

Drought Tolerant Trees and Shrubs (and more)

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UW Extension Short Course

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Drought – what does it mean?

- “A period of dryness especially when prolonged- specifically one that causes extensive damage to crops or prevents their successful growth”
- Water availability is lower than a plant’s requirement for optimal growth
- Are landscape plants crops?

Drought has different impacts based on site

Greater impact

- Tops of Slopes
- Exposed (windy/sunny) Sites
- Urban Sites
- High Wildlife Pressure
- Low Water Table
- Sandy/Sharply Drained Soils
- Compacted Soils

Lower Impact

- Lower 1/3 of Slopes
- Protected Sites
- Woodland (shaded) Sites
- Low Wildlife Pressure
- High Water Table
- Clay-Loamy Rich Soils
- Aerated/Loose Soils

Where is the droughty site here?





Tamaracks here means the site is consistently moist

Perspective shows we're on top of a hill

Use landscape position and existing plants to determine how dry your site is!

Drought Tolerance is NOT a Discrete Trait

- Drought tolerance is dependent on site factors and the plant's suitability for that area.
- A plant may be drought tolerant in the woods but not in full sun.
 - Ex. Common Witch Hazel
- A plant may be drought tolerant in sand but not poorly drained soils
 - Ex. Sweetfern
- Drought tolerance is a gradient, not a binary trait in plants
 - Ex. Junipers are more tolerant than Spruce

So what does Drought Tolerant mean?

- At the individual plant level (ornamental)
 - Plant has a higher threshold for drought before damage to aesthetics
 - Plant does not see significant increases in disease susceptibility during drought (to a point)
- At the landscape level (restoration)
 - Drought does not significantly impact fitness (reproduction)
 - Higher tolerance for 'ugly' drought adaptations (ex. Dormancy)
 - Plant may even be drought-adapted where high heat/low humidity is required for germination/flushing
- We are focusing mainly on the individual level

ALL PLANTS

ARE

INTOLERANT OF DROUGHT

UNTIL THEY ARE

ESTABLISHED

Assume all newly planted plants are stressed

- Stressed = Disease Prone
- Some plants prone to insects & disease after transplant
 - Ex. Two Lined Chestnut Borer in Oaks, Ironwood.
 - In this case use a systemic like Dinotefuran after planting to prevent damage in the first year.
 - Subsequent treatment shouldn't be necessary unless the tree is large or particularly stressed.
 - But if its particularly stressed then maybe it shouldn't have been planted...

One more note:

- We need to start having principles when it comes to plant selection and what we view as “positive” and “negative” traits.
- If you want to discriminate against plants with weak wood (Catalpa, Yellowwood), fine. But don't forget that also includes Freeman Maples and Callery Pears.

On to the plants!

Full details for the plants listed can be found in the spreadsheet handout provided with this presentation. This is just a quick summary.

Large Deciduous Trees

Miyabe Maple – *Acer miyabei*



Pros

Great bark, form, fall color; rhymes with Miyagi so you can make tons of Karate Kid jokes

Cons

Lack of terminal bud (like Lilacs) makes pruning tricky; Verticillium wilt.

Shagbark Hickory – *Carya ovata*



Pros

Cool bark; wildlife benefits; phenomenal golden fall color; tolerates seasonally dry/wet soils

Cons

Not commonly available; difficult to transplant if not grown correctly; moderate litter production

Bitternut Hickory – *Carya cordiformis*



Pros

Faster growing than Shagbark; grows in dry sites and on stream banks; great fall color; wildlife habitat

Cons

Lower availability than Shagbark; difficult to transplant if not grown correctly; similar litter level as Shagbark

Northern Catalpa – *Catalpa speciosa*



Pros
Fast growing; beautiful flowers; tolerates clay/flooding/salt

Cons
SUPER susceptible to Verticillium Wilt; large pods and leaves messy; no fall color; weaker wood

Common Hackberry – *Celtis occidentalis*



Pros
Disease resistant; pollution tolerant; related to Cannabis and Hops; good for birds; cool bark

Cons
Nipple gall, witches broom (aesthetic); low cultivar availability; frequent pruning when young; volunteers

Turkish Hazelnut/Filbert – *Corylus colurna*



Pros
Formal shape; unique bark, foliage, fruit; tolerates alkaline soil and some clay

Cons
Longer establishment period; cankers; not widely available; may sucker

Ginkgo, Maidenhair Tree – *Ginkgo biloba*



Pros
Tough; no diseases; good number of cultivars; beautiful fall color

Cons
Male pollen vs female fruits; fleshy root system can make transplant difficult; harder to produce, more expensive

Thornless Honeylocust – *Gleditsia triacanthos* var. *inermis*



Pros

Drought tolerant; strong wood; good amount of cultivars/shapes;

Cons

Female pods; Thyronectria canker + twig litter; make sure you don't get the thorny form (inspect stock)

