a white to pale pink color surround many stamens. Calyx of 5 green and pointed sepals. Flowers in clusters of 3 (raspberry species) up to 20 (blackberry species). Flower June–August.

Fruit: Juicy aggregate drupes that ripen in mid to late summer. Red or black berries full of tiny seeds. Taste tart when less ripe, gaining sweetness with maturity.

WZ ⚠
BZ ✓

Habitat: *Rubus* species like a moist well-drained spot but can tolerate drier conditions. Grows in a range of soil types, except clay. Prefers a sunny spot. Found in disturbed areas, along roadsides, upland forests and woodlands, boulder fields, rocky outcrops and bluffs, within thickets and fence rows, and can be found in old fields and open valleys.

+

3–6'

6–12'

Propagation: Spreads by rooting at the arching cane tips where they touch the ground. Branch tips can be layered to encourage dense colonies. Shoots along underground root runners can be separated from the mother plant for transplanting. Mowing or hand cutting older stems can stimulate cane production. Seeds are spread readily by foraging birds and mammals.

Additional Information: Fruits are high in vitamins, antioxidants, and natural sugars. Tea can be made from leaves and roots and has been used to treat coughs, toothaches, sore eyes, bowel complaints, and whooping cough. Rich nectar source for hummingbirds, butterflies, and bees, and fruits feed songbirds and mammals. Provides excellent cover for birds and small mammals. Good erosion control.

Dormant Season Identification: Smooth bark is green to brown red. Prominent thorns present along stem. In blackberry species, thorns have at least a slight curve, mostly straight in raspberry species. Buds are alternate, 4 scales finely fuzzy, often with dried-out crisp scales surrounding new bud.

Photo courtesy of Luke Poling

Sambucus species

Red Elderberry (*Sambucus racemosa),* Black Elderberry *(Sambucus canadensis)*

Physical Description: A multi-stemmed woody shrub that can form dense, isolated colonies. Sprawling canopy. Can be leggy in shady conditions. Overall appearance is smooth and knobby. **Caution: Look-alikes include devil's walking stick, poison sumac, pokeberries, water hemlock (all toxic).**

Leaves: Opposite arrangement on stems, 2 leaves per node. Pinnately compound with 5–9 odd-numbered leaflets. Leaflet shape is oblong-lanceolate to oblong-ovate with toothed margins. Dark glossy green and glabrous.

Flowers: Tiny 5-petaled white to cream-colored flowers are borne in large hanging intricately branched panicles in mid to late spring. Petals are fused at the base to make small tubes. 5 stamens align with the sepals. 1 pistil.

Fruit: Each flower produces a single fleshy drupe containing 3 small seeds in mid to late summer. Color can be red, black, or blue.

Habitat: Prefers moist, well-drained soils rich in organic matter in full to partial shade. An indicator species for productive soils. Tolerates a wide pH range, and can grow well in chalk, clay loam, or sandy soils. Can tolerate some flooding. Found in moist woodlands, thickets, along stream banks, in fields, fence rows, and roadsides. Lives up to 60 years.

Propagation: Heavy pruning encourages dense colony formation. Clones from second-year wood (with smooth gray bark) can be easily rooted any time of year. Seeds remain dormant for years. Germination is benefited by a period of cold stratification or scarification via fermentation.

Additional Information: Immunity-strengthening medicine and a rich wine can be made from the fruit. Fruits can also be eaten after cooking. Raw berries are slightly toxic to mammals. Fruits are popular for preparing jams, jellies, and pies. Flowers can be battered and fried by the cluster for eating. Flowers provide a good nectar and pollen source for bees and other pollinators.

Dormant Season Identification: Multiple stems from central base. Smooth gray outer bark when young. Inner pith is soft, spongy, and white in *S. canadensis*, and an orange brown in *S. racemosa*. Older branch bark becomes ridged in texture and thicker. All stems have raised whitish lenticels lending a bumpy appearance.

Photo courtesy of Robert Barbor

Smooth Sumac *(Rhus glabra)*

Physical Description: Dense spreading thickets are covered in big fern-like leaves. Smooth stems are upright.

Caution: Look-alikes include poison sumac (toxic).

Leaves: Alternate pinnately compound leaves with 15–25 leaflets. Leaflet margins are toothed, and their shape is oblong, with dark green upper surfaces and lighter and smooth below. Outstanding fall colors of orange to bright red.

Flowers: Male and female flowers on separate plants (dioecious). Terminal flower clusters. Yellow-green flowers appear in June and July. Flowers are star shaped, with 5 petals and 5 stamens surrounded by a 5-lobed calyx.

Fruit: Female plants produce scarlet red hairy dry-fleshed drupes on upright panicles that persist into winter. Each hairy drupe contains one seed.

Habitat: Common growing along roadsides, fence rows, fields, and prairies. Prefers dry sand to gravelly soils. Tolerates clay soils and salt conditions. Can be found in moist but not wet niches. Heat, drought, and fire tolerant. Life span is 5–20 years.

Propagation: Rootstock clones easy. Rhizomes can be severed from parent plant to produce clones. Softwood cuttings can be taken during dormancy. Seeds may be scattered in fall to winter. Mowing in early spring increases suckering response.

Additional Information: Leaves are a source of black ink. Wood can be used to obtain pigment for dyeing. Fruits persist long into winter when wild turkeys, mourning doves, and other birds rely on them for food. Deer, opossums, and quail also enjoy fruits. Nectar source for pollinators. Larval host to red-banded hairstreak. Has been used for roadside planting to stabilize soil erosion.

Dormant Season Identification: Persistent fruits turn maroon brown. Twig bark is wine red, smooth, hairless. Small, raised tan lenticels on twigs. Alternate sessile, smooth, naked buds have leaf scars that partially or completely surround them.

WZ ✗
BZ ✓

10–15'

10–15'

Winged Sumac *(Rhus copallinum)*

Other common names: Shining Sumac, Dwarf Sumac, Flameleaf Sumac

Photos courtesy of Luke Poling

Physical Description: Open shrub with many erect stems. Similar to smooth sumac, but leaflet margins are not toothed, and midribs have wings.

Caution: Look-alikes include poison sumac (toxic).

Leaves: Alternately arranged compound oddly pinnate leaves. Central leaf stalk is winged below the leaflets. 9–21 oblong to lanceolate leaflets with smooth margins, no teeth. Leaflets up to 4 inches long. Shiny dark green, slightly paler below. Leaves turn flame red in autumn.

Flowers: Tiny yellow-green flowers bloom in pyramidal panicles at branch ends from July to September. 5 petals, 5 stamens, and 1 pistil are surrounded by 5 fused sepals.

Fruit: Clusters of tiny red, hairy drupes containing a single seed. Flesh is dry. Often persists into winter.

Habitat: Grows on hillsides, in open woods, clearings, glades, fields, and along roads, railways, and disturbed areas. Prefers dry to medium sites and does not tolerate poorly drained soils. Can be found growing in partial shade to full sun.

Propagation: Woody suckering shrub that spreads by running rhizomes. Late winter or early spring coppicing or low mowing encourages suckering response. Softwood cuttings can be taken in dormancy. Seeds can be sown in fall to winter over coarse soils.

Additional Information: Astringent berries can be infused for a beverage high in vitamin C. The bark and leaves are high in tannins and have been used for tanning. Thickets provide cover for wildlife. Larval host for various butterflies and moths. Nectar source for pollinators. Fruits eaten by songbirds, deer, opossums, turkeys, and quail. Rabbits eat the bark. Helpful for erosion control.

Dormant Season Identification: Alternate sessile buds are naked and ringed by U-shaped leaf scar. Twig bark is smooth with tiny ring-shaped raised lenticels when young. Color is grayish tan to brownish red. Stem appears to zig-zag from alternate bud arrangement.

Photos courtesy of Luke Poling

WZ ✗
BZ ✓

7–15'

7–15'

Eastern Ninebark *(Physocarpus opulifolius)*

Other common names: Ninebark, Common Ninebark, Atlantic Ninebark

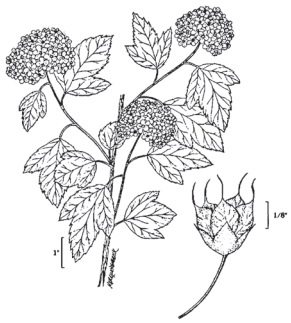
Physical Description: Erect to arching multi-stemmed woody shrub with dramatically exfoliating bark. Delicate branching is decorated with lacy white flowers and later by pink immature fruits.

Leaves: Alternately arranged, simple leaves are shallowly lobed, each having 3–5 lobes. Leaf blades are lance-oval to almost round in overall shape. Margins are coarsely toothed. Texture is smooth or sparsely covered with stellate (star-shaped) hairs on both surfaces. Upper blade is dark green, lower surface is lighter in color.

Flowers: Flowers occur on round to dome-shaped corymb clusters at branch tips of older stems. Individual flowers each have 5 free round white petals, 3–5 pistils with yellow styles, 30–40 spreading pink tipped stamens, and 5 triangular sepals. Bloom time is from May to June.

Fruit: Hanging clusters of inflated dry capsules (follicles). Color progresses from green to bright red before maturing brown and dry. Each flower produces a capsule fruit with 3–5 follicles, each containing one hard seed. Shiny seeds are light tan and somewhat resemble a teardrop.

WZ ✗
BZ ✓



Habitat: Full sun to partial shade, adaptable to many areas. Found growing along stream banks, rocky ledges, and moist thickets, as well as rocky open woodlands and rocky shorelines and bars. Prefers moist, well-drained clay to loam soils. Long lived, 20+ years.

6–10'

6–10'

Propagation: Dormant cutting close to ground level rejuvenates older shrubs. Suckers can be divided and transplanted during winter as well. Green softwood cutting can be rooted in springtime.

Additional Information: Used sparingly as medicine. Flowers are rich in nectar and attract many pollinators. Persistent capsules provide seeds for winter bird food. Dense habit provides cover for birds and small mammals. Older stems were used as arrow shafts by some Indigenous tribes.

Dormant Season Identification: Fruit capsules often persist through winter at branch tips. Grayish stem bark peels to reveal reddish color underneath. Bark hangs like paper strips from stem. Buds alternate, with 3 or more scales. Dry, thin sheaths surround buds at base.

Mapleleaf Viburnum *(Viburnum acerifolium)*

Other common names: Maple-Leaved Arrowwood, Dockmackie

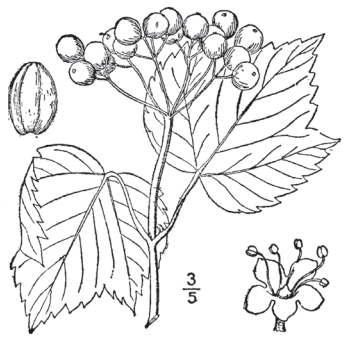
Physical Description: Small rounded woodland shrub with maple-like foliage.

No Image Available

Leaves: Opposite arrangement. 2 leaves per node. Simple maple like leaves: ovate to rounded, three lobed, with coarsely toothed margins. Leaves are dull green, fuzzy textured, with small black spots on lower surfaces. Reddish purple to magenta fall color.

Flowers: Tiny white flowers occur in long-stalked, flat-topped cymes. Each flower has 5 strongly extended stamens that stick out from a 4–5-lobed petal tube. A short green caylex surrounds the tube with 5 small, pointed tooth-like lobes. Late April to early May bloom time.

Fruit: Pea-sized fleshy drupe berries mature in late summer. Red fruits turn bluish black at maturity and persist through winter. Each drupe contains 1 seed.



Habitat: Mapleleaf viburnum is more shade tolerant than other viburnums. Prefers moist, acidic, well-drained soils. Fire, drought, and soil compaction tolerant. Long lived, 20+ years.

Propagation: Dormant-season pruning can encourage spread by rhizomes. Seeds can be sown from ripening to early spring.

Additional Information: Berries can be made into jam. Cherokee and Ojibwa made an infusion of twigs and leaves to relieve cramps and colic. Fruits eaten by a variety of birds. Leaves and twigs provide browse for deer. Dense habit provides cover for ground-nesting birds. Larval host for the spring azure butterfly and various moth caterpillars. Fragrant nectar source for bees, moths, flies, and butterflies.

Dormant Season Identification: Winter buds are covered with 4 purple scales that are sparsely pubescent. Buds are sessile, slightly curved, pointed, opposite, reddish colored, and subtended by 2 leaf scars. Buds curve towards the stem. 3 terminal buds common at stem tips. Twig bark is gray and slightly fuzzy, lacking lenticels.

No Image Available

WZ ⚠
BZ ✓

4–6'

2–6'

Missouri Gooseberry *(Ribes missouriense)*

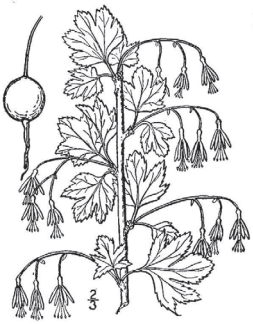
Other common names: Missouri Currant, Wild Gooseberry

Physical Description: Multi-stemmed shrub. Finely spiny in general appearance. Forms dense cane thickets with an arching canopy. Branch tips arch down towards the ground.

Leaves: Resemble the footprint of a goose. Alternate arrangement on stems. Rounded in general appearance with a flattened to heart-shaped leaf base and 3–5 palmate lobes. Venation also palmate. Leaf margins coarsely toothed. Lower leaf sides sometimes fuzzy.

Flowers: Bell shaped, pale yellow to greenish white. Flowers consist of 5 petals, surrounded by a 5 lobed, tubular and hairy calyx. Flowers occur in hanging clusters of 2 but can also hang with 1–4 flowers. Blooms from late March to May.

Fruit: Many-seeded juicy fruits. Smooth berries start green and ripen to reddish purple in color. Ripen around mid-summer.

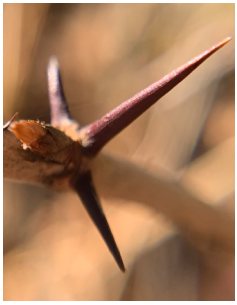


Habitat: Prefers rich, somewhat moist, well-drained clay or silt loams. Full sun to part shade. Found in dry rocky woods and woodland margins, fields, and pastures. Can be an indicator of heavily grazed or abused woodlands if found in abundance. Life span 10–25+ years.

