Japanese barberry
Photo: Leslie Mehrhoff, UConn, via bugwood.org

Winterberry
Photo: Clair Ryan, MIPN

Don't Plant That, Plant This

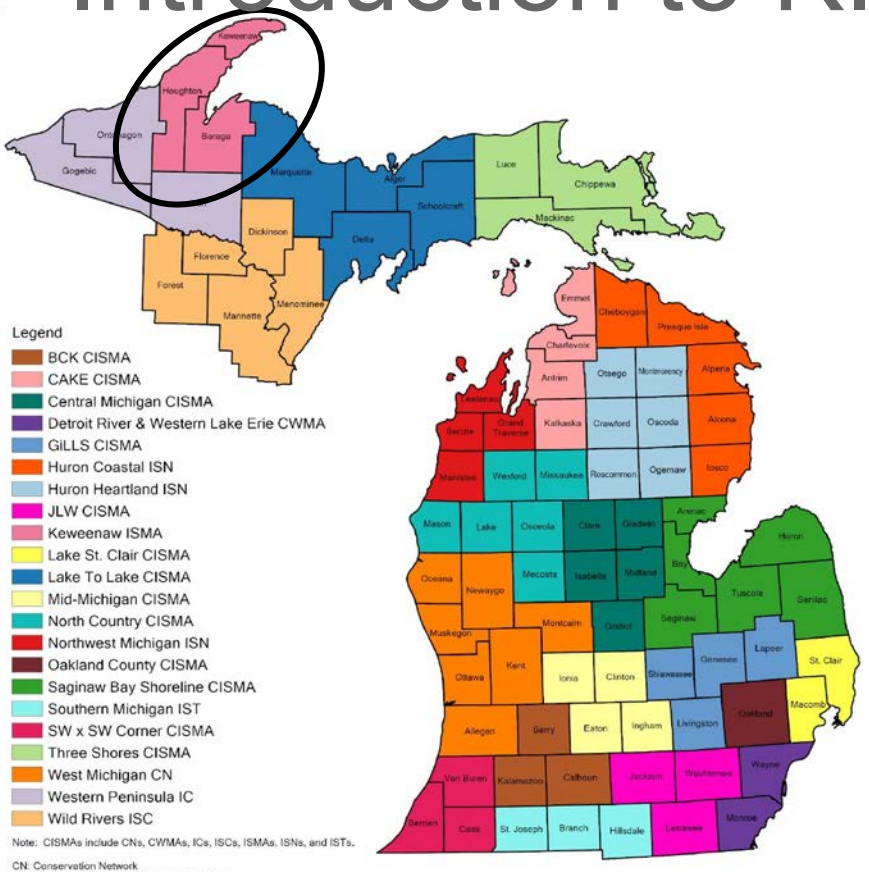
A Guide to Choosing Better Garden Plants — and Avoiding the Troublemakers

Dr. Sigrid Resh

Research Asst. Professor, Michigan Technological University

Coordinator, Keweenaw Invasive Species Management Area

Introduction to KISMA



KISMA
Keweenaw Invasive Species Management Area

Keweenaw
Invasive
Species
Management
Area

Our Mission

To facilitate cooperation and education among federal, state, tribal, and local groups and landowners to prevent and manage invasive species across land ownership boundaries and to foster native aquatic and terrestrial communities.

Partners

*DNR includes Michigan DNR: Forest Resource Division and Michigan DNR: Parks and Recreation Division (Craig Lakes, Fort Wilkins, McLain, and Twin Lakes SPs)

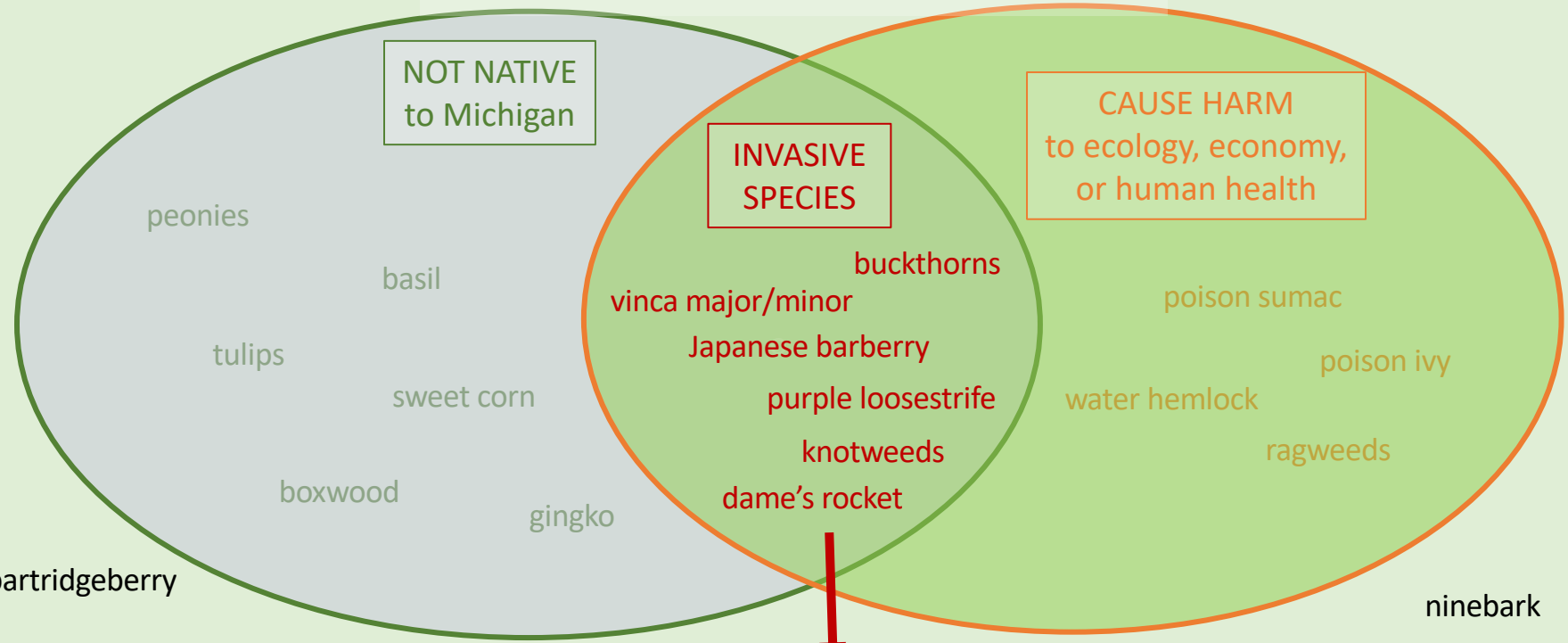
*National Park Service includes Keweenaw National Historical Park and Isle Royale National Park

*Michigan Conservation Districts include the Iron Baraga and the Houghton Keweenaw Districts