Kentucky Coffeetree – *Gymnocladus dioica*



Pros
Coarse texture; unique bark; strong wood; LOVES alkaline soil

Cons
Ugly as sin when young; big seed pods on female trees

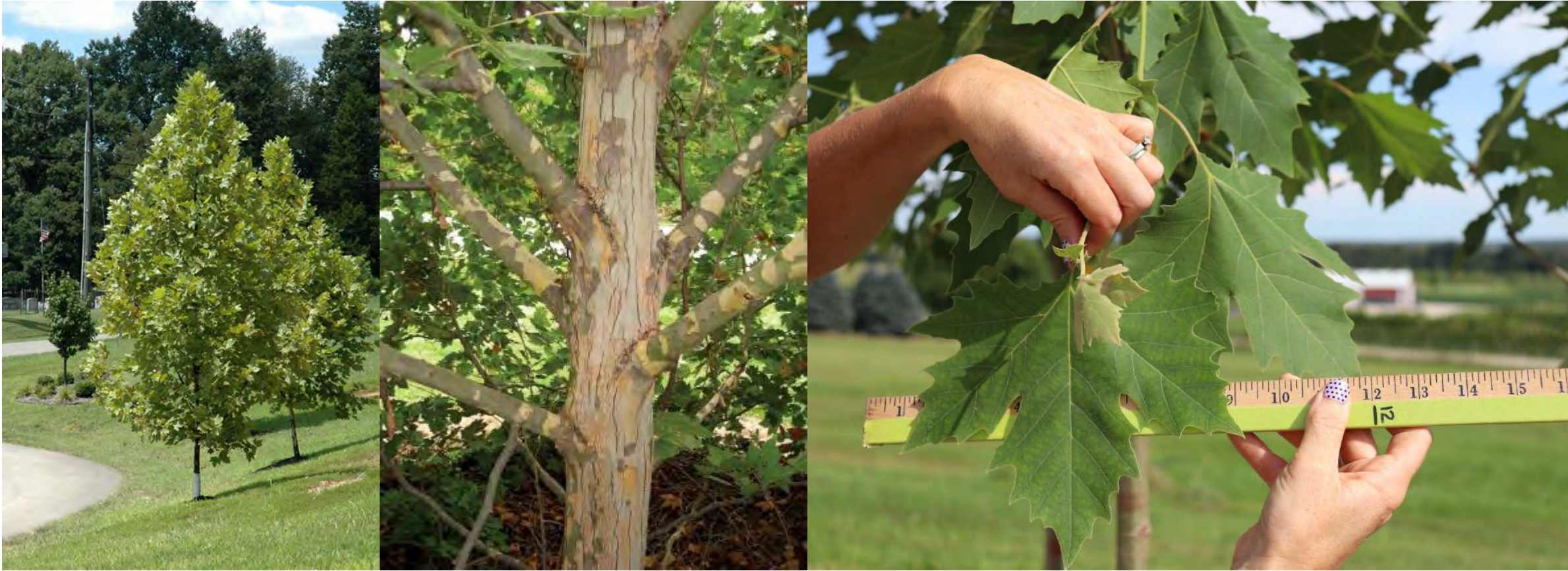
Eyestopper Corktree – *Phellodendron lavalleyi* ‘Longenecker’



Pros
Butter yellow fall color, interesting bark and texture

Cons
Ugly duckling (no leader) when young; female plants invasive

Exclamation London Planetree – *Platanus x acerifolia* ‘Morton Circle’



Pros

Pyramidal form; unique bark and foliage; vigorous; more disease resistant than other cultivars; hardier than others

Cons

Split leaders exceptionally weak (need to prune); large leaves can be messy; can still get winter damage when young

Bigtooth Aspen – *Populus grandidentata*



Pros
Colonizing; faster growing than quaking aspen; beautiful fall color

Cons
Colonizing; prone to buck rub; intolerant of flooding; weaker wood, especially where buck rubbed

Oaks – *Quercus* spp.

Botanical Name	Common Name	Pros	Cons
<i>Quercus bicolor</i>	Swamp White Oak	Tolerates drought and flooding; generally available	Chlorosis in alkaline soils; variable leaf retention
<i>Quercus ellipsoidalis</i>	Northern Pin Oak	Great for dry sandy sites; fall color; faster growing	Messier form; intolerant of clay, alkalinity; not always available; Oak Wilt
<i>Quercus macrocarpa</i>	Bur Oak	<u>Best</u> drought tolerance; strong wood, great form	Larger acorns; Bur Oak Blight
<i>Quercus muehlenbergii</i>	Chinkapin Oak	<u>Best</u> alkaline soil tolerance; great for wildlife; fall color like White Oak	Not always available
<i>Quercus palustris</i>	Pin Oak	Tolerates wet/dry, clay/sand soils; great fall color; faster growing	Intolerant of alkaline soil; Oak Wilt
<i>Quercus velutina</i>	Black Oak	Great drought tolerance; good fall color	Probably the hardest to find in trade; Oak Wilt
<i>Quercus x schuettei</i>	Hybrid Bur x Swamp White Oak	Flood, drought, and alkaline soil tolerant, hybrid vigor	Less alkaline tolerant than Bur & Chinkapin Oak