Propagation: Softwood to semi-softwood cuttings taken in the dormant season can be rooted. Layering of branch tips encourages new roots to form, increasing patch density and spread. Spreads by seed dispersal by birds and mammals, and sowing seeds soon after fruit ripens. Benefits from dormant-season rejuvenation (i.e., pruning) every 4+ years.

Additional Information: Fruits can be eaten fresh or used to make tart juices, jams, and jellies or pie fillings. Fruits can also be dried for later use. Fruits are high in vitamin C and bioflavonoids. Berries provide food for various wildlife including bears, game birds, songbirds, rodents, deer, and cattle.

Dormant Season Identification: Young twigs lose most prickles and hairs by 2nd year. Winter twig bark is gray, thin, and peeling to reveal reddish color underneath. Buds alternate, with 3 or more overlapping scales. Below each bud are 1–3 long persistent spines.



WZ ⚠
BZ ✓

2–6'

2–4'

Sweet Fern *(Comptonia peregrina)*

Physical Description: A rounded deciduous shrub with strongly aromatic fern-like leaves. Forms multi-stemmed dense colonies.

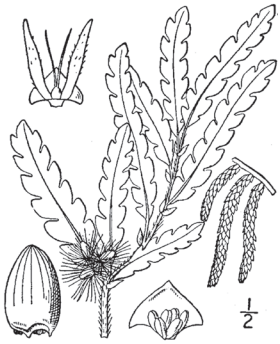
Leaves: Alternate arrangement, 1 leaf per node on short stalks. A pair of stipules at each leaf base forms a heart shape with a pointed tip. Simple, linear to oblong deeply notched lobed leaves. Color is olive to dark green and shiny, sometimes hairy but turning smooth, somewhat paler in color below. Dense yellow glands occur on both surfaces. Margins are smooth.

Flowers: Inconspicuous yellow-green flowers on separate catkins emerge before spring leaf-out. Separate male and female flowers on a single plant. Male catkins are cylindrical and drooping, occurring mostly clustered at 1-year old twig tips. Female catkins emerge just below male catkins, or at branch tips when male catkins are absent. They are round to egg shaped, and develop into burr-like clusters of shiny brown nutlets.

Fruit: Round burr-like clusters that contain 8–15 brown nutlets.

No Image Available

WZ ✓
BZ ✓



Habitat: Drought, salt, and heat tolerant. Found in infertile, acidic, dry, sandy soils, like upland sand prairies, and upland savannas, as well as forest edges and openings. Associated with oaks in savannas and pines in other areas. Fire adapted; seeds wait decades for burns to germinate. Life span 10–20 years.

3–5'

4–8'

Propagation: Colony forming, spreads by rhizomes. Dormant season pruning or mowing can encourage rhizome spread.

Additional Information: Leaves can be used to line baskets for collecting berries and to make tea. Topically, has been used as a poison ivy wash and to treat bruises. Attracts birds and butterflies. Erosion control. A good candidate for naturalizing in tricky sites, as it is highly adaptable to poor, infertile soils and tolerant of salt and drought. Caution: known to be a plant found to be attractive to chiggers.

Dormant Season Identification: Dried catkins persist into winter. Reddish brown dry leaves also often persist, along with their fragrant scent. Twigs are smooth barked and softly pubescent, dotted with glands and some lenticels. Buds are alternate, sessile, and enclosed in fuzzy scales.

No Image Available

American Witchhazel *(Hamamelis virginiana)*

Physical Description: Upright to rounded multi-stemmed or small tree-like suckering shrub. Forms spreading colonies via root suckers.

Leaves: Alternate, elliptic to ovate simple leaves with scalloped, dentate to wavy margins with a pointed leaf tip. Leaf base is lopsided heart to wedge shaped. Star-shaped hairs are found on lower surfaces, concentrated along veins. Upper surface is sparsely hairy to glabrous. New leaves are bronzy red, maturing into a dark green, and changing to a golden butter yellow in fall.

Flowers: Fragrant and showy stalked clusters along stems. 4 narrow strap-like petals are light yellow. Petals alternate with 4 round fertile stamens and 4 flat nectar stamens surrounding 2 central pistils, all maroon red. A bell shaped yellow caylx with 4 curled lobes cups the petals. Bloom time varies by species from March–May.

Fruit: Young green capsules that age to become brown and woody. Capsules split the following season to release 2 shining black seeds. Splitting capsules can eject seeds to a distance of 30 feet!

Hamamelidaceae Family

Habitat: Full sun to partial shade lover. Prefers well-drained, rich organic, somewhat acidic soils that are consistently moist. Tolerates clay soils that drain well. Grows in damp woodlands, forest margins, and stream banks. Life span 20+ years.

Propagation: Suckers readily from roots. Can take sucker cuttings with root material in dormant season to transplant. Spreads by seeds.

Additional Information: Medicinal properties are astringent and sedative. Water witching is actually a reference to witchhazel, whose presence indicated water not far below. Many animals enjoy the black seeds, such as songbirds, turkey, grouse, and squirrels. Nectar source and larva host plant for various butterflies and insects. Provides nesting site for several bird species.

Dormant Season Identification: Dried leaves often persist into winter. Buds are fuzzy and naked (no scales), narrowly elliptic, and stalked. Stalk nearly as long as bud. Twigs gray to brown and densely covered in hairs and tiny dark scales. Twigs become smooth with age. Older bark is gray-brown and rough, with scattered lenticels.

Photo courtesy of Luke Poling

WZ ✗
BZ ✓

6–15'

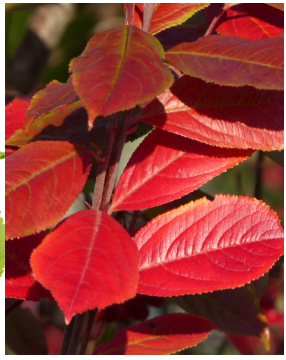
10–15'

Aronia species

Black Chokeberry (*A. melanocarpa*), Red Chokeberry (*A. arbutifolia*)

Physical Description: Deciduous, multi-stemmed shrub that grows in thickets. Typically vase shaped. **Caution: Look-alikes include black cherry tree (too tall) and buckthorn (invasive).**

Leaves: Simple, alternate leaves. Shape variable from round to nearly urn shaped, widest above the middle. Margins finely serrated. Dark, glossy green and smooth upper surface, reddish glands along central vein. Lower surface lighter and smooth or has sparse fine hairs. Fall color orange.



Flowers: Rounded clusters occur at tips of branches, containing 7–18 flowers. Clusters appear after spring leaf-out. Flowers consist of 5 white to pinkish petals that are round to spoon shaped. 5 green styles are surrounded by 18–20 dark pink tipped stamens, shorter than petals. Calyx has 5 triangular lobes, hairy inside and sparsely glanded outside. Blooms May–July.

Fruit: Red or bluish black berry. Pulpy flesh is astringent and somewhat bitter.

WZ ⚠
BZ ✓

Habitat: Found in range of sites from swampy to dry. Most commonly associated with boggy wet conditions of low woods, swamps, and moist thickets. Found occasionally throughout central and northeastern forests. Life span is 10–20 years.

3–6'

3–6'

Propagation: Spreads by root suckers and rhizomes, which can be severed from parent plant for transplanting. Lower branches can be layered to encourage denser thickets to grow the following year. Seeds digested and sown in fall–winter germinate readily on soil surface. Cutting during dormant season (or dormancy) can encourage patch spread by runners.

Additional Information: Berries are edible raw or cooked, but fairly astringent—hence the name chokeberry. Black chokeberry has the highest level of antioxidants of any temperate fruit. Berries eaten in winter by birds and mammals. Useful in wetland and roadside reclamation projects. Nectar- and pollen-providing plant. Larval host for several moths and butterflies.

Dormant Season Identification: Twigs slender, reddish brown, and pubescent. Terminal buds are pointed. Buds sessile, enclosed in reddish scales that overlap. Narrow leaf scar at bud base. Buds alternate. Berries often persist into winter.

Corylus species

American Hazelnut (*C. americanus*), Beaked Hazelnut (*C. cornuta*)

Photo courtesy of Ron Muir

Physical Description: Multiple stems arise from the base and spread by rhizomes to form small, dense colonies.

Leaves: Simple, alternate leaves are covered in a fine fuzz, (especially on lower veins), giving a soft feeling to leaves. Oval to elliptic shape. Margins are sharply doubly serrated with a few subtle lobes towards the tip. Margins taper shortly to a sharply pointed tip and a heart-shaped base. Leaf stalks are covered in both soft white hairs and dark, bristly glandular hairs.

Left Photo courtesy of Ron Muir

Flowers: Dioecious. Male catkins are showy, slender, pale yellow, and found hanging from 1st-year branches at leaf axils. Female flowers occur in inconspicuous bud-like clusters with a spray of red styles at their tips, found on the same branches as male catkins at different leaf axils. Bloom occurs early, from late winter to very early spring.

Fruit: Round nuts with a hard shell enclosed by two bracts that develop into a stiff, green husk. Husk is ruffled at the tip, almost twice as long as the nut inside. Nuts occur in clusters of 1–5. Mature September–October.

WZ ✗
BZ ✓

Habitat: *C. cornuta* more common on moister sites, such as rich thickets, along streams, woodland borders, and in moist clearings. *C. americana* is found on drier sites such as rocky woodlands, forests, and thickets. The two may be found growing side by side and are adaptable. Hazelnuts prefer partial-shade and being forest opening understory shrubs. Life span 20+ years.

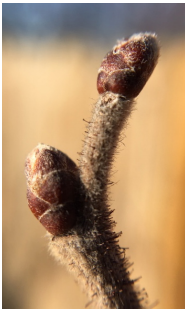
4–12'

9–12'

Propagation: Spreads by root suckers, which can be severed for transplanting. Seeds can be planted fall through spring, if lucky to get them before squirrels do and if the seeds can be protected until they sprout.

Additional Information: Nuts edible and delicious, raw or roasted. Nuts can be ground into flour. Nuts enjoyed by songbirds, ruffed grouse, quail, turkeys, chipmunks, bears, foxes, skunks, squirrels, and other wildlife. Twigs and leaves browsed by deer. Larval host to various moths and butterflies. Provides pollen to bees in early spring.

Dormant Season Identification: Twigs slender and zig-zagging, light brown to reddish, covered with fuzzy hairs. Buds are blunt and egg shaped, sessile, small, and covered by 3 scales that are 2 toned. Triangular leaf scar with multiple bundle scars below buds. Male catkins may persist, as well as husks after nuts fall.



Doghobble *(Leucothoe fontanesiana)*

Other common names: Fetter-Bush, Switch Ivy

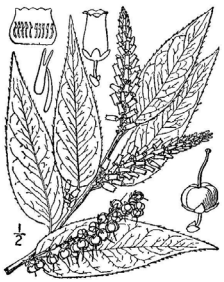
Physical Description: Short, sprawling, evergreen, arching stemmed shrub with droops of bell-shaped flowers.

Leaves: Long glossy, lanceolate leaves are leathery, evergreen, simple, and alternately arranged. Margins have widespread serrate teeth and taper to a long point. Lustrous dark green leaves are somewhat lighter underneath with visible pores. Prominent yellowish mid-vein. Leaves occur on long slender stalks. Fall color rich burgundy to red.

Flowers: Creamy white bell- or urn-shaped flowers hang in groups of drooping racemes from the leaf axils. Blooms from April–May. Fused petals have 5 lobes that curl backwards at bell opening. 5 stamens and a single style reside inside the corolla. Flowers appear waxy, and petals are somewhat thick. Fragrant, though sometimes not appealing.

Fruit: 5-lobed capsules that dangle in clusters. Present from September–October.

WZ ⚠
BZ ✓



Habitat: Requires shade and acidic, moist, well-drained soils. Forms thickets in wet ravines and stream banks. Will grow in clay, silt, loam, and sandy conditions. Naturally found in very wet places, frequently associated with rhododendrons. Lives 10–20 years.

3–6'

10'

Propagation: Spreads by suckering from runners to form short, dense thickets. Root cuttings can be taken in June. Semi-hardwood cuttings can be taken in summer. Summer layering will spread the patch or provide transplants for the following year.

Additional Information: Considered toxic to livestock. Good erosion control species for shady stream banks. Provides wildlife cover in winter. Flowers provide nectar to bees, butterflies, and other pollinators.

Dormant Season Identification: Small, blunt brown buds. Buds sessile, covered by scales, and slightly fuzzy. Twigs red, smooth, and appear to zig-zag. Scant lateral branching. Leaves evergreen. Drooping capsule clusters persist.

No Image Available

Eastern Teaberry *(Gaultheria procumbens)*

Other common names: Checkerberry, Box Berry, American Wintergreen

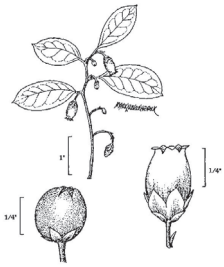
Physical Description: A low-growing to creeping groundcover shrub with a compact and rounded mound shape. Slowly spreads to form matted colonies.

Leaves: Simple, alternate leaves are evergreen, and bunched as 3–5 leaves near branch ends. Oval to paddle shaped with abruptly pointed or rounded tips. Margins have widely spaced teeth and seem almost smooth. Venation is pinnate, with the veins often curving to meet the next one at margins. Leaves are very shiny, leathery, and dark green, paler and dull beneath. Strong wintergreen aroma and taste when bruised. Winter cold turns leaves a dark purple.

Flowers: Single urn-shaped flowers hang downward in sets of 2–5 on smooth, pinkish, hairy stalks from the leaf axils near branch ends. 5 white petals are fused to make the urn tube, with their tips curled tightly back from the constricted urn opening. 5 stamens and 1 stout style are tucked inside the urn. A pair of heart-shaped bracts are found where flower meets stalk. Bloom time is June–August.

Fruit: Bright red to purple berry-like capsules with mealy flesh. Berries have a strong and lasting wintergreen flavor, slightly sweet and minty. Each fruit contains many small seeds. Berries persist September–November.

WZ ⚠
BZ ✓



Habitat: Found in edges and openings in hardwood forests and ROWs. Likes well-drained, acidic, thin, rocky to sandy loam soils as well as organic rich loams and clay soils. Prefers some sun, tolerates deep shade. Understory forest groundcover. Lives 20–100+ years.

1–6"

1–6'

Propagation: Slowly spreads by underground stolons that root as they spread. New plants can be cut from rooted stolons for transplanting. Seeds prefer stratification via fermentation (digestion) and are spread by hungry wildlife. Fruit production increases in bright locations.

