RECOMMENDED URBAN TREES FOR USDA PLANT HARDINESS ZONE 6 AND COLDER

II. MEDIUM TO LARGE TREES (> 30’) SUITABLE FOR CITY ENVIRONMENT PLANTINGS

Scientific Name: Acer x freemanii (A. rubrum x A. saccharinum)
Common Name: Freeman Maple

Environmental Conditions:
Hardiness Zone: 4
Soil Moisture:

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<tbody>
<tr>
<td>occasionally saturated or very wet soil</td>
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</tbody>
</table>

Sun/Shade: full sun
Salt: pH ≤ 7.5

Insect/Disease Factors: none serious or limiting, Autumn Blaze® shows more tolerance to leafhoppers than A. rubrum

Growth Characteristics:
Height: 45’-70’
Width: varies with cultivar, see cultivar chart on following page
Form/Habit: varies with cultivar, see cultivar chart on following page
Rate: medium to fast

Ornamental Characteristics:
Flower: greenish-yellow to red clusters, early spring, some showy red
Fruit: samara, sometimes reddish maturing to brown, seedless forms available
Seasonal Foliage Color: fall color varies with cultivar (yellow/orange/red), see cultivar chart on following page
Bark: typically attractive silver-gray

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root
Management Issues: can develop graft incompatibility depending on understock used, specify own roots to avoid this delayed graft incompatibility problem

Suggested Uses: narrow or wide street tree lawns/pits, parks
Cultivars: see chart on following page

'Armstrong'
### Acer x freemanii (Freeman Maple) Cultivars:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Width</th>
<th>Form/Habit</th>
<th>Foliage</th>
<th>Fall Color</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Armstong’</td>
<td>15’-20’</td>
<td>columnar/fastigiated, upright branching</td>
<td>resembles (A. \text{saccharinum}), 5-lobed, silvery undersides</td>
<td>yellow to orange</td>
<td>fast grower, flowers not showy</td>
</tr>
<tr>
<td>Autumn Blaze®</td>
<td>40’</td>
<td>broad oval, improved branch structure over (A. \text{saccharinum}), dense, multi-stem form available</td>
<td>resemble (A. \text{saccharinum}), deeply 5-lobed</td>
<td>excellent orange-red, long-lasting</td>
<td>fast grower, sparse flowering, nearly seedless</td>
</tr>
<tr>
<td>Autumn Fantasy®</td>
<td>40’</td>
<td>broadly oval to upright-oval</td>
<td>more closely resembling (A. \text{saccharinum}), 5-lobed</td>
<td>consistently bright red</td>
<td>fast growing</td>
</tr>
<tr>
<td>Celebration™</td>
<td>20’-25’</td>
<td>upright-pyramidal, strong branch angles</td>
<td>similar to (A. \text{saccharinum}), dense</td>
<td>golden-yellow to red, reportedly turning from red to gold</td>
<td>red flower, seedless, fast growing in youth</td>
</tr>
<tr>
<td>‘Marmo’</td>
<td>35’-45’</td>
<td>broad columnar, strong central leader</td>
<td>5-lobed, intermediate between parents</td>
<td>excellent, often mottled red &amp; green, can vary burgundy to orange or gold, colors early</td>
<td>good growth rate, seedless</td>
</tr>
<tr>
<td>‘Morgan’</td>
<td>40’</td>
<td>broadly oval, open habit</td>
<td></td>
<td>orange-red to red</td>
<td>very fast growing</td>
</tr>
<tr>
<td>Saturn™</td>
<td>35’-40’</td>
<td>broad oval</td>
<td>resembles (A. \text{rubrum}), 3-lobed</td>
<td></td>
<td>reportedly virtually seedless</td>
</tr>
<tr>
<td>Scarlet Sentinel™</td>
<td>25’-35’</td>
<td>broad columnar to oval-rounded, ascending branches, improved branch structure over (A. \text{saccharinum})</td>
<td>closely resembling (A. \text{saccharinum}), 5-lobed</td>
<td>yellow to red</td>
<td>fast growing, bright red flowers, no fruit observed, reportedly shiny bark</td>
</tr>
<tr>
<td>Sienna Glen®</td>
<td>35’</td>
<td>pyramidal, strong central leader</td>
<td></td>
<td>rusty orange to burgundy</td>
<td></td>
</tr>
</tbody>
</table>

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*‘Armstong’, ‘Armstong Two’, Autumn Blaze®, ‘Marmo’, ‘Morgan’, and Sienna Glen® sometimes listed as Zone 3*
Scientific Name: *Acer miyabei*
Common Name: Miyabei Maple

**Environmental Conditions:**
- **Hardiness Zone:** 5a (4b)
- **Soil Moisture:**
  - occasionally saturated or very wet soil (1)
  - consistently moist, well drained soil (2)
  - occasional periods of dry soil (3)
  - prolonged periods of dry soil (4-12)

- **Sun/Shade:** prefers full sun, tolerates partial shade
- **Salt:** unknown
- **pH:** ≤ 8.2
- **Other:** State Street™ has reportedly good heat tolerance

**Insect/Disease Factors:** relatively pest free

**Growth Characteristics:**
- **Height:** 35’-45’
- **Width:** 30’
- **Form/Habit:** upright oval to rounded, can have open or dense branching, low branching tendency often creates short trunk
- **Rate:** medium

**Ornamental Characteristics:**
- **Flower:** greenish-yellow, in pyramidal clusters, spring
- **Fruit:** samara
- **Seasonal Foliage Color:** flat to semi-glossy, medium to dark green in summer, yellow in fall, often holds green late so fall color is short-lived before leaves fall
- **Bark:** dark gray, typically rough and corky

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** State Street™ (‘Morton’, zone 4, upright oval form, good uniform branching, dark green foliage, good golden yellow fall color, possibly fast growing)
Scientific Name: *Acer platanoides*
Common Name: Norway Maple

**Environmental Conditions:**

- **Hardiness Zone:** 4a
- **Soil Moisture:**
  
<table>
<thead>
<tr>
<th>occasionally saturated or very wet soil</th>
<th>Consistently Moist, well Drained soil</th>
<th>occasional periods of dry soil</th>
<th>prolonged periods of dry soil</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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- **Sun/Shade:** prefers full sun, tolerates full shade
- **Salt:** some observed tolerance
- **pH:** \( \leq 8.2 \)
- **Other:** ‘Summershade’ considered more heat tolerant

**Insect/Disease Factors:** tar/black spot is a common serious aesthetic problem that can defoliate species in certain areas, susceptible to *Verticillium Wilt* (reportedly, *Parkway™, ‘Jade Glen’* are tolerant, ‘Summershade’ is moderately tolerant, ‘Crimson King’ is the most susceptible) which can be a serious problem in some areas, susceptible to leafhoppers (reportedly ‘Summer Shade’ is tolerant), ‘Crimson King’ and reportedly ‘Royal Red’ are more susceptible to pest problems than species, ‘Deborah’ foliage more resistant to leaf scorch

**Growth Characteristics:**

- **Height:** 40’-50’ (can reach 90’)
- **Width:** 30’-50’
- **Form/Habit:** oval to upright-oval or rounded to broadly oval
- **Rate:** medium