Funding Sources

Who we are

All Plant Species Growing in the Midwest



northern white cedar

white pine

partridgeberry

ninebark

winterberry

northern bush honeysuckle

wild lily of the valley

Invaders for sale: the ongoing spread of invasive species by the plant trade industry

Evelyn M Beaury[1*], Madeline Patrick[2], and Bethany A Bradley[1,2]

Table 1. Count and percentage of invasive plants available for purchase as ornamentals within the continental US

List	Number of species searched	Number of species available for purchase	Percentage of species available for purchase
Regulated species*	688	343	50%
Unregulated species	597	435	73%
Imported ornamentals+	434	360	83%
All species	1285	778	61%

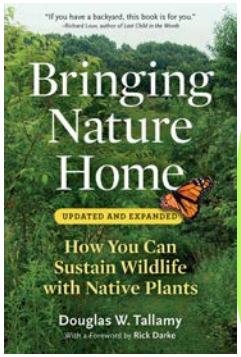
Notes: *includes federal noxious weeds (*n* = 98, 20 found for sale); +species originally introduced into the US as ornamentals.

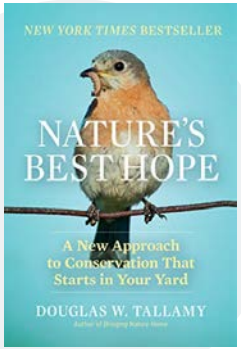
 Beaury et al. 2021. Frontiers in Ecology and the Environment, Vol. 19(10), 550-556.

Plant choice matters

- plants are more than decorations
- plants are critical components of ecosystems because they provide connections with soil organisms, insects, amphibians, birds, mammals (including us)
- if you don't have organisms eating plants and passing on the energy they harness, the rest of the food web collapses and we have biodiversity crises
- nonnative plants, particularly invasive plants, are poor at passing along their energy and supporting those organisms

source: Dr. Doug Tallamy, 2020, **Nature's Best Hope**





> "Unless we modify the places we live, work, and play to meet not only our own needs but the needs of other species as well, nearly all species of wildlife native to the United States will disappear forever. This is not speculation…Our preserves and national parks are not adequate to prevent the predicted loss of species, and we have run out of the space required to make them big enough. For conservationists, and indeed for anyone who celebrates life on earth, this is perhaps the direst possible consequence of the human enterprise."
>
> *Dr. Doug Tallamy, 2007, **Bringing Nature Home***

PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

More than 75 percent decline over 27 years in total flying insect biomass in protected areas

Caspar A. Hallmann, Martin Sorg, Eelke Jongejans, Henk Siepel, Nick Hofland, Heinz Schwan, Werner Stenmans, Andreas Müller, Hubert Sumser, Thomas Hörren, Dave Goulson, Hans de Kroon

Published: October 18, 2017 • https://doi.org/10.1371/journal.pone.0185809

BIODIVERSITY LOSS

Decline of the North American avifauna

Kenneth V. Rosenberg[1,2]*, Adriaan M. Dokter[1], Peter J. Blancher[3], John R. Sauer[4], Adam C. Smith[5], Paul A. Smith[3], Jessica C. Stanton[6], Arvind Panjabi[7], Laura Helft[1], Michael Parr[2], Peter P. Marra[8]†

Species extinctions have defined the global biodiversity crisis, but extinction begins with loss in abundance of individuals that can result in compositional and functional changes of ecosystems. Using multiple and independent monitoring networks, we report population losses across much of the North American avifauna over 48 years, including once-common species and from most biomes. Integration of range-wide population trajectories and size estimates indicates a net loss approaching 3 billion birds, or 29% of 1970 abundance. A continent-wide weather radar network also reveals a similarly steep decline in biomass passage of migrating birds over a recent 10-year period. This loss of bird abundance signals an urgent need to address threats to avert future avifaunal collapse and associated loss of ecosystem integrity, function, and services.

SCIENCE • 19 Sep 2019 • Vol 366, Issue 6461 • pp. 120-124 • DOI: 10.1126/science.aaw1313

Steps to restoring habitat in our own home spaces*

1. reduce lawn space, lawns are biodiversity deserts
2. remove invasive species—85% of our invasive woody plants in the US are escapees from our gardens
3. plant keystone species
4. be generous with plantings—all layers of plants from ground covers to herbaceous to shrub to trees layers
5. plant for specialized pollinators
6. network with neighbors to creating the habitat connectivity
7. create conservation hardscape—cover window wells, reduce artificial lighting
8. create caterpillar pupations sites—leave areas unraked on leaves, plant ground cover under a tree not lawn
9. don't spray pesticides or fertilizers—homeowners spray more insecticide per acre, on average, than the entire agricultural industry

*source: https://joegardener.com/podcast/why-plant-choices-matter-natures-best-hope-doug-tallamy/

Smartphone App Resources

MIPN.org
Midwest Invasive Plant Network

Landscape Alternatives

Version 2

MISIN
Midwest Invasive Species
Information Network

***free* for iOS & Android**

The MISIN smartphone app provides a mobile solution for the capture of invasive species field observation data. You can play an important role in the early detection and rapid response to new invasive threats in your area by contributing invasive species observations to the MISIN database.

- Identify and report 400+ invasive plant and animal species
- Capture and submit species observations from the field
- Include images taken in the field with your observation
- Browse images and species information on the top Midwest invaders

ANDROID APP ON Google play

Available on the App Store

Online Resources

Places to find native plants ideas*	Places to buy native plants
https://woodyinvasives.org/or search “WiGL collaborative”	https://www.upnativeplants.com or search “UP Native Plants”
https://www.nwf.org/NativePlantFinder/Plants	prairie nursery (Wisconsin)—easiest to just type name into google
http://nativeplant.com/plants/search/input	prairie moon nursery (Minnesota)—easiest to just type name into google
https://www.gardenia.net	

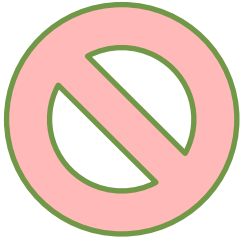
*These resources are often meant to be useful to broad regions of the country, so when selecting a species for the UP, make sure that species is appropriate using species maps (Prairie Moon Nursery, Prairie Nursery, and University of Michigan online herbarium) and other reputable suppliers that provide that information.