Additional Information: Leaves and berries can be used to brew a tea. Poultices of leaves can be used to treat arthritic pain and sore muscles. Fruits may be eaten raw or used in baking. Persistent fruits provide food through winter for birds and mammals. Flowers provide a nectar source. Larval host for several moths. Provides protective cover for nests of small ground-nesting birds.

Dormant Season Identification: Evergreen leaves turn deep purple in winter. Red berries often present throughout winter. Buds alternate and naked.

Forsythia species

Other common names: Easter Tree, Golden Bells

Left photo courtesy of Ron Muir

Physical Description: Numerous straight root suckers develop an arching habit. Early spring branches covered in dense, bright yellow flower clusters, often before leaf unfurling.

Leaves: Opposite leaves are simple, ovate to oblong. Margins are coarsely serrated, especially towards the apex, and taper at both ends to a dull point. Bright green leaves with a lighter lower surface are mostly glabrous, thin, and somewhat shimmery.

Flowers: Light- to dark-yellow flowers appear in early spring along leaf axils. 4–5 partially fused, ray-like petals form a lobed bell shape and slant downwards. Corolla subtended by 4–5 green, square sepals. Blooms March–April.

Fruit: A dry capsule containing several winged seeds.

No Image Available

WZ ⚠
BZ ✓

3–10'

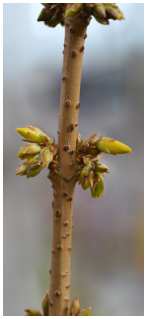
10–12'

Habitat: Prefers alkaline, moist, well-drained soils. Grows in sandy, loam, or clay soils. Drought and salt tolerant. Lives 20+ years.

Propagation: Spreads by root suckering and layering of low branches and arching tips. Bury branch ends in spring to early summer to layer. Sever root suckers from parent for transplanting. Cuttings can be taken from spring to early summer from green wood, or from semi-hardwood November–February.

Additional Information: Young leaves can be eaten sparingly, raw or cooked. Blossoms eaten raw or cooked, used to brighten up spring foraged salads. Attracts many early spring pollinators, providing nectar. The spring Tiphia wasp feeds on abundant plant sugars in spring and lays its eggs in soil grubs nearby. (Larval host relationship.) Dense habit provides shelter and nesting sites for various birds.

Dormant Season Identification: Young twig color reddish to green. Older stems reddish to gray and covered in white lenticels. Bark smooth. Overlapping brown to reddish scales cover buds. Twig tips have 3 buds, 1 larger terminal bud, and 2 smaller side buds. Triangular leaf scar below buds with 1 central bundle scar. Stems erect to arching.



Groundsel *(Baccharis halimifolia)*

Other common names: Eastern Baccharis, Salt Bush

Physical Description: One of the few true aster family shrubs. Dioecious, separate male and female plants. Densely branched, multi-stemmed shrub.

Leaves: Alternate simple leaves are smooth, oval, gray-green. Margins are mostly smooth with 1–3 pairs of coarse teeth towards the tips. Small resinous dots on both surfaces. Basal leaves can have different morphology that is rhombus in shape with serrate margins. Foliage is dense and covered with a waxy layer.

Flowers: Small, dense, terminal panicle clusters of white-green flowers bloom August–October. Female florets have a fluffy white papus, thread-like corollas with many fertile pistils, and follow male plants in blooming. Male florets are narrow, tubular with 5 tiny lobes, and many stout stamens. Both are subtended by scale-like, green-tipped bracts. Flowers are fragrant.

Fruit: Pyramid-shaped achene fruits (seeds) with attached plume or feather-like silvery-white pappi. Tufted pappi act as a sail for wind dispersal. Tufts display from September–November.

WZ ✗
BZ ✓

Habitat: Commonly found growing in salt marshes, coastal uplands, sandy places, along roadsides, in fields, and occupying wet disturbed sites. Tolerant of temporary inundation of brackish water and salty soils. Can also tolerate drier conditions. Full sun dweller. Lives 20–50 years.

6–15'

3–10'

Propagation: Easily sown by seed or by cuttings taken in late summer. Occasional top kill, by mowing, burning or herbicides, results in bushier, rejuvenated growth.

Additional Information: Generally considered somewhat toxic, especially the seeds, although birds and small wildlife can eat them. Resinous secretions from wood and leaves provide a good fuel source. Pollinator plant for various bees and butterflies. Provides excellent shelter for birds and others due to the fine twig branching. Extensive root system binds loose, sandy soils well.

Dormant Season Identification: Sessile alternate buds are covered by 2 smooth scales that do not overlap. 1 leaf scar per node, below the bud. Waxy leaves are often still present through winter.

No Image Available

Ilex species

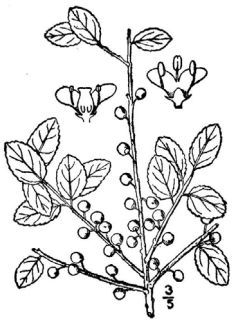
Inkberry (*I. glabra*), Winterberry (*I. verticillata*)

Physical Description: Multiple erect stems reach from a central base. Roots reach to spread by suckers to form upright colonies.

Leaves: Alternate, simple leaves are leathery and evergreen. Oblong to ovate in shape. Shiny dark-green upper surface and a lighter dull green below, glabrous or with soft hairs on lower veins. Margins are subtly toothed.

Flowers: Dioecious. Inconspicuous flowers bloom in late spring. Greenish white flowers appear from leaf axils on short stalks. Male plants typically produce flowers in cymes, while female plants bear cymes or as solitary flowers. 5–7 glossy petals arranged radially. Sepals are light green and thin. 5–7 anthers form a ring in the corolla center on male flowers. A stout, fat, broad style sits on a single swollen pistil on female flowers.

Fruit: Produced in berry-like drupes. Drupes have a terminal black dot, like a belly button. Each drupe contains 1 to several nutlets. Fruits persist through winter or into spring. Fruits ripen in fall as leaves drop.



Habitat: Medium to wet soils. Prefers acidic, even-moisture soils in full sun, but grows well in a variety of habitats from wetlands to sandy dunes. Commonly found in sandy-soiled woods and the peripheries of swamps and bogs. Life span 10–20 years.

Propagation: Spreads readily by digested seed droppings. Requires male plants in order to produce berries. Root suckering produces new shoots to form colonies, which can be severed for transplanting.

Additional Information: Used to mitigate or create wetlands. Larval host for Henry's elfin butterfly. Nectar source for many other butterflies and bees as well. *Ilex* species support the specialized bee *Colletes banksi*. Fruits eaten by many birds. Small mammals also enjoy berries, which provide winter foraging food. Cover plant for many birds and deer.

Dormant Season Identification: Alternate buds covered by scales, round and sessile. Triangular-shaped leaf scar with 1 bundle scar below bud. Tiny, thorn-like black stipules can be present on either side of leaf scar. Twigs slender, gray, smooth with scattered lenticels. Berries persist well into winter and often spring.

Photo courtesy of Ron Muir

WZ ✗
BZ ✓

5–10'

5–12'

Mountain Pepperbush *(Clethra acuminata)*

Other common names: Mountain Sweet, Cinnamon Clethra

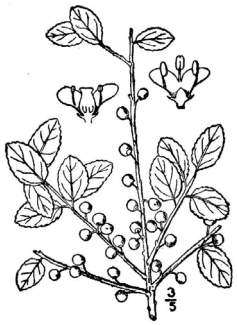
Physical Description: Horizontal branching habit in elegant tiers. Prolific blooms on dense foliage.

Leaves: Simple leaves with an alternate arrangement. Elliptical to ovate shape. Serrate margins with narrow, pointed tip and narrow, rounded base on a short stalk. Leaf color deep green, lower surface pubescent. Fall color is golden. Well-defined pinnate venation gives accordion-like fold appearance.

Flowers: Bloom occurs on terminal drooping racemes, flowering from the base to the tips, from June–August. Flowers are creamy white and bell shaped. Flowers have 5 separate petals and 10 yellow-tipped stamens. A single, slender, 3-parted style extends well beyond the stamens and petals. 5 individual white sepals around corolla base, short white flower stalks. Sepals and stalk have gland-tipped hairs.

Fruit: Brown to copper seed capsules shaped like peppercorns with a long persistent style hang in long clusters. Capsules appear in September and persist for a year or two.

Clethraceae Family



Habitat: Prefers moist, well-drained, humus-rich acidic soils, but adaptable to drier sites. Sun to dappled shade dweller. Found in mountainous areas in the understory or in openings near streams.

Propagation: Softwood cuttings can be taken from fall to spring. Seeds germinate when given moist ground, such as mossy patches on forest floor. Spreads by clumping from crown and stolons to form thickets. Root suckers can be severed from parent for transplanting.

Additional Information: Intensely fragrant flowers. Limited value as a cooking spice from fruits. Hummingbirds, bees, and butterflies feed on flower nectar. Seeds enjoyed by birds throughout the winter. Shelter and nesting sites provided by horizontal branching.

Dormant Season Identification: Thin peeling bark looks like paper. Slender round stems. Alternate buds reddish pink, naked, and softly fuzzy. Terminal bud long and pointed. Leaf scar nearly circular in shape below buds, with bundle scar. Dry fruit capsules typically present, looking like peppercorns with a persistent style.

WZ ✗
BZ ✓

8–12'

8–12'

New Jersey Tea *(Ceanothus americanus)*

Other common names: Red Root, Mountain Sweet, Wild Snowball

Physical Description: Low-growing, round-canopied shrub with deep and extensive woody roots with red inner bark. Profuse fragrant cloud-like flower clusters.

Leaves: Alternate simple leaves are broadly egg shaped. Blunt tip and heart-shaped base that tapers to short stalk. Upper surface hairy, lower surface more densely hairy. Bright green color. Finely serrated margins. Strongly 3 veined, with branched secondary venation. Fragrant when crushed.

Flowers: Dense and prolific panicle clusters bloom from June–August from leaf axils. Clusters are compound, consisting of smaller clusters of 10–14 flowers each. Flowers are cloud white, with 5 spreading, spoon-shaped petals with upturned tips and 5 alternating white triangular sepals that fold in towards flower center. Each petal is aligned with a single stout stamen. One 3-parted style is at flower center.

Fruit: A triangular 3-parted capsule, each containing a single seed. Capsule ripens from a shiny green to a dull purplish black July–September, persisting into winter.

WZ ✓
BZ ✓

Habitat: Found in oak savannas, meadows, edges, and openings in hardwood forests and ROWs. Likes well-drained, thin, rocky to sandy/loam soils. Prefers full sun, tolerates semi-shade. Likes slopes and drier banks. Drought, fire, and salt tolerant once established. Life span 10–15 years.

1–4'

3–5'

Propagation: Enthusiastically resprouts from crown after fire, and seedling establishment encouraged post-fire. Seeds can be sown in fall for cold winter stratification. Softwood and semi-hardwood cuttings can be taken after flowering for clones. Suckers from root crown only, not a runner shrub.

Additional Information: Deep root system provides excellent erosion control on slopes. Nitrogen-fixing shrub can grow in infertile soils and improve soil productivity. Astringent leaves used as a tea substitute. Larval host for several butterflies. Fragrant flowers provide nectar. Seeds enjoyed by songbirds. Specialized bees are also supported. Deer browse twigs and leaves year round.

Dormant Season Identification: Green to yellow-brown twigs are slender and softly hairy. Large white pith. Alternate buds are small and ovoid shaped, with pointy tip. Naked buds somewhat pubescent. Fruit capsules often persist into winter.

Prunus species

Wild Plum (*P. americana*), Chicksaw Plum (*P. angustifolia*),
Beach Plum (*P. maritima*), Allegheny Plum (*P. alleghaniensis*)

Physical Description: Upright thickets are fast growing and short lived. Profuse early blooms announce the coming of spring. Tasty fruit.

Caution: Look-alikes include buckthorn (invasive).

Leaves: Simple, alternate elliptic to oblong leaves. Margins sharply toothed, often doubly toothed. Tapering to a sharp point and rounded at the base with a hairy leaf stalk. Upper surface dark green to purple when young (*P. angustifolia*), lower surface paler and sparsely hairy (if at all). Fall color red to burgundy.

Flowers: Globe-shaped, umbel-like clusters with 1–4 flowers that emerge before leaves. Many clusters lumped together, flowering with dense fragrance. Flowers have 5 free, round petals white to pink tinged. Numerous slender white stamens with yellow anther tips and a single slender style extend beyond petal spread. 5 free green to reddish sepals.

Fruit: Greenish yellow and hard when immature. Ripening yellow to purplish red, tart to sweet, juicy-fleshed drupe with a waxy bloom on the outer surface. Large, single hard seed called a stone. Fruit ripens in mid to late summer.

Habitat: Common dweller of prairies, hardwood forests, man-made forest margins, utility ROWs, streamsides, slopes, moist thickets and riparian areas. Prefers dry to moist well-drained soils, full sun to partial shade, gravelly to clay soil adapted. Often an understory shrub in forest gaps and river banks. Life span 10–15 years.

Propagation: Spreads by root suckering. Shoots can be severed from parent during dormancy for transplanting. Cuttings can be taken from semi-hardwood fall–late winter. Seeds can be scarified either by nicking or scratching seed coat to encourage germination. Sow in the fall for cold stratification. Seeds collected from bear scat have heightened germination.

Additional Information: Tart fruits enjoyed fresh or preserved in many fashions. Fruits are high in vitamin C. Fruits are relished by birds and mammals. Flowers are a very popular pollinator hub, providing ample nectar. Dense branching provides shelter for various birds and other wildlife. Larval host to several butterflies.

Dormant Season Identification: Twigs red to gray, smooth, and dotted with lenticels. Spiny branch spurs often present on major branches. Older stem bark gray and curly scaled. Buds round with pointy tips.

Photos courtesy of Luke Poling

WZ ✗
BZ ✓

10–15'

15–25'

Smooth Alder *(Alnus serrulata)*

Other common names: Tag Alder, Hazel Alder

Photo courtesy of Luke Poling

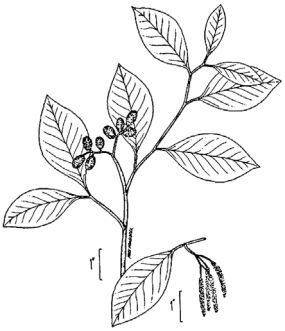
Physical Description: A thicket-forming colonizer of wet edges, with multiple main trunks that form a densely branched crown. Unique fan-textured leaves and miniature cone-like catkins. One of the earliest to bloom in late winter/spring.