**Ornamental Characteristics:**

- **Flower:** yellow to greenish yellow clusters, early spring before leave emerge
- **Fruit:** 1 ½”-2” samara, mature in fall, abundant
- **Seasonal Foliage Color:** dark green in summer, dark maroon color on some cultivars, yellow to brown in fall
- **Bark:** not ornamentally important, gray-black with narrow ridges and shallow furrows
- **Other:** foliage is typically very dense, foliage often held late

**Transplant Issues:** easy to transplant B&B or \( \leq 2” \) caliper bare root

**Management Issues:** over-planted in many communities, very likely to naturalize when planted next to open areas and will grow in shaded forest, tends to heave sidewalks unless adequate rooting space is provided, tendency to develop girdling roots, very dense foliage and shallow root system makes successful turf growth beneath difficult, bark split may be common in zone 4 conditions

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** see chart on following page

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'Superform'

(one of the rounded to broadly oval forms)
**Acer platanoides** (Norway Maple) cultivars:

<table>
<thead>
<tr>
<th>Cultivar and Size</th>
<th>Noteworthy Foliage Characteristics</th>
<th>Other Noteworthy Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rounded to Broadly Oval</strong></td>
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<tr>
<td>‘Crimson King’ 40’high x 30’wide</td>
<td>dark maroon in summer, turn darker or brown-out in fall</td>
<td>maroon-yellow flowers, slower growing</td>
</tr>
<tr>
<td>‘Deborah’ 50’high x 45’wide</td>
<td>thick, new growth emerges red-purple matures dark green in summer, yellow (orangey) in fall</td>
<td>straight central leader</td>
</tr>
<tr>
<td>‘Drummondii’ 35’high x 30’wide</td>
<td>variegated, light green edged with white in summer, yellowish in fall</td>
<td></td>
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<tr>
<td>Emerald Lustre™ (‘Pond’) 50’high x 45’wide</td>
<td>glossy, wavy margin, new leaves have reddish tint</td>
<td>sometimes listed as zone 3, good branching at early age, faster growing</td>
</tr>
<tr>
<td>‘Emerald Queen’ 50’high x 40’wide</td>
<td>leathery, reddish tint in spring, bright yellow in fall</td>
<td>sometimes listed as zone 3, uniform growth, straight trunk, faster growing</td>
</tr>
<tr>
<td>‘Jade Glen’ 45’high x 45’wide</td>
<td>yellow in fall</td>
<td>open habit, faster growing</td>
</tr>
<tr>
<td>‘Princeton Gold’ 35’high x 30’wide</td>
<td>emerges bright yellow in spring, may fade in summer, darker yellow in fall</td>
<td></td>
</tr>
<tr>
<td>Medallion™ (‘Medzam’) 45’high x 35’-40’wide</td>
<td>thick glossy, red and gold in fall</td>
<td>dense branching</td>
</tr>
<tr>
<td>‘Royal Red’ 40’high x 30’wide</td>
<td>glossy, dark maroon in summer, turn darker or browns out in fall</td>
<td>reportedly slightly hardier &amp; slower growing than ‘Crimson King’</td>
</tr>
<tr>
<td>‘Summershade’ 50’high x 40’wide</td>
<td>leathery, leaves out late in spring and holds late in fall, yellow in fall</td>
<td>zone 4b, faster growing</td>
</tr>
<tr>
<td>‘Superform’ 50’high x 45’wide</td>
<td>yellow in fall</td>
<td>symmetrical, uniform branching angles, straight trunk</td>
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<tr>
<td><strong>Oval to Upright Oval</strong></td>
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<tr>
<td>‘Cleveland’ 45’high x 25’-30’wide</td>
<td>good golden-yellow in fall</td>
<td>good branching habit</td>
</tr>
<tr>
<td>‘Columnare’ 50’high x 15’-20’wide</td>
<td>darker green in summer, golden-yellow in fall</td>
<td>sometimes listed as zone 3, moderate growth rate</td>
</tr>
<tr>
<td>Conquest™ (‘Conzam’) 30’-35’high x 8’-10’wide</td>
<td>dark maroon changes to deep green in summer, bright red in fall</td>
<td>dense branching</td>
</tr>
<tr>
<td>‘Crimson Sentry’ 25’high x 15’wide</td>
<td>dark maroon to purple in summer</td>
<td>sometimes listed as zone 4b, dense branching, almost pyramidal, slower growing than ‘Crimson King’</td>
</tr>
<tr>
<td>Easy Street™ (‘Ezeste’) 40’high x 20’wide</td>
<td>yellow in fall</td>
<td>almost pyramidal, faster growing</td>
</tr>
<tr>
<td>‘Fairview’ 45’high x 35’wide</td>
<td>reddish purple new growth, matures to bronze-green in summer</td>
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</tr>
<tr>
<td>Parkway™ (‘Columnarbroad’) 40’high x 25’wide</td>
<td>yellow in fall</td>
<td>sometimes listed as zone 3, strong central leader, good branching, faster growing</td>
</tr>
</tbody>
</table>
Scientific Name: *Acer pseudoplatanus*
Common Name: Sycamore Maple

**Environmental Conditions:**
- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** prefers full sun, tolerates partial shade
- **Salt:** tolerant of both soil and air-borne salts
- **pH:** ≤ 8.2
- **Insect/Disease Factors:** none serious or limiting, the more common cultivar ‘Atropurpureum’ (also known as ‘Spaethii’ or ‘Purpureum’) is likely not as tolerant as straight species (aphids favor, may have problems with leaf scorch, sunscald, and/or borer infestations)

**Growth Characteristics:**
- **Height:** 40’-60’
- **Width:** 30’-50’
- **Form/Habit:** oval to rounded crown, upright spreading branching
- **Rate:** medium

**Ornamental Characteristics:**
- **Flower:** yellow-green clusters, spring after leaves
- **Fruit:** 1 ¼”-2” long samara
- **Seasonal Foliage Color:** dark green in summer, brown to poor yellow in fall
- **Bark:** gray and reddish brown, flaking into scales and exposing orange-brown inner bark
- **Other:** more leathery foliage that *A. platanoides*

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** species naturalizes freely when planted next to open areas

**Suggested Uses:** narrow or wide street tree lawns/pits (popular street tree in Europe), parks, suitable for CU-Structural Soil™

**Cultivars:** many common in Europe, few rarely available in the United States, ‘Atropurpureum’ (also known as ‘Spaethii’ or ‘Purpureum’) is not highly recommended due to above mentioned potential insect and disease problems
Scientific Name: *Acer rubrum*
Common Name: Red Maple

**Environmental Conditions:**

Hardiness Zone: 3b, choose zone appropriate seed source if cultivar not selected

Soil Moisture:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Occasionally saturated or very wet soil</th>
<th>Consistently moist, well drained soil</th>
<th>Occasional periods of dry soil</th>
<th>Prolonged periods of dry soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Sunset® ‘Bowhall’</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>‘Autumn Flame’ October Glory®</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Northwood® ‘Karpick’</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

*Flood tolerance of above cultivars is listed on cultivar chart on following page*