KISMA native plant list available on our webpage:

https://www.mtu.edu/kisma/native-alternatives/2.6.22-native-species-tables.pdf

Scientific name	Common name	Native to the UP	Native regionally (northern half of MI, WI, MN)	Available at Designs by Nature (Marquette)	Available at Prairie Moon Nursery (MN)	Available at Prairie Nursery (WI)
SHADE AND SPECIMEN TREES						
Acer rubrum	red maple	✓	✓			
Acer saccharinum	silver maple	✓	✓			
Acer saccharum	sugar maple	✓	✓			
Acer negundo	boxelder	✓	✓			
Betula alleghaniensis	yellow birch	✓	✓			
Betula papyrifera	paper birch	✓	✓			
Carya cordiformis	bitternut hickory		✓			
Carya ovata	shagbark hickory		✓			
Fagus grandifolia	American beech	✓	✓			

All strata for vertical diversity



- Groundcover Layer

- Tall herbaceous

- Shrubs

- Trees

Don’t plant these ground cover plants and bulbs…

Greater/lesser periv

Vinca major/V. minor

Removal Methods: ???

Pull, rake, mow, or dig? → Re-sprout occurs

Indiana DNR suggests solarization method:

- Cut Vinca down to ground
- Dig up soil 4-6 in. deep
- Sift out rhizomes and plant fragments
- Replace soil
- Cover area with dark plastic/tarp
- Monitor for 1-2 seasons, using same removal method for any re-sprout
- Bag all removed plant material for disposal

sources: https://gobotany.nativeplanttrust.org/species/vinca/major/
https://gobotany.nativeplanttrust.org/species/vinca/minor/
https://www.in.gov/dnr/files/Periwinkle.pdf

Photo: Dr. Sigrid Resh

Goutweed/snow on the mountain

Aegopodium podagraria

Removal Methods: ???

Pull, rake, dig, or mow? → Re-sprout occurs

- Solarization suggested, using same method as Periwinkle

Modified solarization method:

- Mow or cut back goutweed 1 in. tall
- Lay tarps over cut area
- Monitor for 1-2 growing seasons
- Bag all removed plant material for disposal

sources: https://www.gardeningchannel.com/how-to-get-rid-of-invasive-bishops-weed-goutweed/, http://www.ecosystemgardening.com/kill-the-bishops-weed.html

Lily of the valley

Convallaria majalis

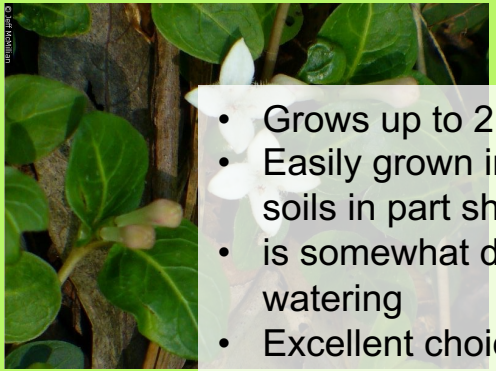
Photo: Wikipedia

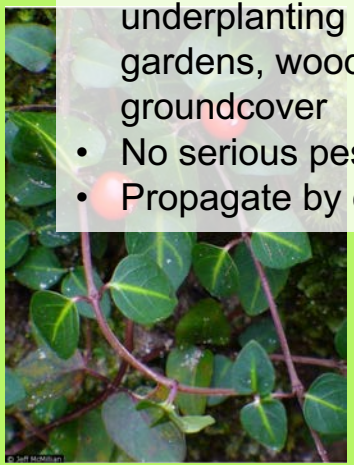
Photo: Dr. Sigrid Resh

Native replacements for ground cover

Partridge Berry

Mitchella repens





- Grows up to 2 in tall (5 cm) and 6-12 in. wide (15-30 cm).
- Easily grown in humus-rich, moist, acidic, well-drained soils in part shade to full shade. Tolerates dry soils and
- is somewhat drought tolerant, but best with consistent watering
- Excellent choice for shaded beds and borders, underplanting shrubs and roses, cottage gardens, rock gardens, woodland gardens. A wonderful evergreen groundcover
- No serious pest or disease issues.
- Propagate by cuttings or division; very difficult from seed

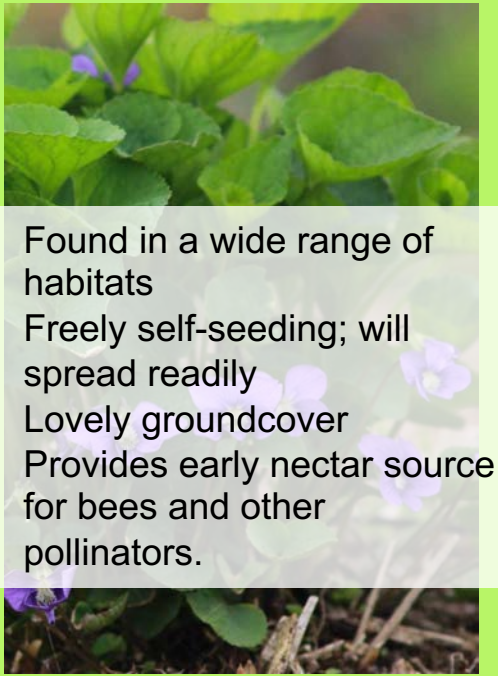
Sources: https://www.fs.fed.us/wildflowers/plant-of-the-week/mitchella_repens.shtml; https://www.gardenia.net/plant/mitchella-repens

Photo: Dr. Sigrid Resh

Additional groundcover possibilities from Prairie Moon Nursery

Common blue violet

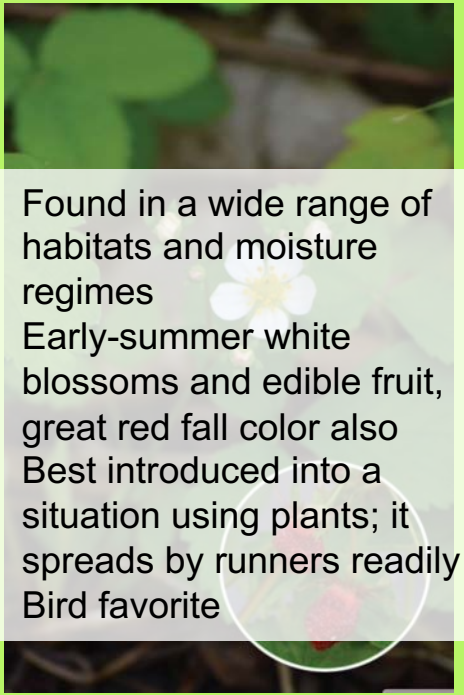
Viola sororia



- Found in a wide range of habitats
- Freely self-seeding; will spread readily
- Lovely groundcover
- Provides early nectar source for bees and other pollinators.