Leaves: Simple, alternate leaves have impressed parallel veins that are raised on the undersides, giving leaves the appearance of being folded like fans. Upper surface bright green, paler and softly fuzzy below. Margins are somewhat scalloped and finely toothed. Wedge-shaped leaf base on stalk. Wide elliptical to ovate shape.

Flowers: Monoecious clusters of catkins at branch tips. Terminal female catkins are upright, and display pinkish red styles during bloom. Male catkins are long and dangle below the female catkins, displaying powdery yellow during bloom. Male flowers consist of 4 short stamens with pollen-laden yellow anthers, no petals, and 1 bract. Flower buds develop in the fall and begin flowering in very early springtime.

Fruit: Female strobiles mature into woody, scaled cones. Each scale encloses a single winged nutlet. Cones ripen in winter and can be retained for over a year.

WZ ✗
BZ ✓



Habitat: Prefer moist to wet acidic clay soils. Full to partial sun. Found along rivers, lakes, swamps, ditches, springs, swampy fields, and wetland margins. Tolerant to drought and compaction. Resistant to erosion and fire. Life span 30+ years.

10–15'

8–15'

Propagation: Spreads by seed dispersal and root suckering to form erect thickets. Suckers can be severed from parent shrub for transplanting. Responds vigorously to moderate disturbance.

Additional Information: Used to restore or mitigate wetlands. Tea made from the bark used to treat diarrhea, toothaches, sore mouth, coughs, and childbirth pains. Bark is astringent, tonifying, and diuretic. Larval host. White-tailed deer browse foliage. Birds and small mammals eat the pollen-rich male catkins in spring, as well as the rich nutlet seeds in fall.

Dormant Season Identification: Twigs copper brown with gray fuzz. Pith triangular. Alternate buds are stalked and plump, resembling a match head with 2–3 reddish purple scales. 1 leaf scar per bud, U-shaped. Older stems smooth, gray, and thin barked with fluted larger trunks. Miniature female cones persistent.

Photo courtesy of Luke Poling

Smooth Hydrangea *(Hydrangea arborescens)*

Other common names: Wild Hydrangea, Sevenbark, Sheep Flower

Physical Description: A hardy, shade-loving understory shrub with multiple widely branched stems and large white flower clusters.

Leaves: Opposite simple leaves. Heart-shaped leaves with a sharply pointed tip and serrated margins. Upper leaf dull dark green, lower surface slightly more pale and glabrous. Strongly pinnately veined.

Flowers: Flat-topped corymb clusters of small white flowers appear May–July at new branch tips. Flowering continues sporadically into autumn. Radial flowers have 4–5 free round petals, 8–12 stamens, and a single pistle with 1–8 fused styles. A few larger showy sterile flowers often scattered around cluster edges.

Fruit: Light-brown, dry capsules mature in July–September. Each contains many small seeds.

Photo courtesy of Robert Barbor

WZ ⚠
BZ ✓

Habitat: Prefers rich, well-drained soils, alkaline to acidic. Needs part shade or moist soils for full-sun sites. Found in moist to rocky wooded slopes, ravines, stream banks, bluff bases, and disturbed sites. Vigorous regrowth after cutting. Intolerant of drought. Tolerant of poor soils. Life span 20+ years.

3–6'

3–8'

Propagation: Layering of lower branches can produce new plants or a denser patch. Stem cutting relatively easy. Spreads by stolon runners to form thicket-like colonies.

Additional Information: Root has been used to treat kidney and bladder stones. An outer bark poultice has been used to treat burns and swollen muscles. The Cherokee would peel and boil or fry new growth for eating. Useful for erosion control. Larval host for hydrangea sphinx moth. Flowers attract butterflies and other pollinators. Songbirds enjoy the seeds.

Dormant Season Identification: Smooth, light-brown twigs with white pith. Multi-colored shredding mature bark. Buds alternate, covered by scales, with shallow, U-shaped leaf scar with 3 bundle scars.

Photo courtesy of Robert Barbor

Spiraea species

Steeplebush (*S. tomentosa*), White Meadowsweet *(S. alba)*

Physical Description: An upright, low-growing, multi-stemmed, colony-forming shrub that enjoys wet feet. An indicator for wet soils.
Caution: Look-alikes include *Spirea japonica* (invasive).

Leaves: Leaves are spreading to ascending with alternate arrangement. Simple, sharply to coarse toothed, blunt tipped and tapering subtly to a short stalk. Leaf upper surface dark green with dense venation, lower surface silver in color with matted soft fuzz (*S. tomentosa*), or hairless and green (*S. alba*).

Flowers: Flowers bloom in dense clusters of terminal spikes. Overall inflorescence is triangular in profile. Blooming begins from stem tip downward, from July–September. Individual flowers have 5 round petals, numerous long stamens, and a cluster of 5 pistils. Flower color ranges from white to pink.

Fruit: Each flower produces a fruit of 5 tiny follicles (pods), each containing a single seed. Pods are brown and woody at maturity. Fruit resembles a tiny wooden flower when pods split to release seeds during winter.

No Image Available

WZ ✓
BZ ✓

Habitat: Needs moist, acidic soils. Found in wet meadows, wet fields and pastures, boggy areas, marshes, and lake margins. Life span 10–15 years.

2–4'

3–5'

Propagation: Spreads by rhizhomes from a dense central mass. Mass can be divided in early spring for transplanting, or runners can be severed to start new plants. Semi-hardwood cuttings can be taken in July–August and rooted in a sandy medium. Seeds fall to ground in late fall–early winter, germinating the following spring if they evade the birds.

Additional Information: Stems and leaves brewed into an astringent tea by various Indigenous tribes. Stems gathered in a bundle to make brooms. Nectar and pollen source for many bees and butterflies. Larval host for New England buck moth. The box elder bug relative, *Plagiognathus fuscosus*, breeds on steeplebush.

Dormant Season Identification: Woody fruits often present. New stems arise in late winter to early spring. Young twigs are softly fuzzy, covered in matted white hairs. Older stems reddish brown with thin peeling bark and white lenticels. Buds are alternate, small, and covered by brown scales. Prominent single leaf scar under each bud.

No Image Available

Viburnum species

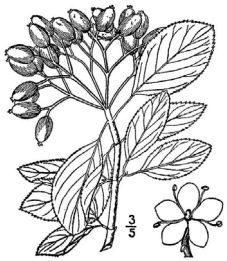
Arrowwood Viburnum (*V. dentatum*), Black Haw (*V. prunifolium*), Swamp Haw (*V. cassinoides*), and Smooth Withrod (*V. nudum*)

Physical Description: These taller-growing viburnums are known for their long, slender but sturdy stems, prolific flat white flower clusters, and their persistent blue fruits that resemble raisins. Their fall color is a showy display of wine red to purple leaves.

Leaves: Opposite, simple leaves, elliptic to oval. Margins range from scalloped (*V. nudum, V. cassinoides*) to coarse or finely serrate (*V. dentatum, V. prunifolium*). Leaves taper to a pointed apex and a rounded to triangular (*V. dentatum*) base. Leathery, dark green leaves are glabrous above and smooth to softly hairy below (*V. dentatum*).

Flowers: Bloom occurs at branch tips on long-stemmed, flat-topped, and spreading cyme clusters from March–June. Scent is considered unpleasant. Flowers are small, creamy white, and trumpet shaped. 4–5 round and spreading petals are fused at their base. 5 yellow-tipped upright stamens alternate with petals. A single sticky style is recessed into floral tube. 5 green sepals are fused to make a triangular lobed calyx.

Fruit: Oval-shaped drupes in upright to drooping clusters, ripening from pink to dark blue, often with both colors present at once. Mature in the fall beginning in August, and persist into winter. 3 seeds per drupe.



Habitat: Full-sun to part-shade dwellers of wet and dry conditions. *V.dentatum* and *V. prunifolium* grow in moist to wet lowlands, streambanks, and at the bases of wooded ravines. *V. nudum* and *V. cassinoides* can be found growing from low, wet woods, streams, and bogs, to dry savannas and high-elevation forests. Life span 20–30 years.

Propagation: Seeds spread readily by foraging wildlife. Layer lower branches by anchoring shallowly in ground to encourage thickets. Semi-hardwood cuttings can be taken from late summer to early spring. Root suckers can be severed from parent plant for transplanting.

Additional Information: Straight and flexible stems of arrowwood were used for arrow shafts by Indigenous peoples. Fruits and flowers are edible. Host for several moth and butterfly species. Nectar source for butterflies. Fruits persist into winter and are eaten by songbirds, grouse, wild turkeys, squirrels, and chipmunks. Twigs browsed by deer. Dense stems provide shelter for birds and small mammals.

Dormant Season Identification: Slender, straight, flexible twigs. Twig bark smooth, gray to copper brown, and dotted with lenticels. Shield-shaped leaf scar below each bud, with 1 bundle scar. Buds opposite, covered by 2 brown scales. Persistent fruit into winter.

Photo courtesy of Ron Muir

WZ ✕
BZ ✓

5–15'

5–15'

American Cranberry *(Vaccinium macrocarpon)*

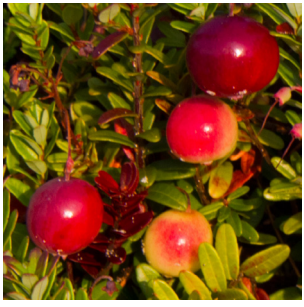
Other common names: Large Cranberry

Physical Description: Low-growing vine or trailing evergreen shrub with glossy upright leaves and red fruits. Spread is greater than height.

Leaves: Simple, alternate leaves display an erect habit, pointing upwards. Oblong to elliptic in shape, rounded at both ends, short stalked. Leaves are evergreen and leathery, dark shiny green above and paler below, with smooth margins that slightly curl under. A waxy coating is often present.

Flowers: Arise from the base of new shoots from leaf-like bracts. 2–6 single flowers occur at each shoot base. Flowers are on long, hairy, red stalks; nodding. 4 narrow, white to pinkish petals curl strongly backwards displaying a tight cluster of slender red stamens and one longer style, giving the flower an inside-out appearance. Blooms late spring to early summer (May–June).

Fruit: Shiny, round, and dark red juicy-fleshed berries. Drooping on long stalks. Persist through winter. Tart flavor.



WZ ✓
BZ ✓

Habitat: Prefers acidic soils. Can tolerate periodic flooding. Found in swamps or wet shores of streams and lakes. Semi-shade to full sun. Life span 20–50 years.

6–8"

6'

Propagation: Trailing stems root readily in contact with soil. Surface layering can increase patch spread in moist areas. Rooted stem cuttings for transplant. Spreads by rhizomes, resprouts with increased vigor after fire or top kill. Prefers undisturbed soil, but recolonizes with vigor after clear-cuts, burns, and in abandoned fields and pastures. Seeds spread by birds.

Additional Information: Fruits edible raw or cooked. Substantial research has gone into cranberries as a longevity supplement, having antioxidant and alkaline anti-aging qualities. Larval host for bog copper butterfly and supports specialized bees. Fruits eaten by birds and some small mammals. Leaves considered important summer browse for deer. Trailing roots hold boggy soils together.

Dormant Season Identification: Evergreen leaves and often bright red fruits present through winter. Alternate sessile buds covered by overlapping scales. Reddish brown upright twigs.

Azalea species

Coastal Azalea (*R. atlanticum*), Roseshell Azalea (*R. prinophyllum*), Swamp Azalea (*R. viscosum*), Flame Azalea (*R. calendulaceum*), Pink Azalea (*R. periclymenoides*)

Physical Description: Woody shrubs with rounded canopies and multiple stems that can form dense thickets in the forest understory. Azaleas are rhododendrons that lose their leaves in the winter.

Leaves: Arranged in alternate whorls. Elliptic to obovate blue-green leaves with blunt to rounded tips. Paler beneath. Smooth margins have bristly ciliate-like hairs. Leaves are clustered at branch ends.

Flowers: Very showy spring flowers in shades of white, pink, purple, yellow, orange, and red. Bloom in clusters of 3–13 flowers on short-stalked umbels at branch tips. Tubular flower consists of 5 petal-like lobes, 5 protruding curved stamens, and 1 extended style. 5 short, pointed, green sepals circle to base of the long petal tube.

Fruit: Long, 5-chambered capsules. Persistent style remains, like an extended tongue.

No Image Available

Habitat: Swamp and roseshell azaleas like boggy swamp areas. Coastal Azalea prefers well-drained sandy soils. Others are found in forests and woodlands, on rocky and talus ridges and slopes, and along riparian areas. All azaleas need acidic soils, part shade, and overall enjoy even moisture. Life span 100+ years.

Propagation: Spreads by root suckering and stolons. Cuttings are taken from half-ripe wood (semi-hard) in late summer. Layering of low-lying branches encourages rooting at nodes. Properly timed pruning may increase suckering spread.

Additional Information: Provides nectar and pollen to various bees, flies, hummingbirds, and butterflies. Large-winged butterflies are the only successful pollinators for azaleas. Pollen is brushed on butterfly wings, and carried to the next flower. Strong, mature branches provide safe roosting sites for ground birds, such as grouse and turkeys.

Dormant Season Identification: Large, rounded buds on long-stalked twigs, with smaller short-stalked leaf buds at the base of flower buds. Buds are covered by 2–6 brightly colored overlapping scales with hairs on scale margins. Seed capsules persistent. Small twigs alternately whorled near branch ends.

No Image Available

WZ ⚠
BZ ✓

4–10'

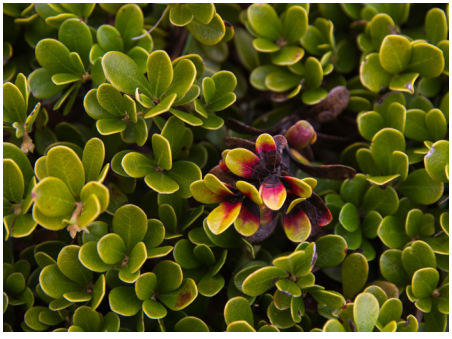
4–8'

Bearberry *(Arctostaphylos uva-ursi)*

Other common names: Kinnikinnick

Physical Description: Evergreen trailing or creeping to somewhat erect groundcover, with reddish woody stems. Spread is greater than height.