Sun/Shade: full sun
Salt: sensitive
pH: ≤ 7.0

**Insect/Disease Factors:** susceptible to *Verticillium* Wilt and leaf hoppers, ‘Brandywine’, ‘Red Rocket’, ‘Somerset’ and ‘Sun Valley’ show good potato leafhopper (which can cause leaves to scorch) resistance, occasionally borers attack young terminals

**Growth Characteristics:**

Height: 35’-60’
Width: 30’-70’
Form/Habit: pyramidal in youth, narrow upright to rounded with age, greatly varies, see cultivar chart on following page
Rate: medium to fast

**Ornamental Characteristics:**

Flower: showy, red, sometimes yellow to orange, small clusters in spring before leaves
Fruit: samara, often red, late spring to early summer
Seasonal Foliage Color: leaves emerge reddish in spring, green in summer, color varies in fall (yellow, orange, red), see cultivar chart on following page
Bark: attractive silver-gray in youth

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** thin bark can be easily damaged, delayed graft incompatibility can be a problem, should specify as ‘own-rooted’ when possible

**Suggested Uses:** narrow or wide street tree lawns/pits, parks
Cultivars: see chart on following page
### Acer rubrum (Red Maple) cultivars:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Zone</th>
<th>Width</th>
<th>Form/Habit</th>
<th>Fall Color</th>
<th>Flood Tolerance</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Autumn Flame’</td>
<td>3b</td>
<td>35’-55’</td>
<td>round, dense, good branch structure, symmetrical</td>
<td>red, early, long-lasting</td>
<td>medium</td>
<td>fruitless, red-brown 1 year old twigs, smaller leaves</td>
</tr>
<tr>
<td>‘Autumn Radiance’</td>
<td>4</td>
<td>40’</td>
<td>oval to rounded</td>
<td>red, early</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Autumn Spire’</td>
<td>3</td>
<td>20’-25’</td>
<td>broad columnar, upright branching</td>
<td>red, early</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Bowhall’</td>
<td>4</td>
<td>15’-25’</td>
<td>narrow columnar, upright, symmetrical</td>
<td>orange, variable</td>
<td>high</td>
<td>pale orange flowers, slower growing</td>
</tr>
<tr>
<td>‘Brandywine’</td>
<td>4</td>
<td>35’</td>
<td>oval to round</td>
<td>red to purple-red, late turning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burgundy Belle®</td>
<td>4</td>
<td>45’</td>
<td>broadly-oval, dense, symmetrical</td>
<td>bright red changing to burgundy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Fireball™’</td>
<td>4</td>
<td>25’-30’</td>
<td>narrow pyramidal, dense, symmetrical</td>
<td>red and gold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Karpick’</td>
<td>4</td>
<td>15’-25’</td>
<td>narrow columnar, upright, dense</td>
<td>yellow or red, variable</td>
<td>low</td>
<td>red twigs, red fruit, fast growing</td>
</tr>
<tr>
<td>‘New World’</td>
<td>4</td>
<td>20’</td>
<td>upright, narrow oval</td>
<td>orange-yellow to orange-red</td>
<td></td>
<td>seedless</td>
</tr>
<tr>
<td>Northwood®</td>
<td>3b</td>
<td>35’</td>
<td>round, somewhat irregular, straight trunk, good branch structure</td>
<td>orange-red</td>
<td>low</td>
<td>orange-red flowers, seedless</td>
</tr>
<tr>
<td>October Glory®</td>
<td>5a</td>
<td>35’-45’</td>
<td>round</td>
<td>red, late turning, holds leaves late</td>
<td>medium</td>
<td>bright red flowers, glossy leaves</td>
</tr>
<tr>
<td>‘Redpointe™’</td>
<td>4</td>
<td>30’</td>
<td>broadly-pyramidal, strong central leader</td>
<td>bright red</td>
<td></td>
<td>fast growing</td>
</tr>
<tr>
<td>‘Frank Jr’</td>
<td>4</td>
<td>30’</td>
<td>broadly-pyramidal, strong central leader</td>
<td>bright red</td>
<td></td>
<td>fast growing</td>
</tr>
<tr>
<td>Red Sunset®</td>
<td>4b</td>
<td>35’-45’</td>
<td>oval to round, upright branching, good branch structure, symmetrical, clump form available</td>
<td>orange-red, leaves hold late</td>
<td>high</td>
<td>bright red fruit, thick glossy leaves</td>
</tr>
<tr>
<td>‘Schlesingeri’</td>
<td>4 (3)</td>
<td>45’</td>
<td>broad vase-shaped to rounded, dense</td>
<td>orange to red, often paler tones, early, often long-lasting color</td>
<td></td>
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</tr>
<tr>
<td>‘Somerset’</td>
<td>4</td>
<td>30’</td>
<td>oval to round</td>
<td>red</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Sun Valley’</td>
<td>4</td>
<td>35’</td>
<td>oval, dense, symmetrical</td>
<td>red</td>
<td></td>
<td>seedless</td>
</tr>
<tr>
<td>Supersonic™</td>
<td>4</td>
<td>10’</td>
<td>columnar, tightly-branched</td>
<td>gold, tinted red</td>
<td></td>
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</tbody>
</table>
**Scientific Name:** *Acer saccharum*  
**Common Name:** Sugar Maple  
**Environmental Conditions:**  
- **Hardiness Zone:** 4 (3b with selection of appropriate genetic material)  
- **Soil Moisture:**

<table>
<thead>
<tr>
<th>Soil Moisture</th>
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<td>consistently moist, well drained soil</td>
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* Adirondak®, Crescendo®, Fiddler’s Creek®, ‘Legacy’, and Steeple® reportedly better drought tolerance than species, ‘Caddo’ (a western ecotype) is extremely drought tolerant  
* *Acer nigrum*, Black Maple, is closely related to *A. saccarhum*, although it has a higher drought tolerance, the *A. nigrum* selection ‘Greencolumn’ is included on cultivar chart on following page  

- **Sun/Shade:** full sun  
- **Salt:** sensitive  
- **pH:** \( \leq 7.5 \)  
- **Other:** heat sensitive, Apollo®, Bonfire®, Commemoration®, Crescendo®, ‘Legacy’, and Steeple® reportedly more heat tolerant than species, ‘Caddo’ (a western ecotype) is extremely heat tolerant  

**Insect/Disease Factors:** *Verticillium* wilt can be a serious problem in some areas, leaf scorch can be serious (reportedly ‘Goldspire’ is moderately resistant, ‘Endowment’ and ‘Wright Brothers’ are resistant, and ‘Goldspire’ is highly resistant), Bonfire® shows good leafhopper resistance  

**Growth Characteristics:**  
- **Height:** 45’-50’ typical, 60’-75’ possible (can grow 100’+ in wild)  
- **Width:** 35’-40’ typical, 55’-70’ possible  
- **Form/Habit:** oval to round  
- **Rate:** slow to medium  

**Ornamental Characteristics:**  
- **Flower:** pale yellow pendulous clusters, early spring before leaves emerge  
- **Fruit:** 1” samara  
- **Seasonal Foliage Color:** medium to dark green in summer, varies from yellow, orange, to bright red in fall, typically excellent fall color  
- **Bark:** smooth gray bark in youth becomes furrowed with long scaly plates with age  