Quercus bicolor



Quercus ellipsoidalis





Q. macrocarpa – Fire Ecotype





Quercus muehlenbergii

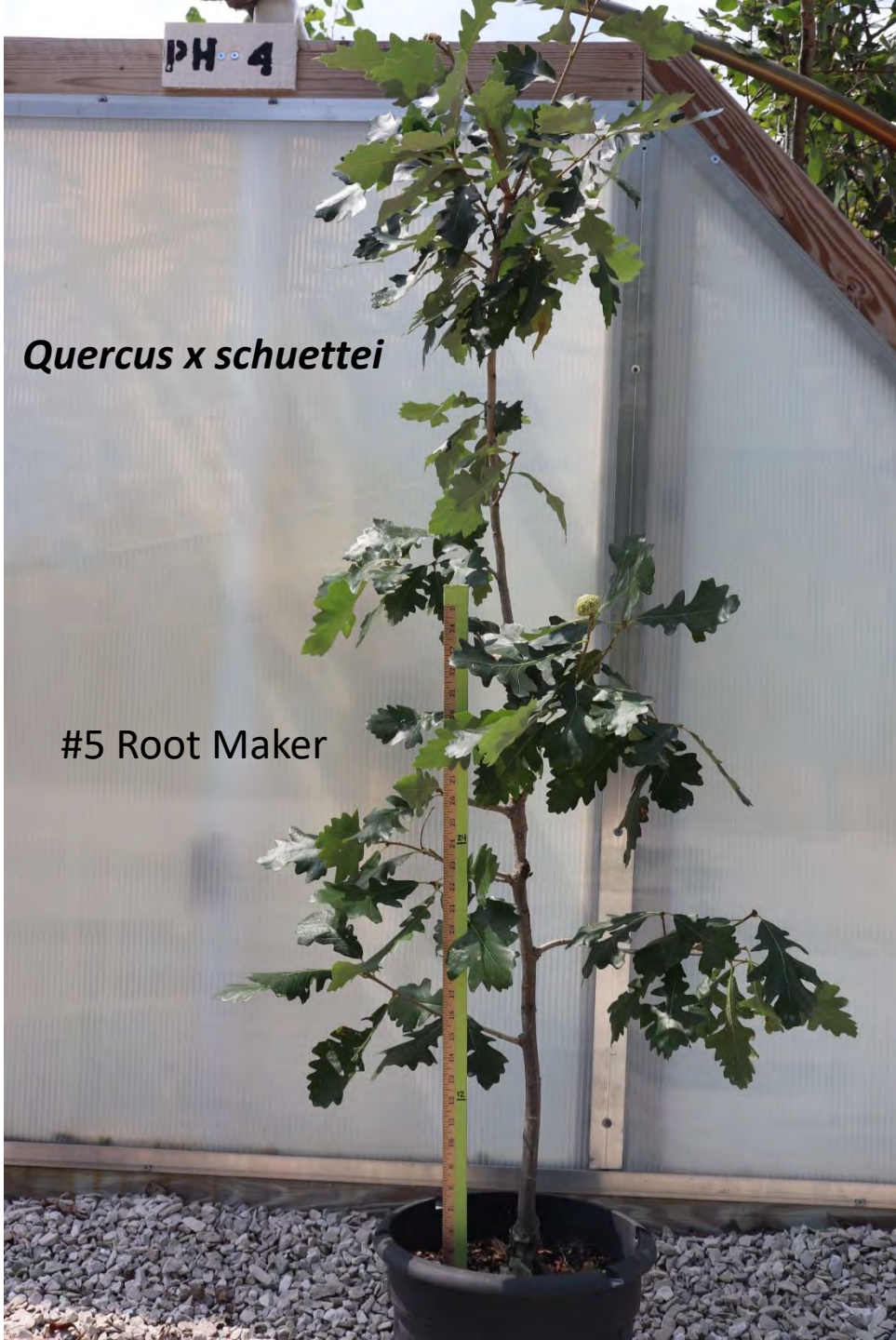
7 year-old RM tree



PH 4

Quercus x schuettei

#5 Root Maker



2 years after planting

Baldcypress – *Taxodium distichum*



Pros

Cool bark and form; salt tolerant; tolerates wet and dry;
Shawnee Brave is narrow cultivar

Cons

Alkaline intolerant (chlorosis); potential Knee formation;
slow growing (expensive)

Basswood, American Linden – *Tilia americana*



Pros
Hands down my favorite tree to prune; great for pollinators and birds; fragrant summer flowers; better structure

Cons
Suckers if you look at it the wrong way; prone to Japanese beetle damage; Verticillium wilt (rarely); weak branch unions

American Elm* – *Ulmus americana*

**Dutch Elm Disease resistant cultivars*



Pros

Vigorous; adaptable; 'Princeton' and 'New Harmony' are excellent cultivars; supports wildlife

Cons

Frequent pruning when young; Dutch Elm Disease can infect stressed plants

Triumph Elm – *Ulmus* ‘Morton Glossy’



Triumph

Accolade

Pros
Phenomenal disease resistance; barrel-shaped habit; rapid establishment

Cons
Less ecosystem benefit than American Elm; requires frequent pruning when young.

Small/Medium Deciduous Trees

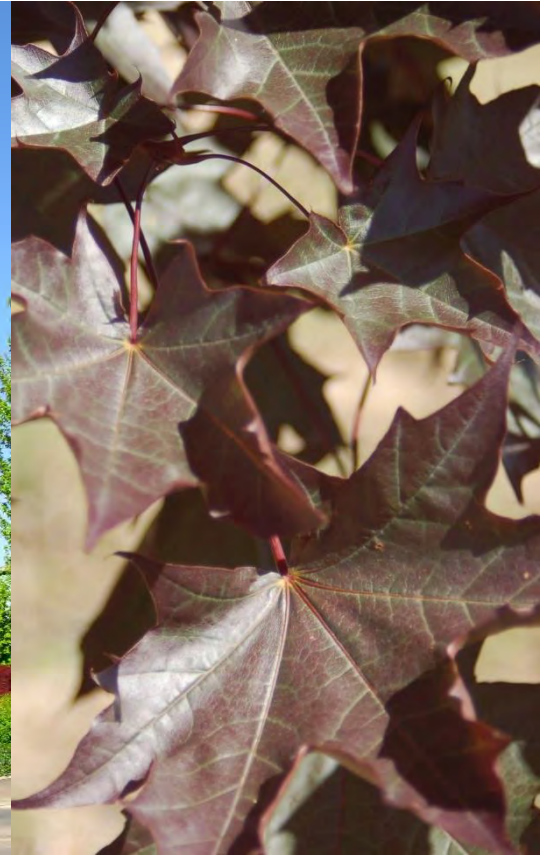
Shantung x Norway Hybrid Maple – *Acer truncatum x platanoides*



Norwegian Sunset



Crimson Sunset



Pros
Glossy leaves, good replacement for 'Crimson King'

Cons
May be headed for the invasive species list; slow growing

Eastern Redbud – *Cercis canadensis*



Pros
Full sun to full shade; loves alkaline soils, early bloomer

Cons
Weaker branch unions; Verticillium wilt

Hawthorns – *Crataegus* spp.