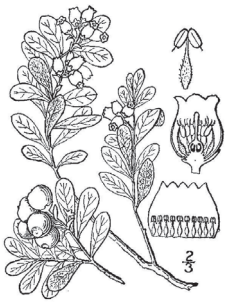
Leaves: Leathery evergreen leaves are closely spaced with an alternate arrangement. Leaves are round to oval shaped, with smooth margins that taper to a short stalk at the base. Leaves go from light green to glossy dark green in summer, turning purplish in the fall with onset of cold temps.



Flowers: Small, bell- or urn-shaped tubular flowers with 5 rounded petal lobes. Flowers are borne on short racemes forming clusters on branching stems. Flowers are nodding and white to pink in color. Bloom season is May–June.

Fruit: Bright red dry-fleshed drupes contain 5 central nutlets. Fruit tastes somewhat sweet but mostly tart. Fruits are the same size as flowers.

WZ ✓
BZ ✓



Habitat: Needs sandy, acidic soils and serves as an indicator species for these soils. Tolerates dry to moist conditions but not standing water. Full sun to part shade. Found growing on rocky outcrops, sandy pine barrens, dry forest heaths, coniferous and mixed woodlands, on ridges and hilltops, and along rights-of-way. Life span is 20 years.

6–8"

3'

Propagation: Trailing stems in contact with the soil will form roots. To promote rooting, layer or press stems to soil surface and anchor with branches or rocks. Seeds germinate best after scarification via digestion or other fermentation methods.

Additional Information: Leaves can be dried and brewed into tea. Leaf preparations bring relief and resolution to poison ivy and oak rashes. Persistent fruits provide winter food for many birds and mammals. Foliage browsed by deer, moose, and grouse. Trailing rooting habit offers good erosion control of dry, loose soils on slopes. Nectar source. Larval host for many butterflies.

Dormant Season Identification: Evergreen leaves persist in winter. Exfoliating thin red bark on ground-creeping stems. Young twigs are covered in dense short hairs to give a fuzzy appearance, bark green-tan to grayish and smooth. Dried fruits often persist through mid-winter.

Bushy St. John's Wort *(Hypericum densiflorum)*

Other common names: Shrubby St. John's Wort

Physical Description: Compact and densely branched shrub. General shape is round.

Leaves: Opposite arrangement of sets of 2 leaves per node. Leaves are narrow and lance shaped, glabrous, with entire margins. Leaves have a dark green upper surface and paler green lower surface.

Flowers: Occur on a dense, flat-topped cyme inflorescence during the summer, June–September, on the new growth of branched twigs. Individual flowers are bright yellow, with 5 round petals notched at the tips, 3 styles, and multiple thread-like yellow stamens that lend a frilly appearance. 5 round green sepals surround each flower.

Fruit: Cone-shaped capsules containing many tiny black seeds. Capsules mature from green to red to brown when dry and ready to split open.

WZ ⚠
BZ ✓

Habitat: Occurs on acidic moist to wet soils such as streams, ponds, lake shores, seepage slopes, and wet meadows. Likes disturbed areas. Clay, silt loam sand and shallow rocky soil dweller. Lifespan up to 20 years.

Propagation: Germinates readily from fall-sown seed. Divide roots of mature plants to produce new plants. Mature wood cuttings taken summer through fall can be rooted. Spreads somewhat by rhizomes.

Additional Information: *Hypericum* species are commonly used to treat anxiety and depression. Topically, flowers are infused in oil and used to treat burns and irritations from eczema to insect bites, as well as general wound healing. Prolific stamens offer abundant pollen. Larval host for gray hairstreak butterfly, gray half-spot moth, and the St. John's Wort spittlebug.

Dormant Season Identification: Buds are naked, sessile, and opposite. 2 leaf scars per node, if leaves absent. Persistent fruit capsules are 3 chambered and reddish brown. Parts of sepals are often present.

Buttonbush *(Cephalanthus occidentalis)*

Other common names: Button Willow, Honey Bells

Physical Description: A coarse and leggy multi-stemmed shrub. Irregular-shaped crown. Fragrant button-like flower clusters attractive to various pollinators.

Leaves: Opposite leaves occasionally whorled in sets of 3. Simple, egg shaped to oblong or elliptic, tapering to a sharply pointed tip and rounded to bluntly tapering base. Shiny dark green above, paler and sometimes sparsely hairy on veins below. Strong venation gives a rippled surface appearance.

Flowers: Round, button-like clusters of 100–200 inconspicuous flowers. A single long, white style projects from the trumpet tube surrounded by 4 shorter stamens. This gives a pincushion appearance to the button cluster. A short sepal calyx surrounds the flower base with 4 lobes lime green in color. Blooms June–September.

Fruit: Each tiny floret produces a cone-shaped, 2-sectioned nutlet. Color matures from green, to red to dark reddish brown. Fruits persist into winter.

WZ ✗
BZ ✓

Habitat: Found in a wide range of wet habitats: lake shores, floodplains, stream banks, swamps, wetland edges, and wet, disturbed sites. Prefers rich, saturated soils and can tolerate standing water up to 3 feet. Likes full sun, and does poorly in shade or dry soil sites. Life span 15-20 years.

5–12'

6–12'

Propagation: Readily spreads by root suckers. Suckers can be divided from mother for transplanting. Seeds germinate readily and are spread by birds and flowing water, as seeds are buoyant.

Additional Information: Used for erosion control on wet sites. The bark tea is astringent, emetic, fever reducing, and tonic. Strong decoctions used to treat stomach complaints and as an eye wash. Inner bark chewed for toothaches. Flowers attract pollinators. Seeds are enjoyed by over 24 species of songbirds and waterfowl. Deer browse leaves. Larval host to various moth and butterfly species.

Dormant Season Identification: Slender twigs are dark reddish brown with light-colored lenticels. Opposite, lateral buds are small and sessile, embedded into bark. D-shaped leaf scar around buds, with one U-shaped bundle scar. Buds are naked, no scales. Fruits often present through winter. Twisted trunks.

Canada Yew *(Taxus canadensis)*

Other common names: Canadian Yew, American Yew, Ground Hemlock

Physical Description: An understory evergreen coniferous shrub. Has a feathery appearance from many needle-shaped leaves and a spreading canopy. Spread is greater than height.

Caution: Look-alikes include balsam fir, eastern hemlock, and english yew (all too tall).

Leaves: Linear, flat needles. Needles are attached singly to twigs in a spiral arrangement that appears flattened. Needles are dark green above and paler below with a prominent green center stripe.

Photo courtesy of Ron Muir

Flowers: Separate male and female cone-like structures called strobili, borne singly in leaf axils. Male and female strobili usually on separate branches. Female cones begin as pointed buds subtended by bracts. Male cones are oval to elliptic in shape and have yellowish scales. Pollen sacs turn color from cream to tan.

Fruit: Yews have a berry-like cone called an aril. Arils are cup shaped and bright red at maturity, opening at the top. They contain 1 single seed in the cup that is released in mid to late summer.

WZ ✓
BZ ✓

Habitat: Grows in swamps, ravines, along stream banks and lake shores. Grows in the mountains in shade to part shade in rich hardwood and conifer forests. An understory plant. Prefers rich soils high in organic matter from clays to loams. Life span over 100 years in ideal conditions.

3–5'

6–8'

Propagation: Layering of lower branches can help promote spread. Stem cuttings can be rooted.

Additional Information: All parts except the fruit are considered toxic internally. The leaves and bark have been studied extensively for cancer research. Provides year-round browse for moose and is food for white-tailed deer. The aril fruit is eaten by many birds. Stabilizes wet soils and grows like a groundcover.

Dormant Season Identification:
Evergreen species. Identification during winter is the same as during growing season.

Catawba Rhododendron *(Rhododendron catawbiense)*

Other common names: Catawba Rosebay, Mountain Rosebay, Purple Laurel

Physical Description: Large-leaved evergreen shrub. Erect to rounded canopy with large, showy flowers.

Caution: Look-alikes include ornamental rhododendron (too tall).

Leaves: Alternate whorled leaves, concentrated towards stem ends. Leathery leaves are dark green and glossy, somewhat paler below, smooth, elliptic in shape, with entire margins.

Flowers: Large lilac to purple funnel-shaped 5-lobed flowers in terminal clusters of 15–25 flowers from mid to late spring (April–early June). Corolla has brownish throat markings inside. 5 small, pointed sepals ring corolla base. Stamens are 5, long, and curved beyond petals, single pistil extends farther than stamens.

Fruit: A 5-valved elongated capsule with a long, persistent style. Capsules split to release up to 500 small seeds. Present from September to late October.

No Image Available

Habitat: Prefers organic, rich, acidic, cool, and moisture-retaining yet well-drained soil. Needs part shade. Found in mountain woods and rocky slopes. Forms dense thickets. Long lived, 75–100 years.

Propagation: Spreads by root suckers and rhizomes to form dense colonies. Semi-hardwood cuttings can be taken in late summer.

Additional Information: Considered toxic for internal use. A few studies for cancer treatment have been investigated. Some homeopathic applications for gout. Provides winter cover for birds and other wildlife. Nectar and pollen source for hummingbirds, butterflies, and bees. Supports the specialized bee *Andrena cornellii*.

Dormant Season Identification: Terminal flower buds are large with yellow-green overlapping scales and 2 long green stipules at base. Leaves evergreen, present in winter. Leaves pivot downward in cold, dry weather to conserve heat and moisture. Yellowish green young twigs.

Photo courtesy of Robert Barbor

WZ ✗
BZ ✓

6–10'

8–12'

Leatherwood *(Dirca palustris)*

Physical Description: A dense understory suckering shrub with extremely flexible stems; hence, the name leatherwood.

Leaves: Alternate leaves are simple, egg to oval shaped, widest above the middle, blunt tipped and stalkless to short stalked. Margins are entire. Bright green color above and below. Early leaves may be hairy, especially at the margins, but leaves become glabrous with age except for scant hairs on lower veins.

Flowers: 1-year-old twigs bear clusters of 2–6 flowers before leaves emerge in early springtime (March–April). Pale yellow flowers are narrowly tubular with 4 inconspicuous lobes. Extending past the flower tube are 8 long white stamens and 1 slender white style.

Fruit: Oval- to elliptic- shaped berry-like purplish drupes. Each drupe contains a single shiny black seed. Fruits available June–July.

No Image Available

WZ ⚠
BZ ✓

Habitat: Found in moist, well-drained organic soils, like rich mesic woodlands, floodplain woodlands along streams and creeks, lower areas of wooded slopes in valleys, shady rock terraces along creeks, and thinly wooded sandstone ridges. Very shade tolerant, found under dense canopies. Life span 20 years.

3–6'

3–6'

Propagation: Spreads readily by suckers and rhizomes. Pruning in late winter can encourage rhizome spread. Not so easy to spread from seed.

Additional Information: Pliable twigs used as cordage and for basket weaving. Bark fibers used to make rope and paper. Medicinally, is strongly emetic and purgative, high caution advised. Decoction of branches applied topically for swellings of the limbs. Birds and small mammals enjoy the fruits. Hummingbirds and butterflies attracted to flowers. Shelter provided in dense thickets.

Dormant Season Identification: Strongly jointed twigs that can be tied in a knot without breaking. Mottled reddish brown smooth bark. Alternate buds occur on flattened joints, recessed into a circular leaf scar.

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Mountain Camellia *(Stewartia ovata)*

Other common names: Mountain Stewartia, Showy Camellia

Physical Description: Spreading branches lend a brushy appearance. Deciduous rubbery leaves with showy camellia-like flowers. Orange scarlet fall color.

Leaves: Simple alternate rubbery leaves. Broadly ovate tapering to a long point with broadly winged leaf stalks. Margins entire with fine hairs. Shiny and dark green upper surface, pale and hairy below.

Flowers: Solitary flowers with 5 bright white fringed petals frame many showy yellow orange anthers crowding a single style. Subtended by 5 persistent pointed sepals. Flowers appear in early summer (June–July).

Fruit: A woody, egg-shaped capsule. Capsule consists of 5 sections with sharply pointed tips, each containing 1–2 nut-like seeds.

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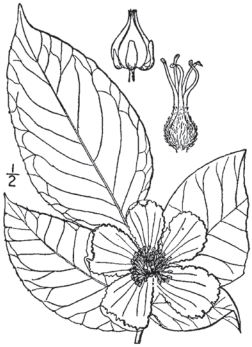
BZ ✓



Habitat: Found growing in mesic forests along acidic bluffs, among rhododendron thicket openings, wooded stream banks. Likes well-drained loam soils and some afternoon shade. Not heat or drought tolerant. Life span 20+ years.

10–15'

10–15'

Propagation: Spreads by layering of lower branches. Seeds have a double dormancy in which they take two springs to germinate.

Additional Information: Related to the common tea plant, *Camillia sinensis*, from which black, green, and white teas are made. Attractive to bees and butterflies. Birds enjoy the seeds.

Dormant Season Identification: Buds are naked, flattened, tapering to a fine point, and covered in silky white pubescent hairs. Ringed by 1 leaf scar containing a single prominent bundle scar. Fruits usually present through winter.

No Image Available

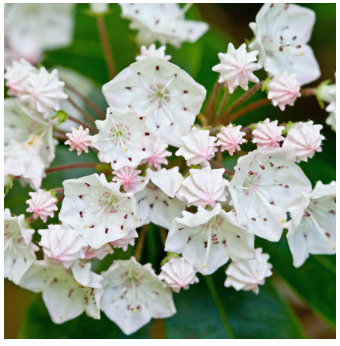
Mountain Laurel *(Kalmia latifolia)*

Other common names: Spoonwood, Calico Bush

Physical Description: A gnarled, twisted-stem, broad-leaved evergreen shrub of various habitats. Showy white flowers have stamens tucked into petal pockets under tension, spring-loaded to release pollen during bee visits.

Leaves: Simple alternate leaves. Evergreen, shiny, wax coated above with a raised and prominent midvein, yellow-green below. Elliptic with a blunt tip, margins entire.

Photo courtesy of Luke Poling



Flowers: Very showy terminal corymb cluster of white to rose flowers with purple ring at corolla center. Flowers have fused and pleated petals forming a 5-wavy-lobed bowl around a single pistil and 10 purple-tipped stamens. Stamens are recurved and tuck into pockets in the bell-shaped corolla, spring-loaded pollen dispensers. Blooms from late spring to early summer (late May-June).

Fruit: Open clusters of 5-chambered round, brown capsules that split to release many small seeds in autumn.