**Management Issues:** none of significance  

**Suggested Uses:** wide street tree lawns/pits due to drought sensitivity, parks  

**Cultivars:** see chart on following page
### Acer saccharum (Sugar Maple) cultivars:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Height</th>
<th>Width</th>
<th>Foliage</th>
<th>Fall Foliage</th>
<th>Growth Rate and Form/Habit variations from species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adirondak®</strong> ('Adirzam')</td>
<td>60'-75'</td>
<td>25'-30'</td>
<td>glossy, dark green</td>
<td>golden-orange, turns and holds color late</td>
<td>pyramidal habit, dense</td>
</tr>
<tr>
<td><strong>Apollo®</strong> ('Barrett Cole')</td>
<td>25'</td>
<td>10'</td>
<td>dark green</td>
<td>variable</td>
<td>dense branching, symmetrical</td>
</tr>
<tr>
<td>‘Arrowhead’</td>
<td>60'</td>
<td>30'-40'</td>
<td>large, dark green</td>
<td>yellow to orange</td>
<td>pyramidal, strong central leader, dense branching</td>
</tr>
<tr>
<td>‘Autumn Splendor’</td>
<td>45'</td>
<td>40'</td>
<td>glossy green</td>
<td>orange-red</td>
<td>heat, drought, and leaf tatter resistant, adaptable to Great Plains region</td>
</tr>
<tr>
<td><strong>Bonfire™</strong></td>
<td>50'-65'</td>
<td>40'-50'</td>
<td>medium green</td>
<td>bright orange to red</td>
<td>faster growing</td>
</tr>
<tr>
<td>‘Caddo’ (describes a western ecotype)</td>
<td>30'-50'</td>
<td>variable</td>
<td>leathery, deeply lobed, dark green</td>
<td>variable, can be very showy</td>
<td>variable form/habit</td>
</tr>
<tr>
<td><strong>Commemoration</strong></td>
<td>50'-60'</td>
<td>30'-35'</td>
<td>thick, glossy, dark green, tatter resistant</td>
<td>variable, turns early, drops foliage late</td>
<td>faster growing, dense branching, develops heavy caliper earlier</td>
</tr>
<tr>
<td><strong>Crescendo™</strong> ('Morton')</td>
<td>45' or 30'</td>
<td>40'</td>
<td>dark green</td>
<td>orange-red to red</td>
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<tr>
<td><strong>Endowment</strong></td>
<td>50'</td>
<td>20'</td>
<td>dark green</td>
<td>bright yellow, sometimes orange-red</td>
<td>slower growing</td>
</tr>
<tr>
<td><strong>Fall Fiesta™</strong></td>
<td>50'-75'</td>
<td>50'</td>
<td>glossy, thick, leathery, tatter resistant</td>
<td>variable</td>
<td>faster growing</td>
</tr>
<tr>
<td><strong>Fairview</strong></td>
<td>55'</td>
<td>40'</td>
<td></td>
<td>orange-red</td>
<td>rapid trunk growth, well branched crown</td>
</tr>
<tr>
<td><strong>Fiddler’s Creek™</strong></td>
<td>40'-50'</td>
<td>20'-25'</td>
<td>large, deeply cut, thick, leathery, glossy</td>
<td>variable</td>
<td>faster growing, dense</td>
</tr>
<tr>
<td>‘Goldsplire’</td>
<td>40'-45'</td>
<td>12'-20'</td>
<td>leathery, dark green</td>
<td>bright yellow-orange</td>
<td>slower growing, dense</td>
</tr>
<tr>
<td><strong>A. nigrum</strong> ‘Greencolumn’</td>
<td>50'</td>
<td>20'-25'</td>
<td>medium green</td>
<td>yellow to apricot-orange</td>
<td>upright, narrow, maintains central leader, columnar in youth</td>
</tr>
<tr>
<td><strong>Green Mountain®</strong></td>
<td>70' (45')</td>
<td>45' (35')</td>
<td>thick, leathery, dark green, tatter resistant</td>
<td>variable</td>
<td>faster growing, uniform growth, upright habit</td>
</tr>
<tr>
<td>‘John Pair’ only hardy to Zone 5</td>
<td>30'</td>
<td>30'</td>
<td>glossy green</td>
<td>red</td>
<td>heat resistant, adaptable to Great Plains region</td>
</tr>
<tr>
<td><strong>Legacy</strong></td>
<td>50'</td>
<td>35'</td>
<td>glossy, thick, leathery, dark green, tatter resistant</td>
<td>variable</td>
<td>faster growing, dense, symmetrical at early age</td>
</tr>
<tr>
<td><strong>Majesty®</strong> ('Flax Mill')</td>
<td>50'-80'</td>
<td>40'-50'</td>
<td>dark green</td>
<td>orange to red</td>
<td>faster growing, develops heavy caliper and full branching earlier, symmetrical</td>
</tr>
<tr>
<td><strong>Seneca Chief</strong></td>
<td>50'</td>
<td>30'</td>
<td>dark green, larger</td>
<td>golden-orange</td>
<td>faster growing, muscle-like bark, dense branching</td>
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<tr>
<td><strong>Steeple®</strong> ('Astis') *cold hardy only to zone 5</td>
<td>45'</td>
<td>20'</td>
<td>dark green</td>
<td>yellow-orange</td>
<td>narrow, symmetrical</td>
</tr>
<tr>
<td><strong>Sugar Cone</strong></td>
<td>25'</td>
<td>13'</td>
<td>dense</td>
<td>yellow</td>
<td>compact form, slow growing</td>
</tr>
<tr>
<td><strong>Wright Brothers</strong> (formerly ‘Moraine’)</td>
<td>50'-75'</td>
<td>35'</td>
<td>variable</td>
<td>faster growing, develops heavy caliper earlier</td>
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</tbody>
</table>

* ‘Arrowhead’, Adirondak®, Green Mountain®, Majesty®, ‘Seneca Chief’, ‘Sugar Cone’, ‘Wright Brothers’ sometimes listed as Zone 3
Scientific Name: Aesculus x carnea (A. hippocastanum x A. pavia)
Common Name: Red Horsechestnut

Environmental Conditions:
- Hardiness Zone: 5a
- Soil Moisture:

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- Sun/Shade: full sun
- Salt: unknown
- pH: ≤ 8.2

Insect/Disease Factors: less susceptible (but not immune) to leaf scorch, leaf blotch and reportedly mildew than Common Horsechestnuts (A. hippocastanum), potential fungal disease problems, sun-scald on trunks can be a problem in Zone 5a, ‘Fort McNair’ is reportedly more resistant to leaf scorch and leaf blotch

Growth Characteristics:
- Height: 35’-50’
- Width: 30’
- Form/Habit: oval to round, typically dense
- Rate: slow

Ornamental Characteristics:
- Flower: 6”-8” tall, pink to red, upright pyramidal clusters, late spring
- Fruit: glossy brown nuts in 1 ½” slightly prickly capsules
- Seasonal Foliage Color: dark green in summer, no notable fall color
- Bark: typically not ornamentally important, dark gray to brown, potentially becoming platy and exfoliating

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: flower, fruit, leaf and twig litter may be a problem in some areas