Wild Strawberry

Fragaria virginiana



- Found in a wide range of habitats and moisture regimes
- Early-summer white blossoms and edible fruit, great red fall color also
- Best introduced into a situation using plants; it spreads by runners readily
- Bird favorite

Pussytoes

Antennaria plantaginifolia

- Late spring flowers look like tiny cat's feet
- Flowers will reach up to about a foot in height, but the leaves grow at ground level
- Spread by rhizomes
- Pussytoes provide a good ground cover for dry areas
- Larvae hosts for the American Painted Lady (*Vanessa virginensis*)

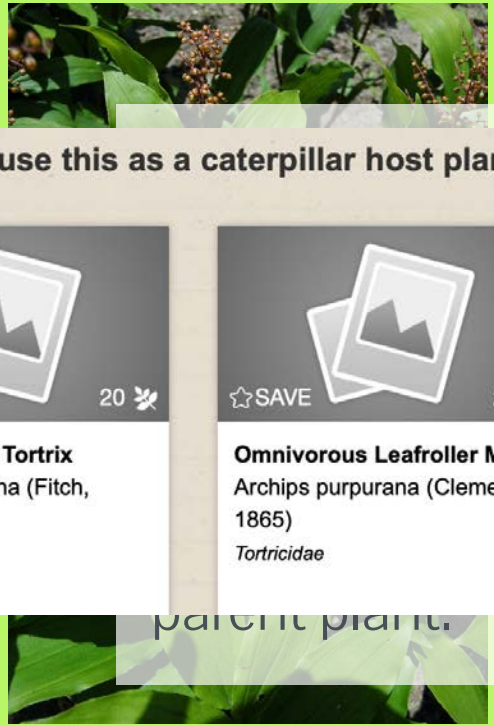
Wild lily of the valley or Canada mayflower

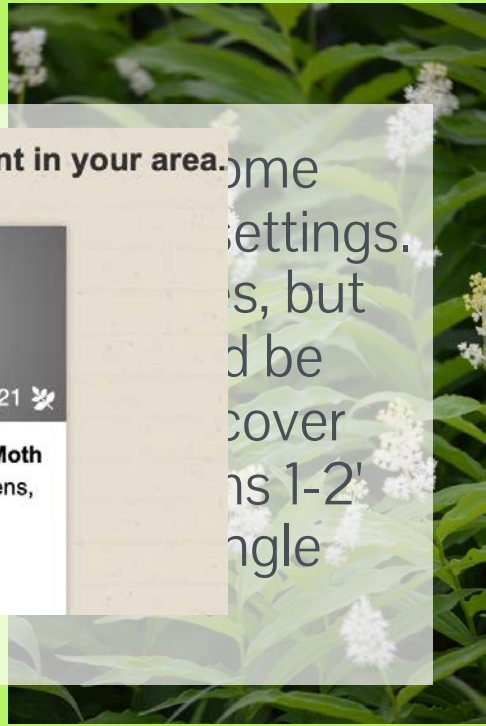
Maianthemum canadense

Feathery false lily of the valley, false Solomon's seal, smilacina

Maianthemum racemosum (Link) ssp. *racemosum*

Photo: Stefan Bloodw





3 species of butterflies and moths use this as a caterpillar host plant in your area.

Burdock Border, Potato-Stalk B ...
Papaipema cataphracta
Noctuidae

White Triangle Tortrix
Clepsis persicana (Fitch, 1856)
Tortricidae

Omnivorous Leafroller Moth
Archips purpurana (Clemens, 1865)
Tortricidae

Photo: Julie Makin

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parent plant.

Sources: https://www.wildflower.org/plants/result.php?id_plant=maca4; https://www.prairiemoon.com/; https://www.nwf.org/NativePlantFinder/Plants

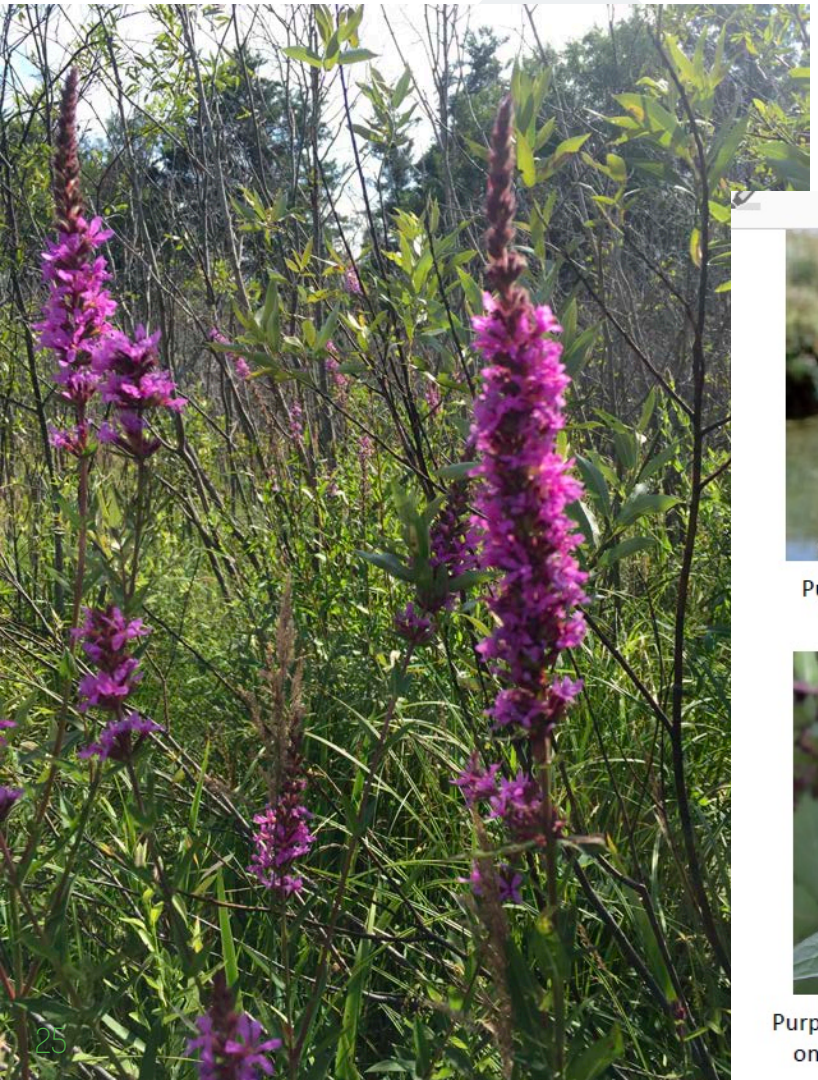
Maianthemum canadense in forest edge setting

Photo: Dr. Sharad Resh

Maianthemum stellatum (Starry solomons plume) with prairie smoke; https://www.prairiemoon.com/

Don’t plant these taller herbaceous plants

All of the following species came to our area as landscaping species and have spread and continue to spread in our native forests and/or wetlands!



Purple Loosestrife can have multiple stems and flower heads which produce millions of seeds.

Purple Loosestrife stems are square and ridged.

Purple loosestrife leaves are smooth and opposite on the stem, with distinctive 'scalloped' veins.

Purple loosestrife flowers have five or six petals.