Washington – *C. phaenopyrum*

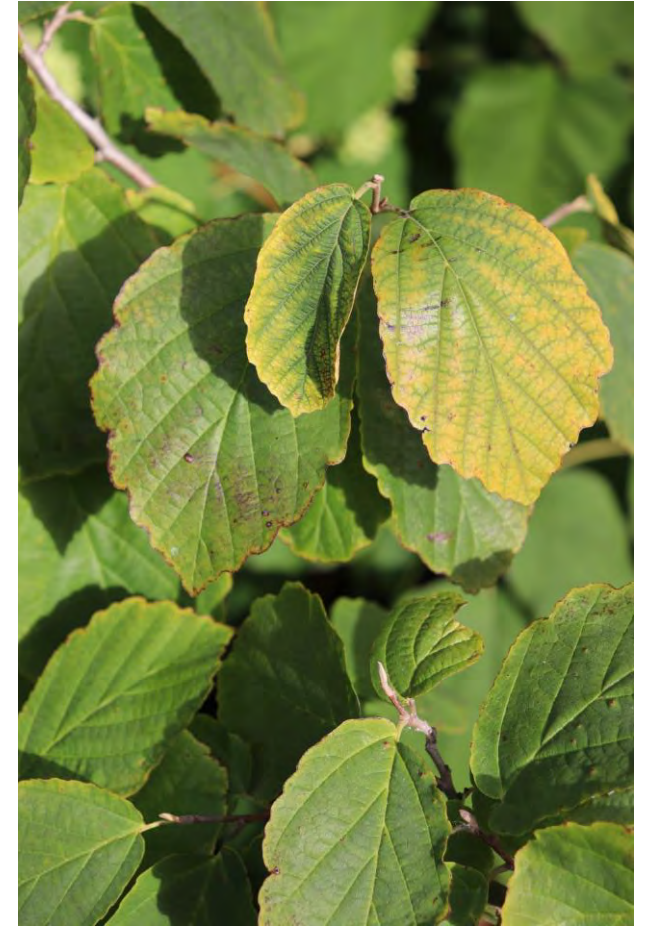
Pros

Bird habitat; tough; great foliage and fruit displays

Cons

Some don't like the flowers; cedar-hawthorn rust; iffy shade tolerance

Common Witch Hazel – *Hamamelis virginiana*



Pros
Coarse texture; unique bloom time; partial to heavy shade

Cons
Intolerant of drought in sun; coarse texture in winter not good for screening; slow growing

Amur Maackia – *Maackia amurensis*



Pros
Cool bark and shape; mid season fragrant flowers; alkaline tolerant, super tough;

Cons
Slow growing; Verticillium Wilt where soils are intermittently wet;

Prairie Crabapple – *Malus ioensis*



Pros
Native; good resistance to Fire Blight; extremely high value to wildlife/pollinators; wide site tolerance

Cons
Prone to apple scab; suckers if damaged; more 'wild' than cultivars; may not be readily available

Ironwood, Hop Hornbeam – *Ostrya virginiana*



Pros

Great shape; cool fruits; tolerates sun and shade

Cons

Medium-poor salt tolerance; raise canopy ASAP if desired.

Choke Cherry – *Prunus virginiana*

Pin/Fire Cherry – *Prunus pensylvanica*



Pros
Fast growing; pioneer species for soil stabilization; great for pollinators and birds; some cultivars available

Cons
Short lived; shade intolerant; disease prone; limited to small sizes for purchase for species

Japanese Tree Lilac – *Syringa reticulata*



Pros
Mid season bloomer; fragrant; decent number of cultivars available

Cons
Verticillium wilt; new foliar blight has decreased fall interest; can sucker

Evergreen Trees

Chinese Juniper – *Juniperus chinensis*



Pros

Consistent year-round color; wide range of cultivars; Deer resistant; tolerates salt and exposure; big fruit display

Cons

Can get exotic Cedar Apple Rust; intolerant of wet or poorly drained soils

Eastern Red Cedar – *Juniperus virginiana*



Pros
Bronze/Purple in winter for some cultivars; great for birds;
Deer resistant; many cultivars; tolerate pollution and salt

Cons
Intolerant of wet soils, difficult to transplant if not container-grown or produced in a nursery; Cedar rusts