No Image Available

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BZ ✓

Habitat: Woodland understory shrub. Highly tolerant of dry sites. Found growing along forest edges, in forests, meadows and fields, swamps, wetland margins, and woodlands. Highly adaptable. Does best in cool, moist, rich, well-drained soils in part shade. Does not really like heavy clay soils. Life span 20+ years.

5–15'

5–15'

Propagation: Semi-hardwood cuttings taken from stem tips in early spring can be rooted. Sow seeds in winter. Sprouts from basal burls, root suckers, and layering of lower branches. Resprouts vigorously after disturbance, such as clearcuts or fires.

Additional Information: Considered toxic internally. Dried and powdered leaves used externally to treat ringworm, tinea, psoriasis, herpes, and syphilis. Provides winter cover. Hummingbirds, bees, and butterflies attracted to blooms for pollen and nectar. White-tailed deer browse leaves and twigs in winter and early spring. Songbirds enjoy the seeds.

Dormant Season Identification: Twisted twigs initially bronze and sticky. Pith is solid and lime green. Capsules persist through winter, as do leathery leaves. Light colored with reddish tipped scales covered in soft hairs.

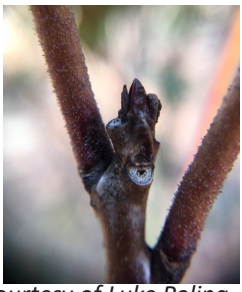

Photo courtesy of Luke Poling

Red Osier Dogwood *(Cornus sericea)*

Other common names: Red Twig Dogwood

Photo courtesy of Ron Muir

Physical Description: Small- to medium- sized multi-stemmed shrub. Red stems form brightly colored thickets.

Leaves: Opposite leaves are simple and smooth, green above and paler below. Margins are entire, somewhat wavy. Prominently arching venation towards leaf margins characteristic of this genus. Shape is oblong to ovate, tapering to a blunt tip.

Flowers: Flat-topped clusters of dull white flowers. Short-stalked flowers at branch tips. Each floret has 4 narrow lance-shaped petals, 4 long spreading stamens, and a single style at the center. 4 tiny sepals at floret base. Appear late spring to early summer.

Fruit: Matte-white, berry-like drupes. Fleshy. Mature late summer to early fall.

Habitat: Found in moist but well-drained soils. Adaptable to a wide range of soil and climate conditions. At home in a wetland environment, but tolerant of a wide range of conditions. Life span up to 20 years.

Propagation: Spreads by stolons and branch layering. Does not like disturbance. Cuttings of medium (1–3-inch diameter) stems can be taken and planted directly during dormancy. Can be mowed to 8 inches every 2–3 years in early spring for rejuvenation.

Additional Information: Used extensively in basket weaving. Bark and root are analgesic, slightly stimulating, astringent, and somewhat purgative. Used as a dressing for wounds to stop bleeding. Fruits attractive to small mammals and birds. Nesting site provider. Larval host for spring azure butterfly. Supports various bee species. Suckering growth holds wet soils along stream banks and in marshes.

Dormant Season Identification: Bright red twigs, flecked with grayish white lenticels. White pith. Sessile, opposite buds narrow and tapering to a point, naked and pubescent. Flower buds more swollen than leaf buds. One V-shaped leaf scar below bud.

Photos courtesy of Ron Muir

WZ ✗
BZ ✓

6–10'

6–10'

Spicebush *(Lindera benzoin)*

Other common names: Wild Allspice, Benjamin Bush

Physical Description: An understory bush of rich, moist woods. Erect stems produce dense clusters of tiny yellow flowers in early spring. Spicy, peppery smell when twigs are broken.

Leaves: Alternately arranged simple leaves. Elliptical in shape, tapering to a blunt tip, with entire margins that are somewhat ciliate (stoutly hairy). Strong and spicy citrus odor when crushed. Deep green above and paler below.

Photo courtesy of Ron Muir

Flowers: Dioecious. Flowers appear in axillary clusters in early spring, before leaves emerge (March–April). 6 greenish yellow cupped sepals surround multiple stamens on male plants and multiple styles on female plants, neither having any petals. Male flowers larger and more showy than female flowers.

Fruit: Green drupe fruits mature to bright red when ripe. Each drupe contains a single seed. Peppery taste and smell. High in fat content. Ripe from July to October.

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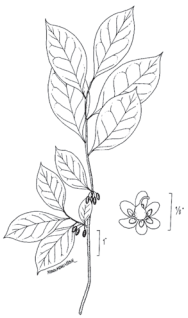
BZ ✓



Habitat: Found in moist locations in bottomlands, woods, ravines, valleys, and along streams. Prefers acidic, moist but well drained soils. Can tolerate wet soils and occasional drought. Shady dweller, but prefers some sun. Was considered an indicator bush for rich agricultural lands. Life span 20+ years.

6–12'

6–12'

Propagation: Often spread by seed propagation, due to abundant germination from birds' fondness of the fruits. Spreads by root suckering, as well as cuttings and layering of branches from fall–spring.

Additional Information: Dried fruits used as a spice. Leaves, twigs, and fruits used for tea. The spicebush swallowtail and Palamedes swallowtail larvae feed on the leaves. Nectar source for butterflies and bees. Fruits favored by birds for their high fat content, especially during fall migration. White-tailed deer browse leaves and twigs.

Dormant Season Identification: Olive-green to brown twigs with light lenticels. Buds stalked, globose (round) covered with 2–3 brown scales.

Photo courtesy of Ron Muir

Sweetshrub *(Calycanthus floridus)*

Other common names: Sweet Betsy, Spicebush, Carolina Allspice, Strawberry Shrub, Sweet-Scented Shrub, Bubby Blossom, Sweet Bubby

Physical Description: A dense, rounded shrub with aromatic stems, leaves, and flowers. Scent is fruity, like strawberries. Mature plants are as tall as wide.

Leaves: Opposite arrangement. Simple, oval to elliptic with entire margins. Tapering to pointed tips. Dark green and smooth above, whitish and pubescent below. Rough to the touch and aromatic when bruised.

Flowers: Strong strawberry scented, solitary saucer-shaped flowers borne on short axillary shoots appear in May–July. Blooming begins before leaf unfurling, and continues sporadically during unfurling. Stalkless. 7–20 brownish red, strap-like sepals and petals with pointed tips.

Fruit: Urn-shaped capsule seems to clasp around stem. Ripening from green to brown, woody at maturity. Capsules contain many 1-seeded achenes, from August–September. Capsules persistent.

Habitat: Prefers moist, deep loam soils but adaptable to many soil types. An understory shrub found in mixed deciduous forests, woodland openings and edges, stream banks, and moist hillsides. Prefers sunny locations but tolerates shade. Grows taller in shady areas. Life span 20 years.

Propagation: Suckers readily. Root cuttings can be taken, as well as semi-hardwood cuttings in fall–spring. Layering done in the spring will provide new plants 15 months later that can be separated from the mother plant.

Additional Information: Bark is used sparingly as a cinnamon substitute. Leaves and flowers are also collected for culinary spice uses. Whole plant is said to have antispasmodic and disinfectant qualities. Oil distilled from flowers has long been a high-quality perfume ingredient. Nectar source for butterflies. Food for beetles in particular. Shallow suckering habit helps with topsoil erosion.

Dormant Season Identification: Naked buds round and hairy, no terminal bud. Buds sessile to recessed, their base tucked in behind U-shaped leaf scar. Brownish gray twigs with lenticels, swollen at bud nodes below solitary leaf scars. Twigs stout, gray, and aromatic when bruised.

Photo courtesy of Luke Poling

WZ ✗
BZ ✓

6–10'

6–10'

Vaccinium species

Highbush Blueberry (V. *corymbosum*), Lowbush Blueberry (*V. angustifolium)*

Physical Description: Ranging from low growing and creeping to upright and spreading. These plants spread by rhizomes and stolon rooting to form massive colonies over long periods of time. They are long lived. Spread is greater than height.

Caution: Look-alikes include buckthorn (invasive) and pokeberries (toxic).

Leaves: Alternate and short stalked, simple and leathery. Shape is elliptic. Margins are entire or very minutely serrated. Appear smooth to casual eye. Upper surface pale to dark green and shiny, lower surface lighter green. New leaves often reddish tinged.

Flowers: Urn-shaped bells that hang downwards. Occur in corymb clusters of 3–9 florets at the ends of 1-year-old twigs. 5 fused white to pinkish petals have triangular tips that curl backwards. Caylx is green with 5 broadly triangular lobes. Flower stalks are short and hairless. Bloom is in the spring, with the appearance of the leaves.

Fruit: A round berry, coated with a whitish bloom that rubs off to reveal a dark bluish black skin. Juicy-fleshed fruits are tart to sweet flavored and enjoyed by many.

Habitat: Well-drained to boggy acidic soils rich in organic matter. Moist and loose soils preferred. Highly shade tolerant, but better fruiting in sun. Found in open, old growth forests and younger conifer woods, on sandy to rocky balds, in old moist fields and meadows, along lake shores, bogs and swamps. Colonies can live hundreds of years.

Propagation: Respond vigorously to low-intensity fire by increasing growth. Spreading branch tips can be layered by anchoring them to soil surface to form new, rooted plants. Seed dispersal and germination by many birds and mammals. Spread by rhizomes at a slow rate, so minimizing large disturbances to the soil is beneficial. Softwood cuttings can be taken in the spring.

Additional Information: The deep blue fruits are high in antioxidants and vitamins. Medicinally, the leaves and twigs have been brewed as tea. Flowers provide nectar for various bees, butterflies, and hummingbirds. The fruits are relished by many birds and mammals. Larval host for many moths and butterflies.

Dormant Season Identification: Reddish or green twigs are soft and smooth. Twigs are slender and appear to zig-zag. Alternate leaf buds are small, red, and pointed, while flower buds are much larger, reddish, and round. Buds covered in overlapping scales.

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WZ ⚠
BZ ✓

2–9'

10'

Virginia Sweetspire *(Itea virginica)*

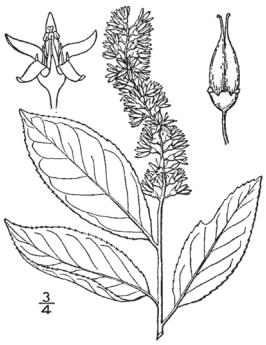
Other common names: Virginia Willow

Physical Description: Broadly spreading rounded deciduous shrub with arching branches and showy, nodding flower spikes with a strong sweet fragrance.

Leaves: Long, simple leaves alternate on stems. Shape is elliptic, pointed at the tip, and finely toothed along the margins. Petiole (leaf stalk) is pubescent and has a groove on the upper side. Color is a glossy green that turns a mix of yellow, orange, red, and purple in autumn.

Flowers: Dense, spiked clusters of drooping white florets occur at branch tips. Highly fragrant and long-lasting bloom on previous season's growth from May to June. Flowers have 4–5 petals in a star shape, with 4–5 stamens arranged between petals and a central pistil. Caylx is fused and cup-like. Flower stems and inflorescence spikes covered in gland-tipped hairs.

Fruit: Small, dry, persistent woody capsules in drooping racemes. Fruits are slender, pubescent, and contain many tiny seeds. Persistent into following year.

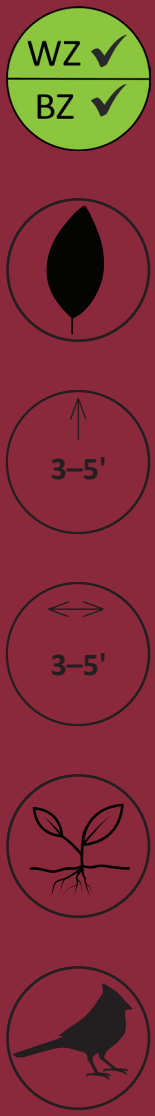


Habitat: Grows in medium to wet, slightly acidic clay/loam soils. Prefers moist soils. Found in wet woodlands and along stream banks. Full sun to heavy shade. Prolonged flood and drought tolerant once established. Life span 20 years.

Propagation: Spreads readily by root suckering to form slender-stemmed colonies. Can propagate by root cuttings. Seeds readily. Properly timed mowing during dormancy may increase suckering response.

Additional Information: Beautiful and showy year round, from bloom to fall colors. Fragrant and attractive to a diversity of pollinators. Erosion control of wet banks and plains. Fire resistant. Songbirds feed on seeds. Delicate branching provides nesting sites and shelter for wildlife.

Dormant Season Identification: Short imbricate reddish green branches have a superposed bud. Crescent-shaped leaf scar below bud. Persistent fruit capsules.



Section III

Compatible Herbaceous Plants

Herbaceous plants, by definition, have nonwoody stems. Many perennials, and nearly all annuals and biennials, are herbaceous plants. Herbaceous plants include graminoids, forbs, and ferns. Forbs are generally defined as herbaceous broad-leafed plants, while graminoids are plants with a grass-like appearance such as true grasses, sedges, and rushes.

There are hundreds of thousands of herbaceous plant species around the world. It would be nearly impossible to learn them all, but fortunately, many herbaceous plant families share similar patterns, which makes plant identification a lot simpler. If you know a plant family's pattern, you can easily spot its family members.