Photo: Dr. Sigrid Resh

- Perennial, herbaceous flowering plant grows to 6 feet
- Simple, round to heart-shaped leaves are 1-2 feet across, with dense hairs on the underside
- Single leaves grown on hollow, ridged, 3-4 foot stems somewhat similar in appearance to rhubarb
- Flowers are pink to purple and grow on a spike that emerges before foliage in spring
- Fruit and seeds appear in a white, flower-like tuft

Photos: William M. Ciesla, Forest Health Management International, Bugwood.org

Butterbur

Petasites hybridus

Dame's rocket

Hesperis matronalis

source: https://www.appliedeco.com/dames-rocket/

Native replacements for tall herbs

Taller herbaceous natives for moist to wet soils

FIREWEED: A native plant found in wetlands and wet prairies. Flowers have only 4 petals plus 4 narrow bracts; spikes are wider than loosestrife, tapering to a tip.

BLUE VERVAIN: Another native wetland plant with small flowers on a tall spike. The flowers are much more blue than loosestrife, and the leaves have toothed edges, not smooth like loosestrife.

MARSH or SWAMP MILKWEED: A wetland native butterfly favorite, with flower heads that are round to slightly flat-topped. Its leaves are opposite, similar to loosestrife; so be sure to check the flower shape!

JOE-PYE WEED: A native wetland plant growing 2 to 7 feet tall, with 3 to 6 whorled leaves on stem and round flower head

Goldenrod *Solidago sp.*






ATTRACTS:

135 species of butterflies and moths use this as a caterpillar host plant in your area. Our top 15:

The Astroid, Asteroid Paint, G ...
Cucullia asteroides
Noctuidae

Brown-Hooded Owlet, Calico Pai ...
Cucullia convexipennis
Noctuidae

Green Leuconycta
Leuconycta diphteroides
Noctuidae

Wavy-Lined Emerald, Camoflaged ...
Synchlora aerata
Geometridae

Helvibotys helvialis
Crambidae

Source: https://www.prairiemoon.com/search.html?Search=solidago#/filter:ss_midwest:MI
https://www.nwf.org/NativePlantFinder/Plants/3081

Blazing star

Liatris spicata

- Grows to 5’ tall (150 cm)
- Most moisture-tolerant of Liatris species, this Blazing Star does equally well in sunny, well-drained garden sites. For about three weeks in mid- to late summer, it sports purple wands of stemless, crowded flowers, facing all directions and blossoming from the top of the stem down
- Great for pollinators and birds

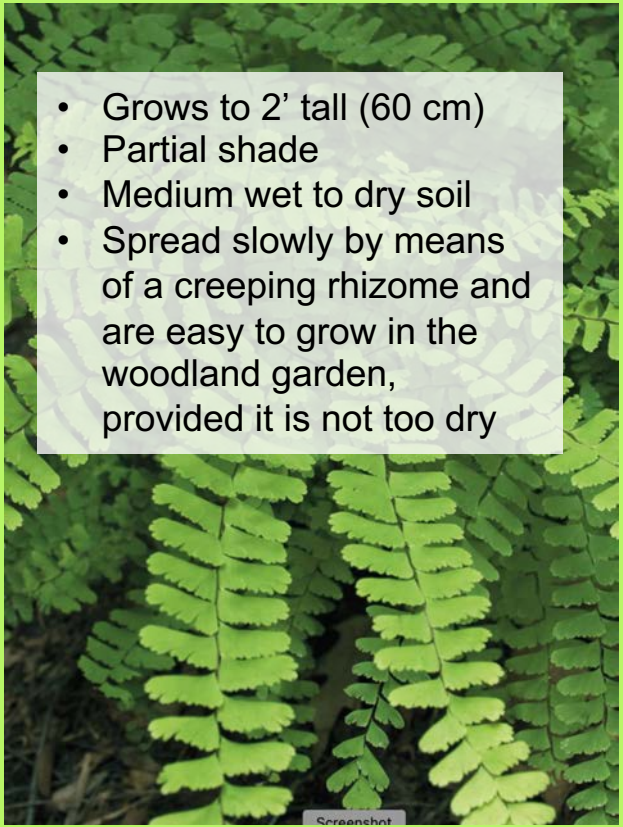
Little bluestem

Schizachyrium scoparium

- Grows to 3’ tall (90 cm)
- Full to partial sun
- Medium to dry soil
- Great for pollinators and birds

Maidenhair fern

Adiantum pedatum



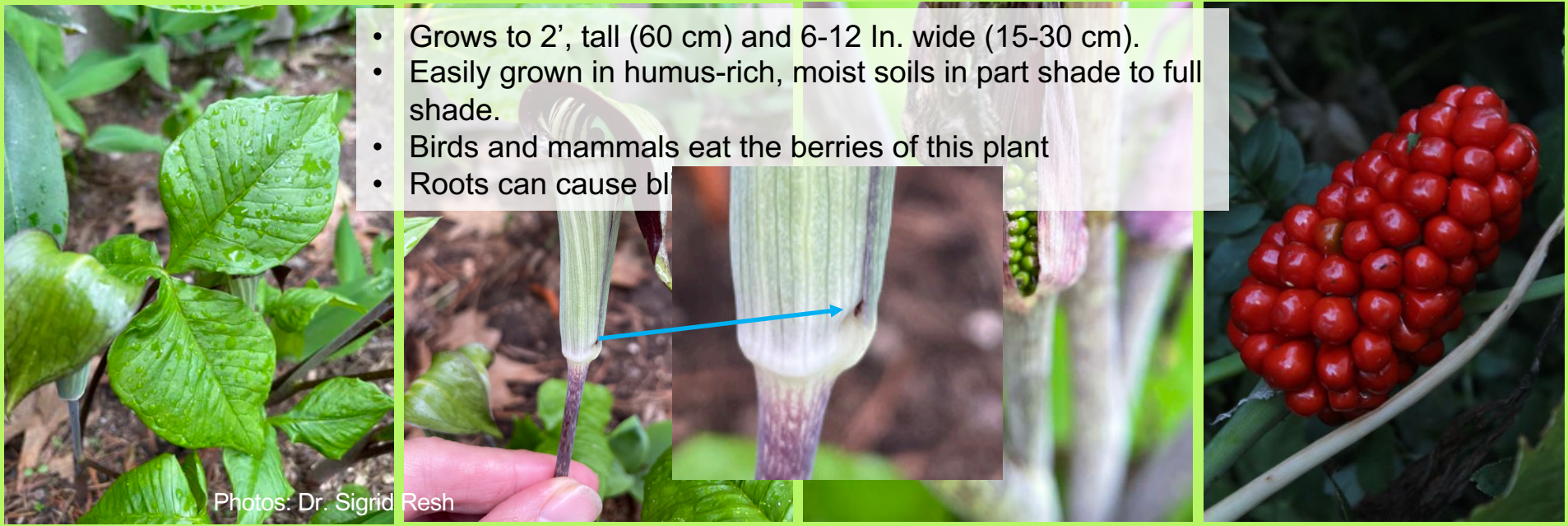
- Grows to 2’ tall (60 cm)
- Partial shade
- Medium wet to dry soil
- Spread slowly by means of a creeping rhizome and are easy to grow in the woodland garden, provided it is not too dry