Suggested Uses: narrow or wide street tree lawns/pits, parks

Cultivars: ‘Briotii’ (sometimes listed as Zone 4, bright red flowers in longer (10”) clusters, deep green foliage, reportedly nearly fruitless), ‘O’Neill’ (red flowers in longer, (10-12”) clusters, lighter green foliage), ‘Fort McNair’ (pink flowers with yellow throats)

Related Species: Aesculus octandra, Yellow Buckeye (sometimes still listed as A. flava), zone 4, 60’ high, 40’ wide, 7” long yellow-green flower, may have yellow to orange fall color
Scientific Name: *Alnus glutinosa*

Common Name: European Alder or Black Alder

Environmental Conditions:
- Hardiness Zone: 4a
- Soil Moisture:
  
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  \[\text{Sun/Shade}:\text{ prefers full sun, tolerates partial shade}\]
  
  \[\text{Salt}:\text{ some observed tolerance}\]
  
  \[\text{pH}:\leq 8.2\]

Insect/Disease Factors: numerous insects and diseases are potentially problematic (including leaf miners, tent caterpillars, woody alder aphids, and cankers)

Growth Characteristics:
- Height: 40’-60’
- Width: 20’-40’
- Form/Habit: pyramidal to oval, multi-stem form available, should specify single-stem form
- Rate: fast in youth, slows down with age

Ornamental Characteristics:
- Flower: not typically considered ornamental, yet attractive, male - reddish-brown, 2”-4” long catkins open yellow, female - purple, in an upright egg-shaped strobile, both spring
- Fruit: small winged nutlets inside ½” long, egg-shaped pine cone-like fruit, persists through winter
- Seasonal Foliage Color: dark glossy green in summer, typically no fall color, yellow possible
- Bark: attractive, lustrous gray-green to green-brown in youth, polished brown with age

Transplant Issues: easy to transplant B&B, moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root

Management Issues: relatively short lived, may naturalize when planted next to open areas

Suggested Uses: narrow or wide street tree lawns/pits, parks, good for reclamation sites (fixes own nitrogen), often used for windbreaks

Cultivars: ‘Pyramidalis’ or ‘Fastigiata’ (upright columnar habit, 10’-15’ wide, somewhat denser and lower branched)
Scientific Name: *Betula nigra* ‘Cully’ and ‘BNMTF’

Common Name: Heritage® and Dura-Heat™ River Birch

Environmental Conditions:

- **Hardiness Zone:** 4b (4a)
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

Sun/Shade: prefers full sun, tolerates partial shade

Salt: unknown

pH: \( \leq 7.0 \)

Other: Dura-Heat™ is reportedly heat tolerant

Insect/Disease Factors: resistant to bronze birch borer, less prone to leaf-spot than species, Dura-Heat™ is aphid resistant

Growth Characteristics:

- **Height:** 40’-50’
- **Width:** 30’-40’
- **Form/Habit:** broadly pyramidal to oval, vigorous grower, multi-stem or single-stem forms available, Dura-Heat™ has dense compact appearance
- **Rate:** medium to fast

Ornamental Characteristics:

- **Flower:** 2”-3” slender dark brown catkins
- **Fruit:** not ornamentally important, inconspicuous, small nutlets inside catkins
- **Seasonal Foliage Color:** glossy, Heritage® is light green in summer, Dura-Heat™ is dark green, both turn yellow in fall
- **Bark:** strongly exfoliating, cream and tan, Heritage® exfoliates pinkish-orange as well
- **Other:** Heritage® has larger leaves than straight species, Dura-Heat™ has smaller leaves than straight species

Transplant Issues: moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, best planted B&B

Management Issues: can be low branched, may require pruning to be used as street tree

Suggested Uses: narrow or wide street tree lawns/pits (preferably wide lawns/pits for multi-stem form), parks

Cultivars: above information is specific to cultivars
Scientific Name: *Betula populifolia* ‘Whitespire Sr.’ (cultivar formerly listed as *Betula platyphylla* var. *japonica*, Asian White Birch)
Common Name: Whitespire Sr. Gray Birch
Environmental Conditions:
- Hardiness Zone: 4a
- Soil Moisture:
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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<td>Other</td>
<td>reportedly better heat tolerance than most Birch but not as good as previously listed River Birch cultivars Heritage® and Dura-Heat™</td>
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Insect/Disease Factors: shows some resistance to bronze birch borer, reportedly leafhopper resistant

Growth Characteristics:
- Height: 40’
- Width: 25’
- Form/Habit: pyramidal to oval, available in multi-stem or single-stem forms, specify desirable form
- Rate: medium (possibly fast)

Ornamental Characteristics:
- Flower: catkins
- Fruit: not ornamentally important, inconspicuous, small nutlets inside catkins
- Seasonal Foliage Color: glossy, dark green in summer, yellow in fall
- Bark: attractive, grayish-white, with black markings, doesn’t exfoliate

Transplant Issues: moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, best planted B&B

Management Issues: none of significance

Suggested Uses: narrow or wide street tree lawns/pits(preferably wide lawns/pits for multi-stem form), parks

Cultivars: above information is cultivar specific, ‘Whitespire Jr.’ not recommended because of genetic variability due to seed propagation
Scientific Name: *Carpinus betulus*
Common Name: European Hornbeam

Environmental Conditions:
- **Hardiness Zone:** 5a (4)
- **Soil Moisture:**
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** sensitive
- **pH:** ≤ 8.2

Insect/Disease Factors: none serious or limiting, leaf minor possible, two-lined chestnut borer sometimes attacks ‘Fastigiata’

Growth Characteristics:
- **Height:** 40’-60’
- **Width:** 30’-40’
- **Form/Habit:** pyramidal to rounded in youth, oval to rounded at maturity, fine textured branches, low branching tendency typically creates short trunk
- **Rate:** slow to medium

Ornamental Characteristics:
- **Flower:** catkins with light-green bracts, spring
- **Fruit:** small green-brown nutlets at base of leafy flower bracts in pendulous clusters, mature in fall
- **Seasonal Foliage Color:** dark green in summer, yellow to yellow-green in fall, fall color is often late
- **Bark:** attractive, smooth slate-gray

Transplant Issues: difficult to transplant B&B or bare root, somewhat slow to establish

Management Issues: typically low branched, may require pruning to be used as street tree, tolerates heavy pruning, dieback can be a minor problem, narrow branch angles on columnar forms may be problem with heavy snow/ice loads

Suggested Uses: wide street tree lawns/pits, narrow tree lawns/pits with pruning, parks, suitable for CU-Structural Soil™, columnar forms useful for screening or hedging

Cultivars: ‘Fastigiata’ (35’-40’ high, 20’-30’ wide, narrowly conical becoming broadly oval-vase shaped with age, very dense branching), ‘Columnaris’ (another upward branching and compact crown form commonly confused with ‘Fastigiata’ in the nursery trade, theoretically ‘Columnaris’ develops a central leader and ‘Fastigata’ does not), ‘Pyramidalis’ (just another name given to ‘Fastigiata’ and ‘Columnaris’ forms), ‘Franz Fontaine’ (35’-40’ high, 15’ wide, narrowest form available, maintains narrow-columnar form with age as current season’s growth curves inward toward central leader)