Star Power Juniper – *Juniperus x*



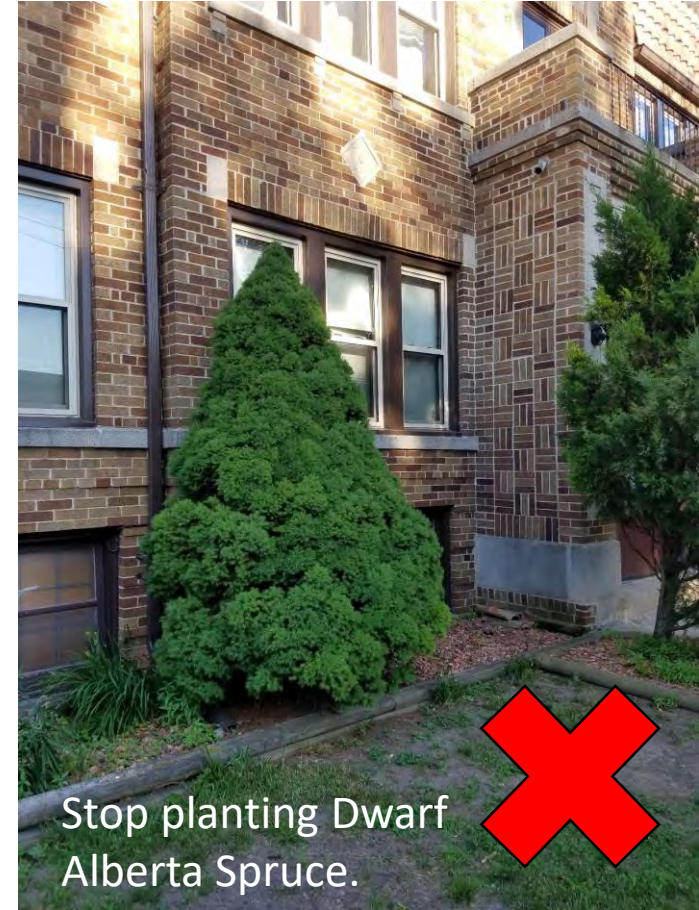
Pros

Fastest growth of upright junipers, great replacement for Arborvitae where deer pressure is bad; easy to shear

Cons

Variable foliage on the same plant; VERY spiky (difficult to handle)

White Spruce – *Picea glauca*



Stop planting Dwarf
Alberta Spruce.

Pros

Tolerates dry and wet soils, clay and sand soils; great for wildlife

Cons

Intolerant of salt and pollution; Not as drought tolerant as Junipers (better than Arborvitae and Tamarack)

Black Hills Spruce – *Picea glauca* var. *densata*



Pros
Denser than White Spruce; tolerates salt and drought better than White Spruce

Cons
Can get Rhizosphaera needle cast if site is too wet or air flow is poor; slower growing than white spruce

Jack Pine – *Pinus banksiana*



Pros

Unique; superior drought tolerance; indifferent to soil fertility;

Cons

Needs sandy, acid-to-neutral soil; can look scruffy; difficult to find; needs mycorrhizae for calcareous soil

Mugo Pine – *Pinus mugo*



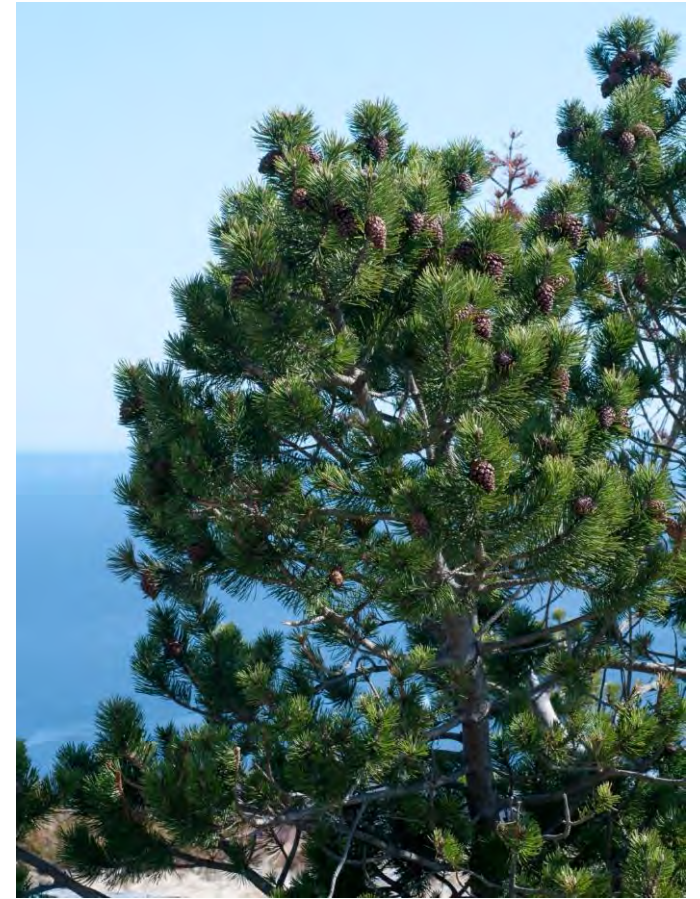
Tannenbaum

Tannenbaum

Pros
Good disease resistance; tolerates alkaline and clay soils;
many cultivars available

Cons
'Tannenbaum' is only tree form; intolerant of wet sites

Red Pine – *Pinus resinosa*



Pros

Thrives in sandy dry sites; attractive bark; winter burn is practically nonexistent in right site when established

Cons

Not widely available; few cultivars; needs neutral-acid surface soil, good drainage; intolerant of salt, pollution; litter

Waterer Scots Pine – *Pinus sylvestris* ‘Watereri’



Pros

Short-needled, better disease resistance; unique form; attractive bark; tolerates alkaline soils

Cons

Species is invasive in areas; still susceptible to pine diseases (although not as bad as species or Austrian Pine)