This next section will focus on the patterns of some of the most common herbaceous plant families:

- Aster
- Evening primrose
- Milkweed
- Mint
- Parsley
- Pea

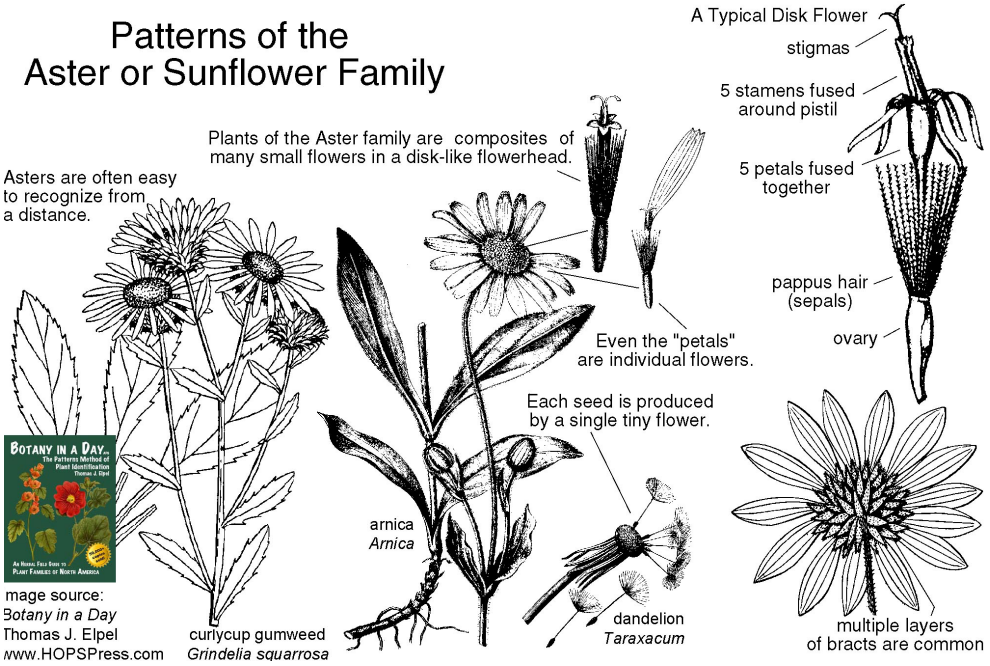
Learning these six family patterns will allow you to recognize thousands of plant species. The shape of the leaves as well as the parts of the flower described earlier in this handbook will come in handy while studying the next few pages.

Most herbaceous plants are compatible in both the wire zone and the border zone because they do not typically reach greater than 5 feet tall. Presence of diverse herbaceous plant cover can hinder growth of incompatible woody species. Knowing your herbaceous plant families allows you to help protect the plants that serve as valuable biological controls.

Aster Family

The aster family is one of the largest flowering plant families, made up of more than 20,000 species worldwide! Asters are unique because what looks like one big flower is actually a composite of several smaller flowers growing on a disc that each produce one seed.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the aster family.



On the next page, you'll find examples of compatible herbaceous plants in the aster family you might find in your area.

Joe Pye Weed
Eutrochium spp.

Sunflowers
Helianthus spp.

Blazing Star
Liatris spp.

Tickseed
Coreopsis spp.

Black-Eyed Susan
Rudbeckia spp.

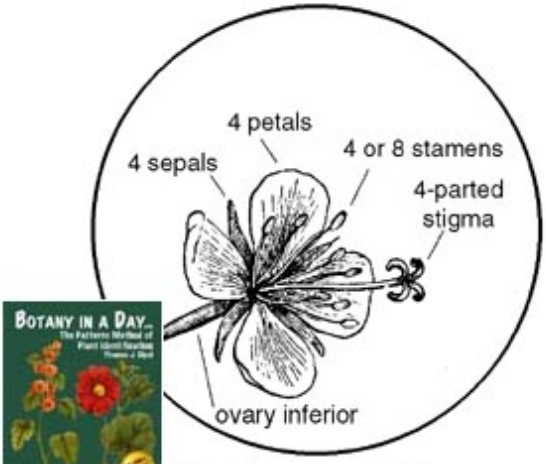
Goldenrod
Solidago spp.

Coneflower
Echinacea spp.

Evening Primrose Family

The evening primrose family is made up of more than 600 species of trees, shrubs, vines, and herbs. 4 is the magic number for members of the evening primrose family. Flowers have 4 sepals, 4 petals, a 4-parted stigma, and 4 or 8 stamens.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the evening primrose family.



Patterns of the Evening Primrose Family

On the next page, you'll find examples of compatible herbaceous plants in the evening primrose family you might find in your area.

Common Evening Primrose
Oenothera biennis

Missouri Evening Primrose
Oenothera macrocarpa

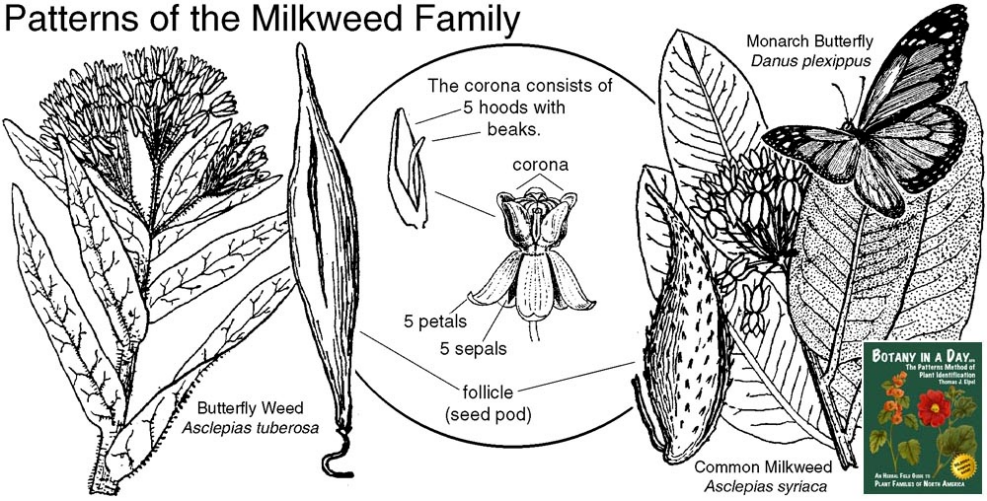
Biennial Beeblossom
Oenothera guara

Pinkladies
Oenothera speciosa

Milkweed Family

The milkweed family is made up of 2,400 plant species. Milkweeds are the required host plants for caterpillars of the monarch butterfly and thus play a critical role in the monarch's life cycle.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the milkweed family.



On the next page, you'll find examples of compatible herbaceous plants in the milkweed family you might find in your area.

Common Milkweed
Asclepias syriaca

Butterfly Milkweed
Asclepias tuberosa

Swamp Milkweed
Asclepias incarnata

Mint Family

The mint family is made up of 7,000 plant species. If you pick a plant with a distinctly square stalk and simple, opposite leaves, then it is very likely a member of the mint family. You're probably familiar with many culinary herbs that are members of the mint family, such as basil, lavender, oregano, thyme, and rosemary.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the mint family.

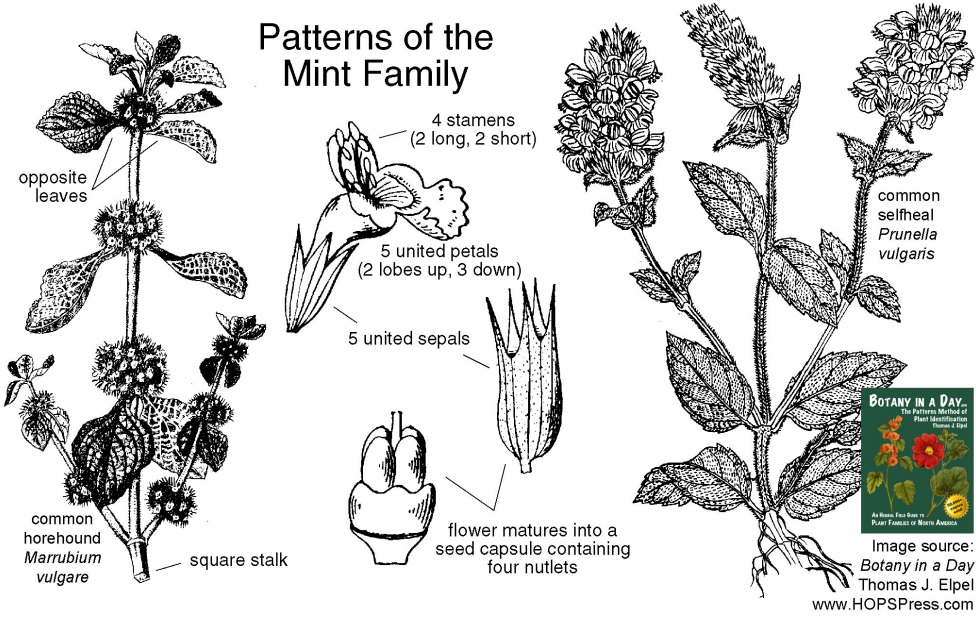
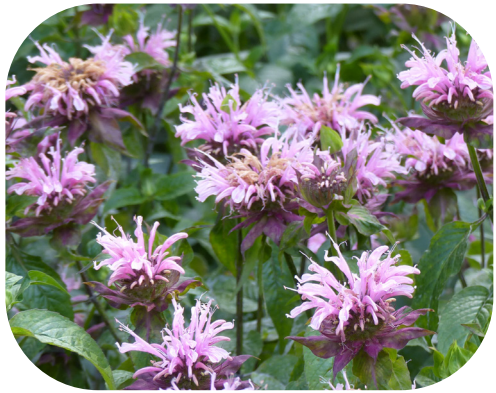


Image source:
Botany in a Day
Thomas J. Elpel
www.HOPSPress.com

On the next page, you'll find examples of compatible herbaceous plants in the mint family you might find in your area.

Slender Mountain Mint
Pycnanthemum tenuifolium



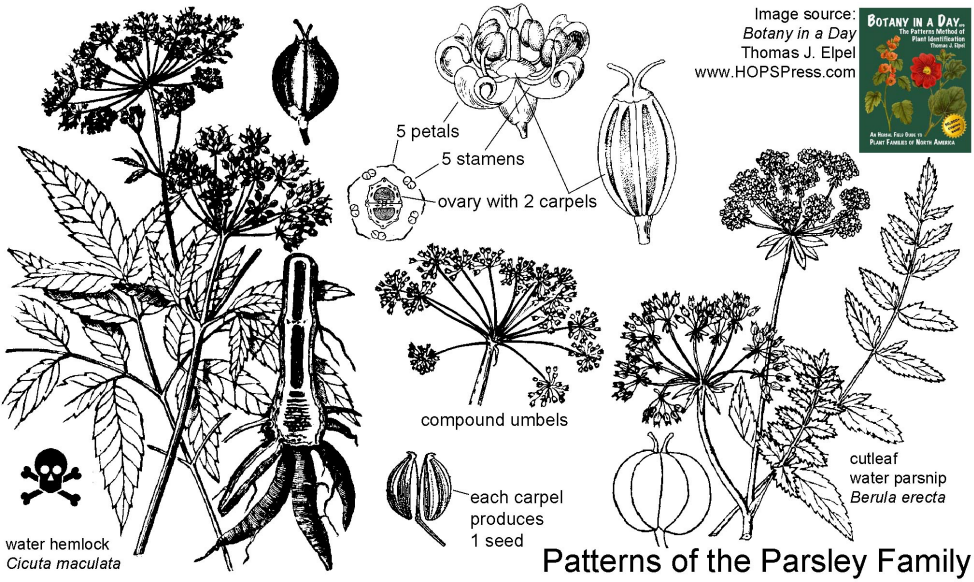
Wild Bergamot
Monarda spp.

Self-Heal
Prunella vulgaris

Parsley Family

The parsley family is also sometimes referred to as the carrot family. This significant group of flowering plants comprises approximately 3,700 species. Its members are often aromatic and are characterized by hollow stems, taproots, and flat-topped flower clusters known as umbels.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the parsley family.



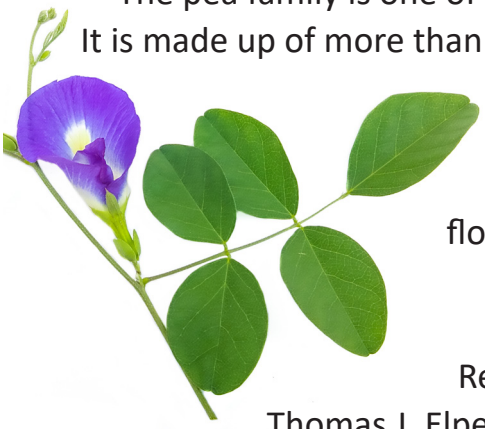
Patterns of the Parsley Family

On the next page, you'll find examples of compatible herbaceous plants in the parsley family you might find in your area.

Golden Alexander
Zizia aurea

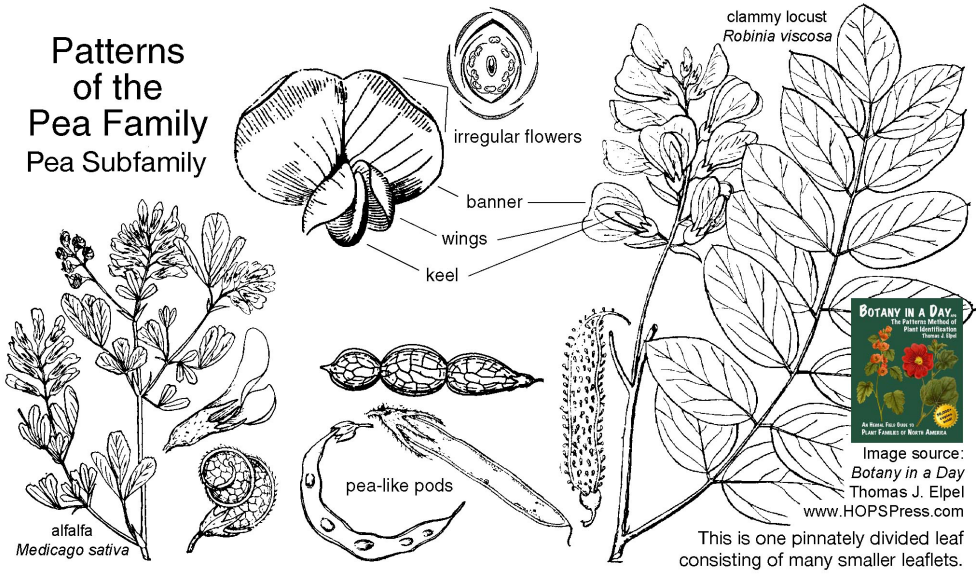
WARNING: This family includes a significant number of phototoxic species, such as giant hogweed and wild parsnip, and a smaller number of highly poisonous species such as water hemlock, poison hemlock (pictured below), water dropwort, and spotted cowbane.

Pea Family



The pea family is one of the larger plant family groups. It is made up of more than 20,000 species of trees, shrubs, vines, and herbs. Plants in the pea family are recognizable for their irregular flowers with a banner, wings, and keel.

Refer to the image below from Thomas J. Elpel's *Botany in a Day* to familiarize yourself with the characteristics shared by members of the pea family.



On the next page, you'll find examples of compatible herbaceous plants in the pea family you might find in your area.