Sources: https://www.prairiemoon.com/

Jack in the pulpit

Arisaema triphyllum (L.) Schott

- Grows to 2', tall (60 cm) and 6-12 In. wide (15-30 cm).
- Easily grown in humus-rich, moist soils in part shade to full shade.
- Birds and mammals eat the berries of this plant
- Roots can cause bl



Photos: Dr. Sigrid Resh

source: Lady Bird Johnson Wildflower Center; https://www.wildflower.org/plants/result.php?id_plant=ARTR

Smooth Solomon's seal

Polygonatum biflorum (Walter) Elliott

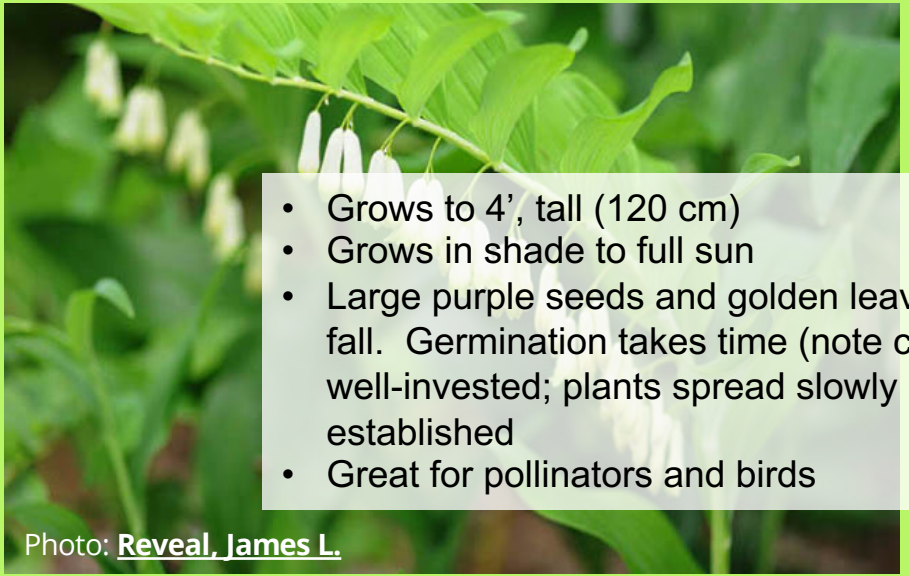
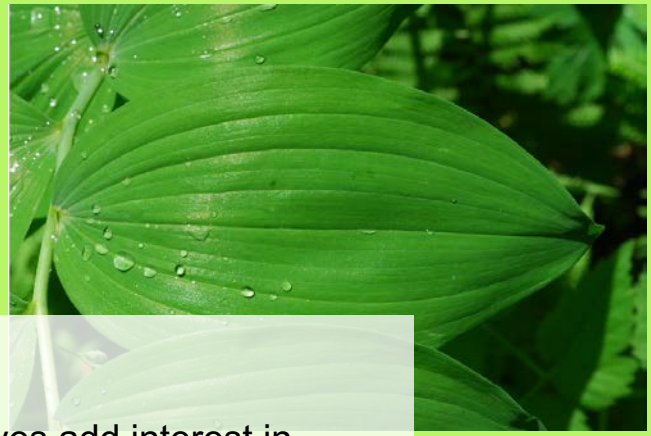
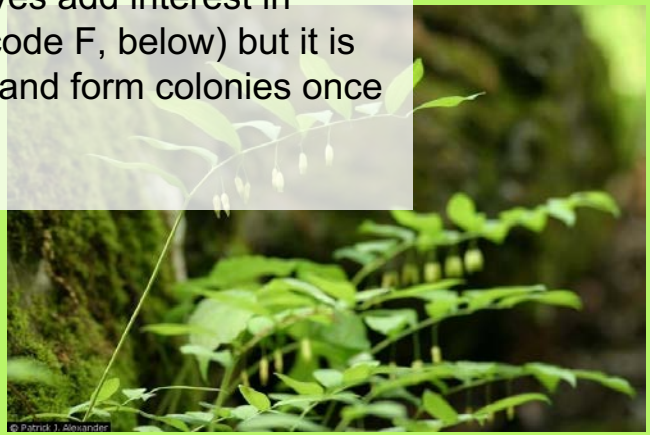


Photo: **Reveal, James L.**





- Grows to 4', tall (120 cm)
- Grows in shade to full sun
- Large purple seeds and golden leaves add interest in fall. Germination takes time (note code F, below) but it is well-invested; plants spread slowly and form colonies once established
- Great for pollinators and birds

Sources: Lady Bird Johnson Wildflower Center https://www.wildflower.org/plants/result.php?id_plant=POBI2; https://plants.usda.gov/home/; https://www.prairiemoon.com/; https://gobotany.nativeplanttrust.org/species/polygonatum/biflorum/

PAIR WITH...

Arisaema triphyllum
JACK-IN-THE-PULPIT

$3.00 - $10.00

Asarum canadense
WILD GINGER

$3.00 - $20.00

Cardamine concatenata
TOOTHWORT

$3.00 - $8.00

Caulophyllum thalictroides
BLUE COHOSH

$3.00 - $8.00

source: https://www.prairiemoon.com/

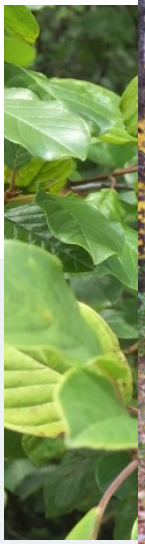
Don’t plant these shrubs…

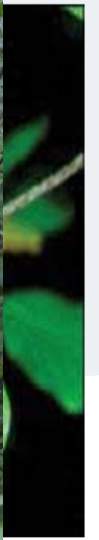
All of the following species came to our area as landscaping species and have spread and continue to spread in our native forests and/or wetlands!