Shrubs n' Such

Evergreens and Deciduous

Common Juniper – *Juniperus communis*



Pros

Cons

Siberian Cypress – *Microbiota decussata*



Pros

Tolerates part-shade, some drought; deer resistant

Cons

Requires sharp drainage to avoid burn and root rot

Yucca, Adam's Needle – *Yucca filamentosa*



Pros

Exotic-looking; surprising flower; super tough; tolerates some shade; deer resistant

Cons

Extremely deep rooted (removal sucks); will colonize over time (make sure you leave room)

Bottlebrush Buckeye – *Aesculus parviflora*



Pros

Coarse texture; flowering; dense in summer

Cons

Open in winter; not as easy as a dense plant to prune; slow growing

Running Serviceberry – *Amelanchier stolonifera*



Pros

Shade tolerant, birds love it, plant-and-forget

Cons

Fall not as showy as other *Amelanchier*; can get powdery mildew if stressed;

Glossy Black Chokeberry – *Aronia melanocarpa* var. *elata*
Appleleaf Chokeberry – *Aronia melanocarpa* var. *grandifolia*
Red Chokeberry – *Aronia arbutifolia*



Pros

Great for birds; like a mini serviceberry; phenomenal fall color

Cons

Animal browse (fine once established); can look leggy and coarse depending on site/pruning

New Jersey Tea – *Ceanothus americanus*



Pros

Fragrant foliage; very drought/browse tolerant when established; attractive midsummer blooms and fruit

Cons

Can act like dieback shrub (greater maintenance); no fall color; is probably a Giants fan

Sweetfern – *Comptonia peregrina*



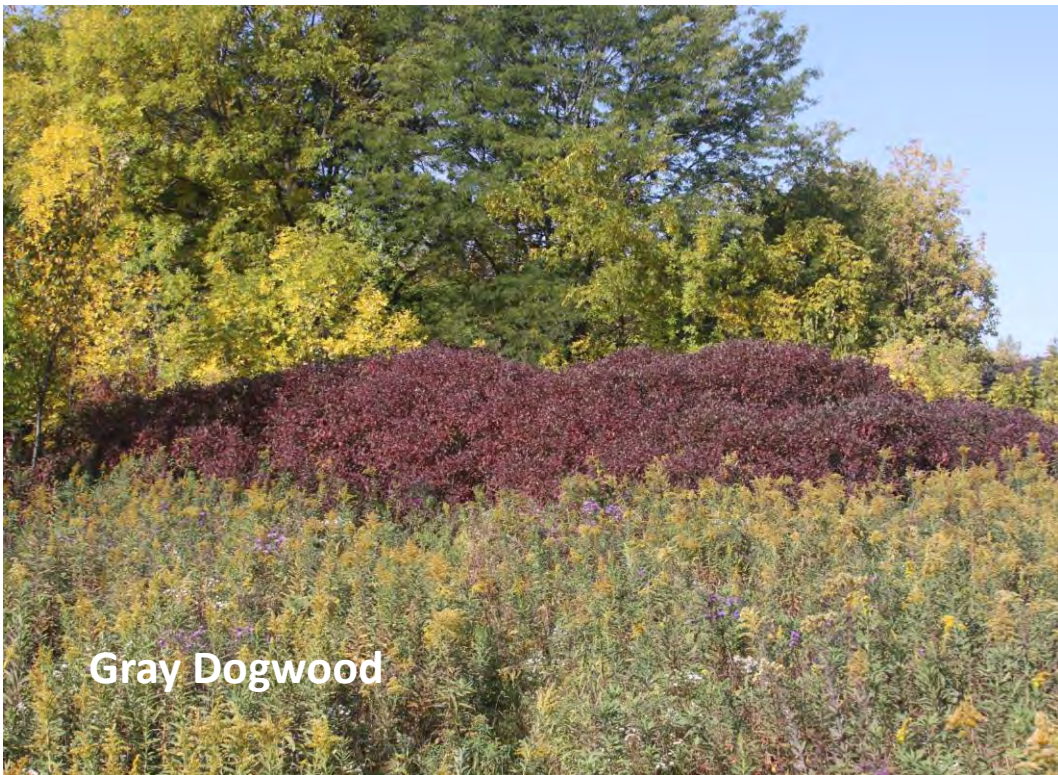
Pros
Fixes nitrogen; tolerates light shade, salt; great for massing;
fragrant foliage; willow-like texture for dry sites

Cons
Needs crappy sandy soil to do well; not a rapid colonizer
(may need more per area than *Diervilla*)

Silky Dogwood – *Cornus amomum*

Gray Dogwood – *Cornus racemosa*

Silky dogwood is better for wet areas, but will hybridize with Gray Dogwood, which is why it's included here.



Pros

Birdscaping (and bird spread); colonizing; great fall color; adaptable; showy fruits

Cons

Can get Septoria leaf spot (use hybrids); deer browse when short

American Hazelnut – *Corylus americana*



Pros
Great for wildlife; JN seed source has red-purple fall color;
deer resistant

Cons
Coarse, irregular texture difficult in formal sites; species can
have sub-par fall color

Smokebush – *Cotinus coggygria*



Winecraft Black



Royal Purple

Pros

Unique leathery leaf; beautiful 'plumes'; purple and yellow leaf cultivars available

Cons

May not be attractive in winter; winter dieback; intolerant of poor drainage; verticillium wilt

Hedge Cotoneaster – *Cotoneaster lucidus*



Pros

Dense (better than privet); easy to shape/shear

Cons

Fireblight; difficult to clean interior of leaves/trash/weeds; fairly common in landscape; only moderate drought tol.