‘Fastigiata’
Scientific Name: *Catalpa speciosa*
Common Name: Northern Catalpa

**Environmental Conditions:**
- **Hardiness Zone:** 4a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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**Growth Characteristics:**
- **Height:** 50’-60’ typical, can reach over 100’
- **Width:** 20’-40’
- **Form/Habit:** narrow, open, irregular-oval
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** showy, white, orchid-like with yellow and/or purplish spots inside, large 6” upright clusters, early to mid summer
- **Fruit:** 8”-20” long, thin, pendulous pods, green changing to brown, persistent throughout winter
- **Seasonal Foliage Color:** bright to medium green in summer, poor yellow-green to brownish in fall
- **Bark:** dark grayish brown, old trunks are ridged and furrowed or thick and scaly

**Transplant Issues:** easy to transplant B&B or \( \leq 2” \) caliper bare root

**Management Issues:** fruit litter could be a nuisance in some areas

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** none known
Scientific Name: *Celtis laevigata*

Common Name: Sugar Hackberry, Southern or Mississippi Hackberry

**Environmental Conditions:**

- **Hardiness Zone:** 6a (cultivars reportedly zone 5)
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** prefers full sun, tolerates partial shade
- **Salt:** unknown
- **pH:** $\leq 7.5$
- **Other:** good heat and wind tolerance

**Insect/Disease Factors:** resistant to witches’ broom and nipple gall, ‘**Magnifica**’ resistant leafhoppers

**Growth Characteristics:**

- **Height:** 60’-80’
- **Width:** similar to height, 60’+
- **Form/Habit:** rounded with spreading, often pendulous branches
- **Rate:** medium to fast

**Ornamental Characteristics:**

- **Flower:** not ornamentally important, inconspicuous clusters
- **Fruit:** small orange-red to blue-black drupes in fall
- **Seasonal Foliage Color:** light green in summer, dull yellow in fall
- **Bark:** smooth light gray with corky/warty ridges
- **Other:** foliage is smaller than *C. occidentalis*

**Transplant Issues:** moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, best planted B&B, somewhat slow to establish

**Management Issues:** ‘**All Seasons**’ twigs are heavier than average for species and less likely to shed

**Suggested Uses:** wide street tree lawns/pits due to size, ‘**All Seasons**’ can be used in narrow street tree lawns/pits, parks

**Cultivars:** ‘**All seasons**’ (reportedly zone 5, 40’-50’ high, 30’-40’ wide, fast growing, well balanced crown with ascending branches, fine textured foliage, good yellow fall color, red fruit, American Beech-like bark is smooth silver-gray with few corky ridges), ‘**Magnifica**’ (*C. occidentalis* and *C. laevigata* hybrid, reportedly zone 5, broadly oval to vase-shaped, fast growing, nearly sterile – little to no fruit)
Scientific Name: *Celtis occidentalis*

Common Name: Common Hackberry

Environmental Conditions:
- Hardiness Zone: 3b (3a, 2b)
- Soil Moisture:
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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Insect/Disease Factors: susceptible to various problems, although most rarely serious or limiting, except witches’ broom, which can disfigure form with abnormal branch growth (broom-like clusters)

Growth Characteristics:
- Height: 40’-60’
- Width: similar to height, 40’+
- Form/Habit: pyramidal when young, irregular-rounded when mature, open branching, somewhat elm-like with ascending then arching branches
- Rate: medium to fast

Ornamental Characteristics:
- Flower: not ornamentally important, inconspicuous clusters, spring as leaves are emerging
- Fruit: yellow or orange-red to dark purple drupe, fall
- Seasonal Foliage Color: light to medium green in summer, yellow in fall
- Bark: gray with rough and corky ridges

Transplant Issues: moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, best planted B&B, somewhat slow to establish

Management Issues: none of significance

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars: ‘Prairie Pride’ (zone 3b or 4, rapid grower, compact uniform crown, thick leathery lustrous foliage, dark red-purple fruit, lighter fruit crop than species), *Prairie Sentinel®* (‘KSU-1’, 10’ wide, fastigate form)
Scientific Name: *Cercidiphyllum japonicum*
Common Name: Katsura Tree

Environmental Conditions:
- **Hardiness Zone:** 5a
- **Soil Moisture:**
  - Occasionally saturated or very wet soil 1
  - Consistently moist, well drained soil 2
  - Occasional periods of dry soil 3
  - Prolonged periods of dry soil 4

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  - **Sun/Shade:** prefers full sun, tolerates partial shade
  - **Salt:** unknown
  - **pH:** \( \leq 8.2 \)
  - **Other:** protected site best

Insect/Disease Factors: relatively pest free, resistant to *Verticillium Wilt*

Growth Characteristics:
- **Height:** 40’-60’ (can reach 100’ in the wild)
- **Width:** quite variable, 25’-60’
- **Form/Habit:** upright pyramidal when young, round with age, multi-stem or single-stem forms available
- **Rate:** medium to fast

Ornamental Characteristics:
- **Flower:** early spring before leaves emerge
- **Fruit:** small ½”-¼” pods in clusters (resemble tiny banana bunches)
- **Seasonal Foliage Color:** new leaves emerge bright red-purple, becoming bluish-green in summer, good yellow to apricot-orange in fall
- **Bark:** attractive, shaggy brown
- **Other:** yellow leaves in fall have a cotton-candy scent

Transplant Issues: easy to transplant B&B or \( \leq 2” \) caliper bare root

Management Issues: trunk sunscalds easily when young

Suggested Uses: wide street tree lawns/pits and parks due to size and drought sensitivity

Cultivars: weeping forms (f. *pendula* and f. *pendula ‘Morioka Weeping’*) available but not suitable for street tree use
Scientific Name: *Cladrastis kentukea*

Common Name: Yellowwood

Environmental Conditions:
- **Hardiness Zone:** 4b
- **Soil Moisture:**
  
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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** ≤ 8.2

Insect/Disease Factors: relatively pest free

Growth Characteristics:
- **Height:** 30’-50’
- **Width:** 40’-55’
- **Form/Habit:** broadly rounded, graceful arching habit, branches low and typically loses central leader, may need to specify single-stem for street tree use due to multi-stemmed potential
- **Rate:** medium-fast

Ornamental Characteristics:
- **Flower:** showy, fragrant, white, 8”-14” long pendulous clusters, late spring (bi-annually)
- **Fruit:** brown, 3” long seed pods, ripening in fall
- **Seasonal Foliage Color:** bright green in summer, yellow in fall
- **Bark:** attractive smooth gray
- **Other:** yellow leaf axis (rachises) persist after leaflets fall off in fall, prolonging seasonal interest

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: prune only in summer as profuse bleeding will occur other times of the year, can be weak wooded with poor crotch angles that split out as the tree grows older, pruning may be needed in youth to develop desired trunk form or for use as a street tree, thin bark sensitive to mechanical damage

Suggested Uses: wide street tree lawns/pits, narrow tree lawns/pits with pruning, parks

Cultivars: ‘Rosea’ (sometimes called ‘Perkins Pink’) a pink flowering form, may be difficult to find
Scientific Name: *Corylus colurna*
Common Name: Turkish Filbert