knotweeds

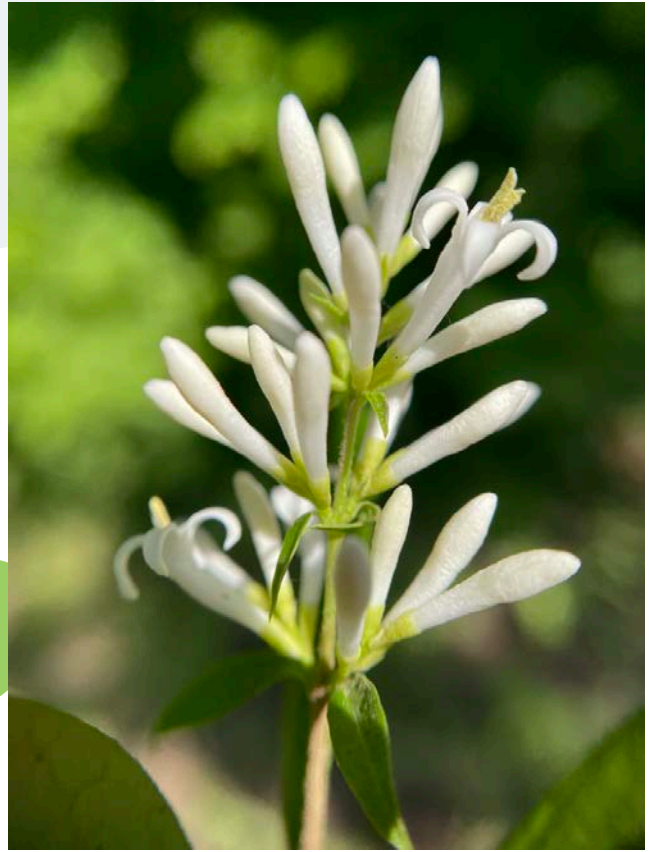
Fallopia sachalinensis and *F. japanica*


Quilt House giant knotweed July 2015
Repeated cutting of site every 2-3 weeks of growing season since 2017. It used to take up to 2 days for a crew of 6 people to cut and pile all the knotweed on carpet/tarps to dry in the sun. Now it takes about 1.5 hours.
WICKLEY AGENCY, INC.
Auto-Owners Insurance





Honeysuckles (Tartarian, Morrow's, Bell's) Lonicera sp.



Privet

Ligustrum obtusifolium and others

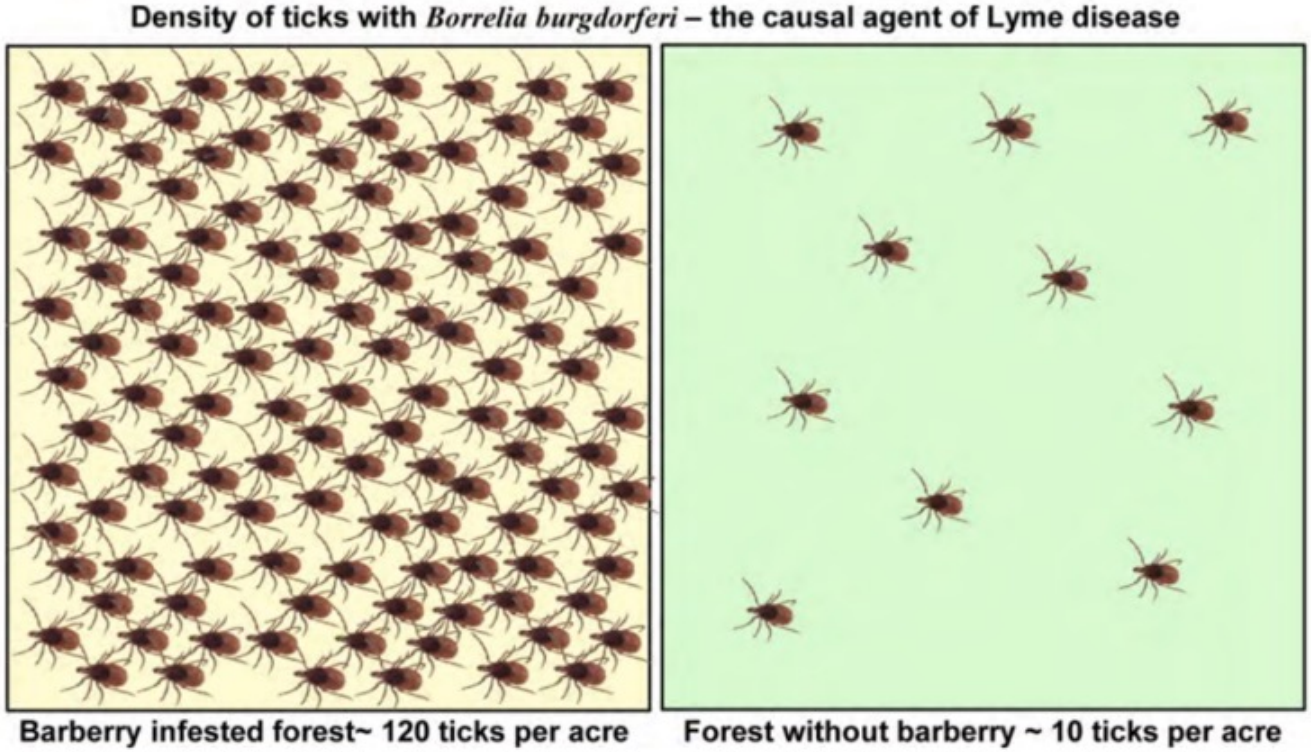
Japanese barberry

Berberis thunbergii

Sources: WiGL Collaborative and Midwest Information Network (MISIN)

Japanese Barberry—note-worthy health issue

- Researchers in CT found a higher density of **deer ticks** carrying Lyme disease under barberry infestations than in other habitats



Fecundity of Japanese Barberry (*Berberis thunbergii*) Cultivars and Their Ability to Invade a Deciduous Woodland

Mark H. Brand, Jonathan M. Lehrer, and Jessica D. Lubell*

- maturity of evaluated barberry is important—cultivars exhibited significant increases in fruits per plant, producing as much as 35,000 fruits plant^{-1} and even fruitless cultivars produced fruit 4-5 years later.
- 12.5 and 31% cultivar seed sown in a deciduous woodland germinated, and seedlings survived at rates between 5.6 and 29.3%
- even cultivars producing as few as 100 seeds annually have the potential to contribute a few seedlings each year to a natural area

Brand, M. H., Lehrer, J. M., & Lubell, J. D. (2012). Fecundity of Japanese Barberry (Berberis thunbergii) Cultivars and Their Ability to Invade a Deciduous Woodland. *Invasive Plant Science and Management*, *5*(4), 464–476. https://doi.org/10.1614/ipsm-d-12-00029.1