Potentilla – *Dasiphora fruticosa*



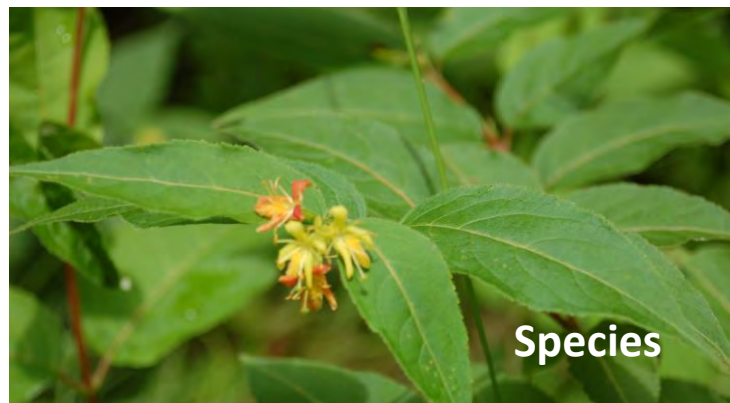
Pros

Easy to grow and maintain; native and cultivars; great for hot, dry sites with little maintenance required

Cons

Grows wild if allowed; spider mites and mildew occasionally; some people just hate them

Dwarf Bush Honeysuckle – *Diervilla lonicera*



Pros
Deer adapted; groundcover or specimen; great for pollinators; adaptable to any soil or moisture, sun-partial sun

Cons
Leaf spot/powdery mildew; can look gangly if left to grow naturally; colonizes if cut back

Forsythia – *Forsythia* spp.



Pros

Beefy, fast growing, large shrub; great for the border/screening; 'Bronx' can be used as groundcover

Cons

Flowering not always reliable, depends on snow level in some winters

Panicle Hydrangea – *Hydrangea paniculata*



Pros
Lots of color, size options; ubiquitous in the landscape; fairly idiot-proof pruning

Cons
Still needs some water; improper pruning causes snow damage; does not rejuvenate; trees are gross

Kalm's St. John's Wort – *Hypericum kalmianum*



Pros
Natural globe shape; beautiful yellow-orange-red fall color;
attractive seed heads in winter

Cons
Dies randomly (but not frequently); individual plants don't
really rejuvenate

Common Ninebark – *Physocarpus opulifolius*



Pros

Several color options; great replacement for barberry; 4-season interest

Cons

Powdery mildew when stressed; leaf spot on native can be unsightly; moderate drought tolerance

American Plum – *Prunus americana*



Pros

Tough, adaptable native; spreads readily in disturbed areas; loved by birds and pollinators; great for borders

Cons

Gangly form means it's not great in the formal landscape; not long-lived

Fragrant Sumac – *Rhus aromatica*



Pros

Fragrant!; great fall color; understated yellow flowers in spring; indifferent to soil or moisture; fruit for birds

Cons

Fragrant...; a pain to clear out if you've got volunteers coming through it; leaf mite

Staghorn Sumac – *Rhus typhina*

Smooth Sumac – *Rhus glabra*



Pros

Big sturdy shrub/trees; Deer will propagate (through rubbing); indifferent to soil or moisture; reliable color

Cons

Gets huge in some cases; will likely need to herbicide if you want to remove; stems very coarse

Alpine Currant – *Ribes alpinum*



Pros
If you need a plant that's green and shrubby, I guess this is a good choice

Cons
There is literally nothing that excites me about this plant.

Rugosa Rose – *Rosa rugosa*



Pros
Tolerates salt, drought, abuse; fragrant blooms and showy hips;

Cons
Coarse (and ugly?) up close, better as a mass plant

Prairie Rose – *Rosa virginiana*



Pros
Native (to U.S.); good disease resistance; showy hips; red, orange, maroon fall color

Cons
Single flower less showy than cultivars, form not as organized

Thimbleberry – *Rubus parviflorus*



Pros
PHENOMENAL coarse groundcover for the shaded site; great fall color

Cons
No/low fruit (blooms are marginally hardy)

Fritsch Spirea – *Spiraea fritschiana*



Pros

Coarser spirea than typical; more pastel fall colors; good disease resistance; tolerates partial shade

Cons

Not a good globe-shaped sacrifice to the parking lot gods; will reseed and hybridize with other spireas

Cutleaf Stephanandra – *Stephanandra incisa* 'Crispa'



Pros

Stems look beautiful in winter as hedge, unique texture; great for cascading over stones or slopes; great fall color