Environmental Conditions:
Hardiness Zone: 5a (4b)

Soil Moisture:

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Sun/Shade: full sun
Salt: unknown
pH: ≤ 8.2
Other: heat tolerant once established

Insect/Disease Factors: occasionally eastern filbert blight can be a serious problem in some areas, leaves fairly resistant to leaf scorch

Growth Characteristics:
Height: 40’-60’
Width: 20’-40’
Form/Habit: broadly pyramidal, conical
Rate: medium

Ornamental Characteristics:
Flower: 2”-3” long, pendulous male catkins, late winter to early spring, female flowers inconspicuous
Fruit: edible nuts inside textured and fringed 2” husks
Seasonal Foliage Color: dark green and leathery in summer (although species variable), potentially yellow to purple in fall, often leaves drop yellow-green
Bark: gray-brown, flakes and scales with age on trunk and older branches, exposing orange-brown inner bark

Transplant Issues: difficult to transplant bare root, best planted B&B
Management Issues: fruit may be a litter problem
Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™
Cultivars: none available
Scientific Name: *Eucommia ulmoides*
Common Name: Hardy Rubber Tree

**Environmental Conditions:**
- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** ≤ 8.2
- **Other:** heat tolerant

**Insect/Disease Factors:** relatively pest free

**Growth Characteristics:**
- **Height:** 40’-60’
- **Width:** 40’-60’
- **Form/Habit:** very sparsely branched in youth, rounded to broad-spreading at maturity
- **Rate:** medium

**Ornamental Characteristics:**
- **Flower:** not ornamentally important
- **Fruit:** 1 ½” winged capsule on female trees
- **Seasonal Foliage Color:** attractive glossy dark green in summer, fall color often nonexistent or poor yellow-green
- **Bark:** gray-brown, becomes ridged and furrowed with age

**Transplant Issues:** easy to transplant B&B

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** none available
Scientific Name: *Fraxinus americana*
Common Name: White Ash

**Environmental Conditions:**

- **Hardiness Zone:** 4a (some cultivars to 3)
- **Soil Moisture:**

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</table>

- **Sun/Shade:** full sun
- **Salt:** some observed tolerance
- **pH:** ≤ 8.2

**Insect/Disease Factors:** Ashes are susceptible to a number of insect and disease problems, ash borer (in hot dry environments) and ash yellows (in the Eastern and Midwestern United States) may be the most serious, all *Fraxinus* are very susceptible to Emerald Ash Borer, do not use in midwest or northeast where Emerald Ash Borer exists or is moving toward the region

**Growth Characteristics:**

- **Height:** 50’-70’
- **Width:** 40’-60’
- **Form/Habit:** oval to rounded and open with age, maintains good central leader in youth
- **Rate:** medium

**Ornamental Characteristics:**

- **Flower:** not ornamentally important, inconspicuous
- **Fruit:** not ornamentally important, 1”-2” long samara, male seedless cultivars available
- **Seasonal Foliage Color:** dark green in summer, color variable in fall (yellow to purple), certain cultivars selected for good reddish to purple color in fall
- **Bark:** gray to gray-brown, narrow interlacing ridges create diamond shaped furrows

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** fruit litter can be a problem in some areas, non-fruiting cultivars available, graft incompatibility problems have been observed on some cultivars

**Suggested Uses:** narrow or wide street tree lawns/pits, wide street tree lawns/pits preferred for straight species due to tree size, parks, suitable for CU-Structural Soil™

**Cultivars:** see chart on following page
### Fraxinus americana (White Ash) Cultivars:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Zone</th>
<th>Form/Habit</th>
<th>Fall Color</th>
<th>Fruiting/Non-fruiting</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Autumn Applause’</td>
<td>5a</td>
<td>oval, dense branching</td>
<td>maroon, early turning and long lasting</td>
<td>non-fruiting</td>
<td>young trees subject to bark splitting at ground level</td>
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<tr>
<td>‘Autumn Blaze’</td>
<td>3</td>
<td>oval</td>
<td>purple</td>
<td>light fruit set</td>
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<tr>
<td>Autumn Purple® (‘Junginger’)</td>
<td>5a</td>
<td>round</td>
<td>reddish-purple to deep red</td>
<td>non-fruiting</td>
<td>fast growing, glossy leaves</td>
</tr>
<tr>
<td>‘Champaign County’</td>
<td>4a (5a)</td>
<td>dense, strong central leader, heavy trunk</td>
<td>not much, yellow to purple possible</td>
<td>little to no fruiting observed</td>
<td>lustrous dark green leaves</td>
</tr>
<tr>
<td>‘Chicago Regal’</td>
<td>4a</td>
<td>oval to rounded, symmetrical branching</td>
<td>orange to purple, mixed with earth tones</td>
<td>non-fruiting</td>
<td>fast growing, larger foliage, bark resistant to frost cracking</td>
</tr>
<tr>
<td>‘Empire’</td>
<td>3</td>
<td>narrow oval (25’wide), strong central leader</td>
<td>rusty orange to purple</td>
<td>non-fruiting</td>
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<tr>
<td>‘Rose Hill’</td>
<td>5b</td>
<td>upright oval to pyramidal, sturdy branching</td>
<td>bronze-red to purple</td>
<td>non-fruiting</td>
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<tr>
<td>‘Royal Purple’</td>
<td>4a</td>
<td>oval, upright habit</td>
<td>purple</td>
<td>fruiting</td>
<td>vigorous grower in youth, bark resistant to frost cracking</td>
</tr>
<tr>
<td>Skyline® (‘Skycole’)</td>
<td>4b</td>
<td>oval, strong central leader, symmetrical branching</td>
<td>orange-red</td>
<td>non-fruiting</td>
<td>glossy leaves</td>
</tr>
<tr>
<td>Sparticus® (‘Sparzam’)</td>
<td>4a</td>
<td>pyramidal form</td>
<td>burgundy with bronze highlights</td>
<td>non-fruiting</td>
<td>glossy dark green foliage, silvery-white undersides, wavy leaf margins, longer foliage retention</td>
</tr>
<tr>
<td>Windy City™ (‘Tures’)</td>
<td>4a</td>
<td>oval to rounded, good central leader, may have smaller width, possibly only 30’-35’ wide</td>
<td>burgundy to reddish-orange with orange and yellow highlights</td>
<td>fruiting</td>
<td>semi-glossy foliage, bark resistant to frost cracking</td>
</tr>
</tbody>
</table>
Scientific Name: *Fraxinus excelsior* ‘Hessei’

Common Name: Hessei European Ash

Environmental Conditions:

- **Hardiness Zone:** 4b
- **Soil Moisture:**
  
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  - Sun/Shade: full sun
  - Salt: some observed tolerance
  - **pH:** ≤ 8.2

Insect/Disease Factors: Ashes are susceptible to a number of insect and disease problems, *F. excelsior* is particularly susceptible to borers, ‘Hessei’ has shown good pest resistance compared to species and other Ashes, although almost as susceptible to borers as species if planted in a hot dry site, all *Fraxinus* are very susceptible to Emerald Ash Borer, do not use in midwest or northeast where Emerald Ash Borer exists or is moving toward the region