Autumn olive

Elaeagnus umbellata

photo: James Miller, USDA Forest Service, via bugwood.org

Photo: Chris Evans, University of Illinois, via bugwood.org

Winged burning bush

Euonymus alatus

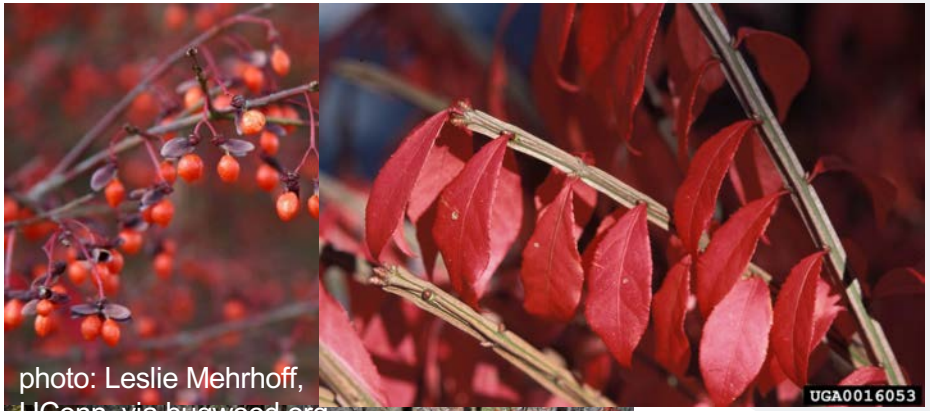


photo: Leslie Mehrhoff, UConn, via bugwood.org

source: WiGL collaborative

Native replacements for invasive shrubs

Winterberry

Ilex verticillata

Photo: Clair Ryan, MIPN

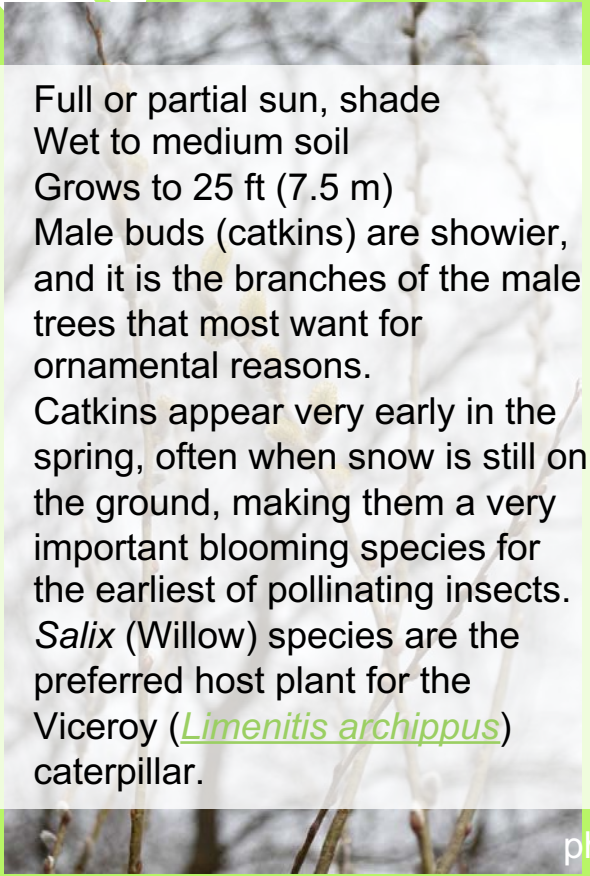
- Grows to 10’ tall (9 m)
- Full sun to shade
- Wet to medium soil
- Great for birds
- Typically **dioecious**

Photo: Dr. Sigrid Resh

Photo: Dr. Sigrid Resh

Willow (e.g., Pussy willow)

Salix sp.



- Full or partial sun, shade
- Wet to medium soil
- Grows to 25 ft (7.5 m)
- Male buds (catkins) are showier, and it is the branches of the male trees that most want for ornamental reasons.
- Catkins appear very early in the spring, often when snow is still on the ground, making them a very important blooming species for the earliest of pollinating insects.
- *Salix* (Willow) species are the preferred host plant for the Viceroy (*Limenitis archippus*) caterpillar.

Highbush cranberry

Viburnum trilobum

- Full or partial sun
- Wet to medium soil
- Grows to 12 ft (3 m)
- In spring, develops white flowers that resemble lace-cap hydrangeas; in summer, dense foliage provides habitat for wildlife, and in autumn, the bush will develop tart red berries before the leaves turn from yellow to purple-red in color
- Great for pollinators and birds

Red osier dogwood

Cornus sericea

- Full or partial sun
- Wet to medium soil
- Fast-growing shrub, can reach to 10’ (2.5 m), especially in rich, moist soils
- Dark red stems in winter, white flowers early-spring and white to pale blue fruit late summer
- Some plants of the Cornus genus are one of the host plants of the Spring Azure butterfly
- Berries are a very important food source for a number of different kinds of wildlife in the fall and winter

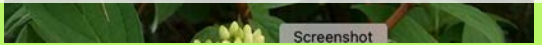


photo and info. source: Prairie Moon Nursery

PAIR WITH...

Cornus amomum subsp. obliqua
SILKY DOGWOOD

$3.00 - $12.50

Amelanchier sanguinea

$12.00

Cornus alternifolia
PAGODA DOGWOOD

$3.00

Cornus rugosa
ROUND-LEAVED DOGWOOD

$3.00 - $20.00

source: https://www.prairiemoon.com/

Don’t plant these trees…

Norway maple

Acer platanoides

source: WiGL collaborative

Tree of heaven

Ailanthus altissima

Photo: Jan Samanek, Phytosanitary Administration, via bugwood.org

Photo: Richard Gardner via bugwood.org

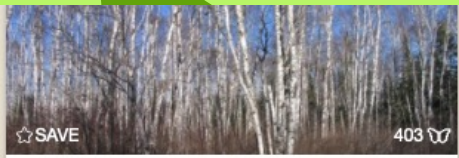
source: WiGL collaborative

Native replacements for invasive trees

oak
Quercus
Fagales

willow
Salix
Salicales

beach plum, cherry, chokecherr ...
Prunus
Rosales



birch
Betula
Fagales

aspen, cottonwood, poplar
Populus
Salicales

cranberry, blueberry
Vaccinium
Ericales

crabapple, apple
Malus
Rosales

maple, boxelder
Acer
Sapindales

alder
Alnus
Fagales

pine
Pinus
Pinales

elm
Ulmus
Urticales

hawthorn
Crataegus
Rosales

source: https://www.nwf.org/NativePlantFinder/Plants/2058

Don’t Plant	Plant Instead
Groundcover: vinca, goutweed, lily of the valley	partridgeberry, violet, wild strawberry, pussytoes, Jack in the pulpit, Solomon’s seal, wild lily of the valley, feathery false Soloman’s seal
Tall herbaceous: purple loosestrife, butterbur, knotweed	goldenrod, milkweeds, fireweed, Joe Pye weed, blue vervain, blazing star, little bluestem, maidenhair fern
Shrubs: inv. buckthorns, inv. honeysuckles, privet, barberry, autumn olive	winterberry, pussy willow, highbush cranberry, red osier dogwood, silky dogwood, service berry, pagoda dogwood, gray dogwood
Trees: Norway maple, tree of heaven	red oak, red maple, sugar maple, basswood

Thanks!

ANY QUESTIONS?

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