Wild Lupine
Lupinus perennis

Yellow Bush Lupine
Lupinus arboreus

Partridge Pea
Chamaecrista fasciculata

Section IV

Appendix 1: Advanced WZBZ Application

Application of WZBZ is rarely a one-size-fits-all approach. Sloping or undulating terrain, and wire sag can create critical wire zones and effective border zones within the traditional wire zone area. Effective border zones are areas beneath and adjacent to the conductors (within the wire zone) where small trees and shrubs (approximate 5–15 feet) may be compatible if their maximum height at maturity will not breach border zone wire clearance distances, such as small valley crossings. Critical wire zones are areas within the transmission corridor where border zone wire clearances by voltage cannot be maintained for compatible brush heights of 15 feet or less.

Figure 7 provides a plan view of a typical WZBZ with one wire zone traversing the full length of the right-of-way from transmission tower/pole to transmission tower/pole bound by two border zones on either side. This situation is typical of rights-of-way on flat ground, where the additional complexity of critical wire zones is undesirable.

Figure 8 provides a plan view and a profile view of an advanced WZBZ with one critical wire zone at mid-span beneath maximum wire sag. In this example, effective border zones may be implemented within the wire zone on either side of the critical wire zone and between the exclusion zones surrounding the transmission towers or pole structures.
Similar to the traditional wire zone concept, the goal of the advanced WZBZ application of critical wire zones is to "promote a low-growing plant community of grasses, herbs, [ferns], and low-growing shrubs (approximately 3–5 feet)." Within the effective border zones, compatible vegetation may consist of "a low-growing plant community of forbs, tall shrubs, and low-growing trees below a specified height approximately 5–15 feet)." Vegetation composition within exclusion zones, just like critical wire zones, should consist of a "low-growing plant community of grasses, herbs, [ferns], and low-growing shrubs (approximately 3–5 feet)" that does not interfere with maintenance of or access to the structure.

Figure 9 provides a plan view and a profile view of an advanced WZBZ on sloping/undulating terrain where additional complexity is desirable. In this scenario, multiple critical wire zones and effective border zones exist within the traditional wire zone.

Figure 7

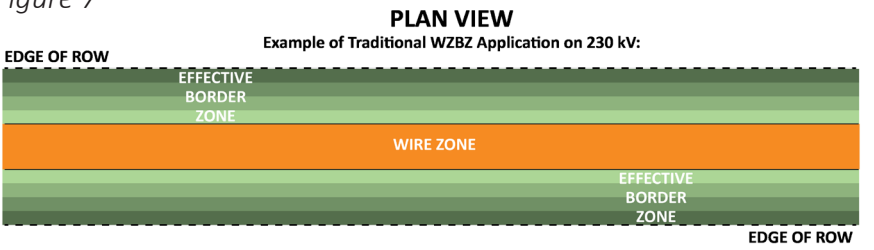


Figure 8

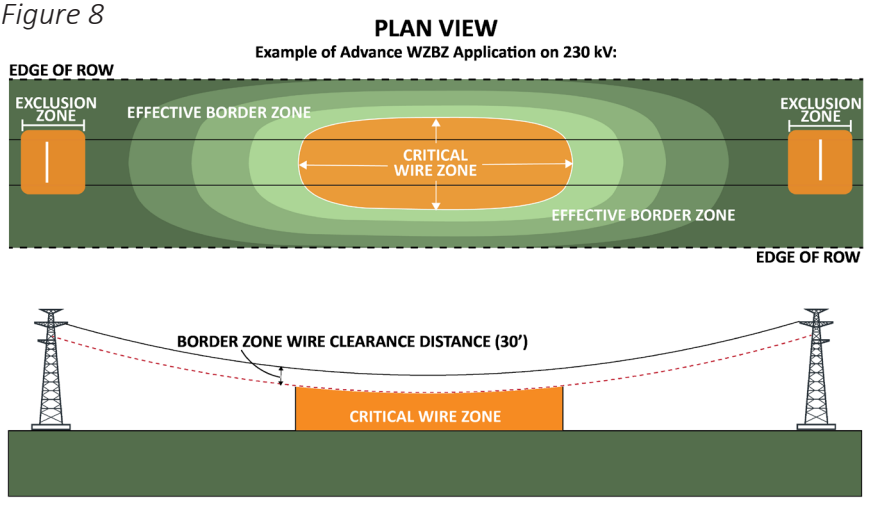
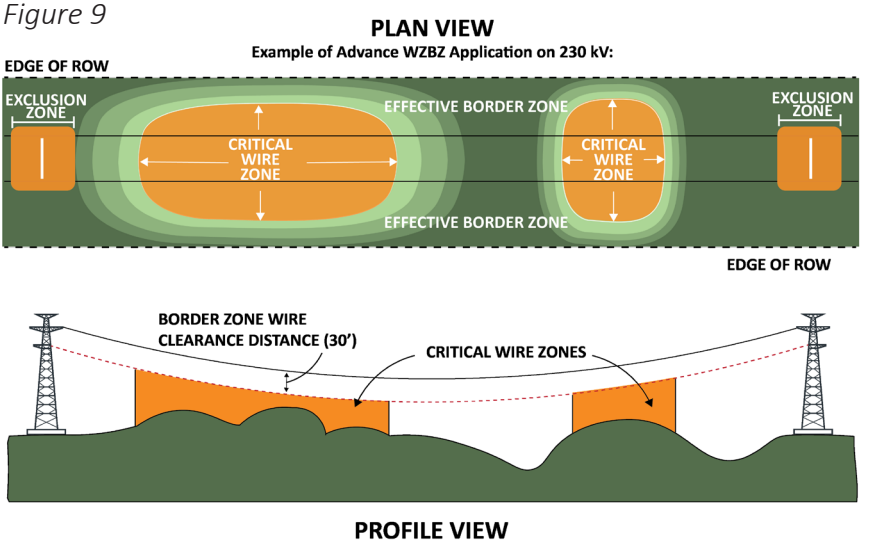


Figure 9



Appendix 2:
Compatible Woody Plants by Max. Height

Plant Name	Max Height	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	20'	25'	30'
American Cranberry	6-8"																		
New Jersey Tea	1-4'																		
Spirea species	2-4'																		
Canada Yew	3-5'																		
Sweet Fern	3-5'																		
Virginia Sweetspire	3-5'																		
Bushy St. Johns Wort	1-6'																		
Eastern Teaberry	1-6'																		
Fragrant Sumac	2-6'																		
Missouri Gooseberry	2-6'																		
Aronia species	3-6'																		
Doghobble	3-6'																		
Leatherwood	3-6'																		
Rosa species	3-6'																		
Rubus species	3-6'																		
Smooth Hydrangea	3-6'																		
Mapleleaf Viburnum	4-6'																		
Bearberry	6-8'																		
Huckleberry	2-9'																		
Forsythia species	3-10'																		
Azalea species	4-10'																		
Ilex species	5-10'																		
Catawba Rhododendron	6-10'																		
Eastern Ninebark	6-10'																		
Red Osier Dogwood	6-10'																		
Sweetshrub	6-10'																		
Corylus species	4-12'																		
False Indigo	4-12'																		
Buttonbush	5-12'																		
Spicebush	6-12'																		
Mountain Pepperbush	8-12'																		
Sambucus species	8-12'																		
Mountain Laurel	5-15'																		
Viburnum species	5-15'																		
Groundsel	6-15'																		
Witch Hazel	6-15'																		
Winged Sumac	7-15'																		
Mountain Camellia	10-15'																		
Prunus species	10-15'																		
Smooth Alder	10-15'																		
Smooth Sumac	10-15'																		
Pawpaw	15-20'																		
Alternate Leaf Dogwood	15-25'																		
Scrub Oak	3-30'																		
Crabapple species	10-30'																		
Serviceberry	10-30'																		
Redbud	15-30'																		

Species indicated in yellow can exceed the 15-foot vegetation clearance distance. Consult with local FirstEnergy TVM specialist for approval.

Glossary

Acicular: a slender leaf shape.

Alternate: (of leaves or flowers) borne singly at different levels along a stem, including spiralled parts. Contrast opposite.

Aril: an extra seed covering, typically colored and hairy or fleshy.

Axil: the upper angle between a leaf stalk or branch and the stem or trunk from which it is growing.

Biological control methods: management of vegetation by establishment and conservation of compatible, stable plant communities using competition, allelopathy, animals, insects, or pathogens.

Bipinnately compound: a leaf that is divided into multiple leaflets, with each leaflet further subdivided into smaller leaflets.

Border zone: a section of transmission corridor that extends from 15 feet outside the wires to the right-of-way edge.

Bracts: a modified leaf or scale, typically small, with a flower or flower cluster in its axil. Bracts are sometimes larger and more brightly colored than the true flower, as in poinsettia.

Browse: (of an animal) feed on leaves, twigs, or other high-growing vegetation.

Calyx: the sepals of a flower, typically forming a whorl that encloses the petals and forms a protective layer around a flower in bud.

Catkins: a flowering spike of trees such as willow and hazel. Catkins are typically downy, pendulous, composed of flowers of a single sex, and wind-pollinated.

Chemical control methods: management of incompatible vegetation through the use of herbicides or plant growth regulators.

Cold stratification: the process of subjecting seeds to both cold and moist conditions. Seeds of many trees, shrubs, and perennials require these conditions before germination will ensue.

Compatible vegetation: plant forms that are consistent with the intended use of site.

Compound: a leaf of a plant consisting of several or many distinct parts (leaflets) joined to a single stem.

Coppicing: a traditional method of woodland management that exploits the capacity of many species of trees to put out new shoots from their stump or roots if cut down.

Crenate: round-toothed or having a scalloped edge.

Critical wire zone: the area beneath and adjacent to the conductors where border zone wire clearances by voltage cannot be maintained for compatible brush heights of 15 feet or less.

Cultural control methods: land uses that preclude the growth of incompatible vegetation; for example, agricultural systems such as crops and pastures, parks, or other managed landscapes.

Dentate: having teeth or toothlike projections; toothed or notched.

Dioecious: (of a plant or invertebrate animal) having the male and female reproductive organs in separate individuals.

Drupes: a fleshy fruit with thin skin and a central stone containing the seed (e.g., a plum, cherry, almond, or olive).

Emetic: a medicine or other substance that causes vomiting.

Entire: a leaf, petal, or sepal margin that has a smooth, undivided outline.

Glabrous: (chiefly of the skin or a leaf) free from hair or down; smooth.

Host plant: refers to a plant whereby various types of organisms such as butterflies and other insects lodge and subsist.

IHM: integrated habitat management.

Incompatible vegetation: all vegetation that may grow tall enough to interfere with overhead electric facilities, impede access and/or the ability to visually inspect the transmission corridor from structure to structure to ensure continued safe and reliable transmission service.

IVM: a system of managing plant communities in which compatible and incompatible vegetation are identified, action thresholds are considered, treatment methods are evaluated, and selected treatments are implemented to achieve specific objectives.

Lanceolate: shaped like the head of a lance; a narrow oval shape tapering to a point at each end.

Layering: method of propagation in which plants are induced to regenerate missing parts from parts that are still attached to the parent plant.

Leaf scar: the mark left by a leaf after it falls off the twig.

Leaflets: each of the leaflike structures that together make up a compound leaf, such as in the ash and horse chestnut.

Lenticels: one of many raised pores in the stem of a woody plant that allows gas exchange between the atmosphere and the internal tissues.

Linear: leaves, such as those of grasses, that are elongated and parallel sided for much of their length.

Lobed: (of a leaf) having lobes or divisions extending less than halfway to the middle of the base.

Manual control methods: use of hand-operated tools, such as handsaws and small power tools.

Mechanical control methods: use of equipment-mounted saws and mowers.

Monoecious: (of a plant or invertebrate animal) having both the male and female reproductive organs in the same individual; hermaphrodite.

Native plant: a plant that is a part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem.

Obovate: (of a leaf or similar flat part) shaped like the longitudinal section of an egg, with the narrower end at the base; inversely ovate.

Opposite: set against each other, but separated by the whole diameter of the stem, as two leaves at the same node.

Ovate: (of a leaf or similar flat part) shaped like an egg and flat, with the broad end toward the base.

Palmately compound: leaflets radiating outwards from the end of the petiole, like fingers off the palm of a hand.

Palmately lobed: a compound leaf with leaflets arranged in a radial pattern, like fingers off the palm of a hand.

Panicles: a loose branching cluster of flowers, as in oats.

Petiole: the stalk that joins a leaf to a stem; leafstalk.

Physical control methods: use of manual or mechanical equipment that may discourage incompatible growth and may also stimulate compatible coverage.

Pinnate: (of a compound leaf) having leaflets arranged on either side of the stem, typically in pairs opposite each other.

Pinnately compound: a row of leaflets forms on either side of an extension of the petiole called the rachis.

Pinnately lobed: leaves that have the lobes arranged on either side of a central axis, like a feather.

Pistil: the female organs of a flower, comprising the stigma, style, and ovary.

Prescribed fire control methods: involve the planned, controlled use of fire to meet management objectives.

Propagation: reproduction by natural processes.

Rachis: a stem of a plant, especially a grass, bearing flower stalks at short intervals.

Reniform: shaped like a kidney: in leaves, having the petiole attached at the notch; in seeds or spores, shaped generally like a kidney bean.

Rhizomes: a continuously growing horizontal underground stem that puts out lateral shoots and adventitious roots at intervals.

Rosette: a circular arrangement of leaves or of structures resembling leaves.

Sagittate: (of a leaf shape) like an arrow head without flaring base lobes.

Scarification: weakening, opening, or otherwise altering the coat of a seed to encourage germination.

Sepal: each of the parts of the calyx of a flower, enclosing the petals and typically green and leaflike.

Serrate: (of leaves) having a margin of forward-pointing teeth.

Sessile: (of a plant or animal structure) attached directly by its base without a stalk or peduncle.

Simple: a single leaf that is never divided into smaller leaflet units.

Spp.: abbreviation for species (plural).

Stamen: the male fertilizing organ of a flower, typically consisting of a pollen-containing anther and a filament.

Stipules: a small leaflike appendage to a leaf, typically borne in pairs at the base of the leaf stalk.

Strobili: the cone of a pine, fir, or other conifer.

Toothed: a leaf margin with a serrated or tooth-like edge.

Trifoliate: (of a compound leaf) having three leaflets.

Whorled: an arrangement of leaves, sepals, petals, stamens, or carpels that radiate from a single point and surround or wrap around the stem or stalk.

Wire zone: section of a utility transmission corridor directly under the wires, and extending to 15 feet on each side of the wires.

Acknowledgements

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