Cons

Needs to be massed to look best; form isn't for everybody

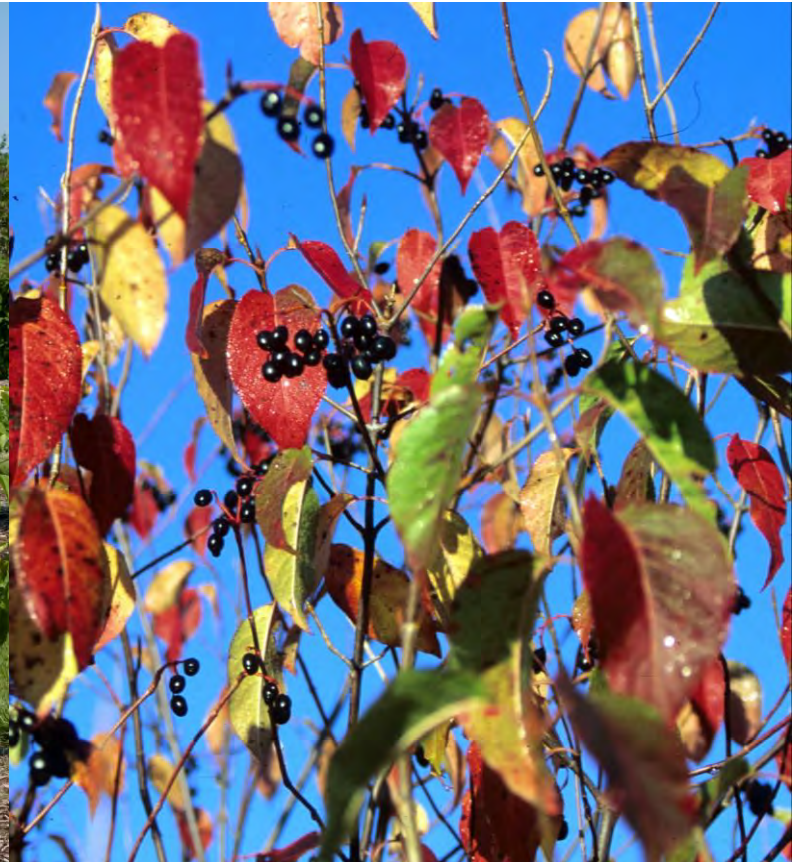
Snowberry – *Symphoricarpus albus*



Pros
Loves dry alkaline clays; deer resistant; fruit for birds; nice foliage texture for hedging; better hardiness than hybrids

Cons
No fall color; fruits aren't super showy

Nannyberry – *Viburnum lentago*



Pros

Birds; good screening; thicket-forming; great fall color; phenomenal fruit display (green-yellow-pink-black)

Cons

Colonizes; may be too large to use as a specimen plant

Prickly Ash – *Zanthoxylum americanum*



Pros
Wildlife food and habitat; super tough; aromatic foliage

Cons
Thorns for days; can be an aggressive spreader in crappy sites; dioecious (if you want fruit production)

Don't forget big perennials!

Leadplant – *Amorpha canescens*



Pros

Thrives in dry sand/clay soils; unique gray-green foliage; intense mid-season purple flowers

Cons

Slow to establish; small when young; a tough sell like Kentucky Coffeetree or Amur Corktree

Amsonia, Bluestar – *Amsonia* spp.



Pros

Early blooms; great texture in masses; easily fits on a woodland edge; great fall color

Cons

The least drought tolerant of all the big perennials listed, would probably need some compost at planting

False Indigo – *Baptisia* spp.



Pros

Intense early season blooms; extremely drought tolerant; several colors to pick from; great summer texture

Cons

Turns black in fall (some may not like look); difficult to remove/transplant due to root system; can flop in shade

Wild Senna – *Senna (Cassia) hebecarpa*



Pros

Unique foliage; LOVES alkaline clay soil; attractive pea-like mid-late season blooms; cool pods

Cons

May need to mass or intersperse with other tall perennials if floppy; flops if soil good

Russian Sage – *Perovskia atriplicifolia*



Pros
Beautiful in masses; sturdy in dry soils; great for later-season color; fragrant

Cons
Can flop if soils are too rich; intolerant of poor drainage

Plants to Avoid in Dry Sites

Red text means avoid the plant in general.

Black text means avoid the plant only in dry sites.

Botanical Name	Common Name	Reason
<i>Juniperus scopulorum</i>	Rocky Mountain Juniper (Skyrocket, Wichita Blue)	Prone to foliar diseases; use Taylor or Star Power juniper as subs
<i>Picea pungens</i>	Colorado Spruce	Guys, it's been >20 years since we found Rhizosphaera needle cast. It's time to stop.
<i>Acer tataricum</i>	Tatarian Maple (Hot Wings)	Heading to the invasive list, personally I don't like the form. Use
<i>Pyrus calleryana</i>	Callery Pear (Autumn Blaze, Cleveland Select/Chanticleer, Jack)	Heading to the invasive list. Also prone to winter damage. Flowers stink.
<i>Berberis spp.</i>	Barberry	All the tough ones are invasive, and the non invasive ones are weak sauce. Use Little Devil/Raspberry Lemonade Ninebark if you need tiny colorful leaves.
<i>Buddleia spp.</i>	Butterflybush	It's an expensive woody annual.
<i>Cercidiphyllum japonicum</i>	Katsuratree	Intolerant of drought (but I love this plant!)

Botanical Name	Common Name	Reason
<i>Larix laricina</i>	Tamarack	Absolutely intolerant of drought
<i>Betula papyrifera</i>	Paper Birch	Gets Bronze Birch Borer in dry sites
<i>Cornus alternifolia</i>	Pagoda Dogwood	Absolutely intolerant of drought. A real 'Goldilocks' plant. Gets Golden Canker if poorly sited.
<i>Spiraea betulifolia</i>	Birchleaf Spirea	Fungal diseases have gotten bad in the past 5 years. What's the point of a plant with beautiful fall color if there aren't any leaves by September?
<i>Picea abies</i>	Norway Spruce	It doesn't get Rhizosphaera and grows fast, but Norway Spruce needs average moisture to do well.
<i>Abies spp.</i>	Firs (White/Concolor, Balsam, Fraser)	Shallow root system, intolerant of drought

Resources

- General Websites
 - www.kb.jniplants.com
 - www.mortonarb.org
 - www.missouribotanicalgarden.org
- [Plants Tolerant/Susceptible to Verticillium Wilt](#)