Growth Characteristics:

- **Height:** 60’
- **Width:** 45’
- **Form/Habit:** typically upright oval to rounded, occasionally almost flat-topped at maturity, very vigorous, typically dense
- **Rate:** medium

Ornamental Characteristics:

- **Flower:** not ornamentally important
- **Fruit:** seedless
- **Seasonal Foliage Color:** lustrous dark green in summer, potentially yellow in fall, although leaves typically remain green late into fall and drop when still green
- **Bark:** not ornamentally important, gray to gray-brown

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: none of significance

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars: above info is cultivar specific
Scientific Name: *Fraxinus pennsylvanica*
Common Name: Green Ash

Environmental Conditions:
Hardiness Zone: 2a
Soil Moisture:

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<tr>
<th>Hardiness Zone</th>
<th>Soil Moisture</th>
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<td>3</td>
<td>occasional periods of dry soil</td>
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<td>4</td>
<td>prolonged periods of dry soil</td>
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</table>

Sun/Shade: full sun
Salt: some observed tolerance
pH: ≤ 8.2

Insect/Disease Factors: Ashes are susceptible to a number of insect and disease problems, ash borer (in hot dry environments) may be serious, *F. pennsylvanica* is fairly resistant to ash yellows (a problem for *F. americana* in the Eastern and Midwestern United States), all *Fraxinus* are very susceptible to Emerald Ash Borer, do not use in midwest or northeast where Emerald Ash Borer exists or is moving toward the region

Growth Characteristics:
Height: 40'-60'
Width: 30'-50'
Form/Habit: pyramidal in youth, variable with age, oval to rounded and often irregular
Rate: fast

Ornamental Characteristics:
Flower: not ornamentally important
Fruit: not ornamentally important, samara on female trees
Seasonal Foliage Color: glossy medium to dark green in summer, typically inconsistent yellow in fall, some of available cultivars turn bronze-red, burgundy, or purple in fall
Bark: gray to gray-brown, narrow interlacing ridges create diamond shaped furrows

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root
Management Issues: may require frequent pruning as storm damage prone, fruit litter can be a problem, non-fruiting cultivars available

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™
Cultivars: see chart on following page, selections made for growth form/habit, seedless character of male trees, and foliage characteristics (specifically dark green and shiny leaves in summer and attractive fall color)
Fraxinus pennsylvanica (Green Ash) cultivars:

<table>
<thead>
<tr>
<th>Common:</th>
<th></th>
<th>Form/Habit</th>
<th>Foliage</th>
<th>Fruit</th>
<th>Other</th>
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<tbody>
<tr>
<td></td>
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<td>Z</td>
<td>upright-oval, 30’wide,</td>
<td>thick, glossy, dark green in summer, burgundy changing to orange in fall, leaves-out late, holds leaves late</td>
<td>non-fruiting</td>
</tr>
<tr>
<td>Fraxinus</td>
<td>4</td>
<td></td>
<td>straight central leader,</td>
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<tr>
<td>pennsylvanica</td>
<td></td>
<td></td>
<td>good branch structure</td>
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<td>(‘Cimmaron®</td>
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<td>(‘Cimmzam’)</td>
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<tr>
<td>Cultivar</td>
<td></td>
<td>Zone</td>
<td>broadly oval, irregular</td>
<td>glossy dark green in summer, bright yellow in fall</td>
<td>usually but not always</td>
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<td>at times</td>
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<tr>
<td>‘Marshall’</td>
<td>3</td>
<td>a</td>
<td>oval to broadly pyramidal,</td>
<td>glossy, dark green in summer, long-lasting yellow in fall</td>
<td>non-fruiting</td>
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<td>straight trunk, good</td>
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<td>branch structure,</td>
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<td>‘Patmore’</td>
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<td>a</td>
<td>broadly oval, dense,</td>
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<td>none observed</td>
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<td>rapid grower</td>
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<td>thicker bark appears more</td>
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<td>(2b)</td>
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<td>thick, leathery, lustrous dark green in summer, bronze-red in fall</td>
<td>non-fruiting</td>
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<td>Zone</td>
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<td>lustrous dark green in summer, yellow in fall</td>
<td>non-fruiting</td>
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<td>rapid grower</td>
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<tr>
<td>‘Bergeson’</td>
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<td>(2)</td>
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<tr>
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<td>4</td>
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<td>ChampTreeTM</td>
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<td>glossy, bright green changes to dark green in summer, deep yellow in fall</td>
<td>non-fruiting</td>
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<tr>
<td>(‘National 1999’)</td>
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<td>(‘Wahpeton’)</td>
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<td>tends to maintain central</td>
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<td>leader, good branch</td>
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<td>structure</td>
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<td>Georgia GemTM</td>
<td>6</td>
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<td>upright-oval</td>
<td>larger leaves, glossy, dark green in summer, yellowish in fall</td>
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<td>(‘Oconee’)</td>
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<td>NewportTM</td>
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<td>oval, straight trunk,</td>
<td>glossy dark green in summer, yellow in fall</td>
<td>non-fruiting</td>
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<tr>
<td>(‘Bailey’)</td>
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<td>good branching</td>
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<td>Prairie SpireTM</td>
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<td>upright-oval to narrow</td>
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<td>(‘Rugby’)</td>
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<td>dense branching</td>
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<td>var. lanceolata</td>
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<td>oval to rounded</td>
<td>lanceolate, golden yellow in fall</td>
<td>non-fruiting</td>
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72
Scientific Name: *Ginkgo biloba*
Common Name: Ginkgo, sometimes called Maidenhair Tree

Environmental Conditions:
- **Hardiness Zone:** 4b
- **Soil Moisture:**
  - Occasionally saturated or very wet soil
  - Consistently moist, well-drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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Insect/Disease Factors: relatively pest free

Growth Characteristics:
- **Height:** 50’-80’ (can reach over 100’)
- **Width:** greatly variable, 30’-40’ is common, potentially wider than high at maturity
- **Form/Habit:** variable, irregular when young, pyramidal with age, open, often large wide-spreading branches
- **Rate:** slow

Ornamental Characteristics:
- **Flower:** not ornamentally important, inconspicuous
- **Fruit:** noxious smelling on female trees, specify male trees
- **Seasonal Foliage Color:** bright green in summer, yellow in fall
- **Bark:** light gray-brown, ridged and furrowed

Transplant Issues: difficult to transplant bare root, best planted B&B

Management Issues: specify male trees to avoid fruit litter and noxious fruit smell, easy fall clean-up as all leaves drop within just a couple days of each other

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars: *all the following cultivars are male (non-fruiting)*

- **Common:** ‘Autumn Gold’ (50’ high, 35’ wide – perhaps broader later, symmetrical when young, broad, excellent golden yellow fall color), ‘Lakeview’ (45’ high, 25’ wide, narrowly conical, upright, frequently irregular), ‘Magyar’ (60’ high, 30’ wide, narrowly-pyramidal, uniform, upright branching), Princeton Sentry® (‘PNI 2720’, 60’ high, 25’ wide, narrowly conical, upright, uniform branching)

- **Available:** Golden Colonade™ (‘JFS-UGA2’, 40’ high, 25’ wide, narrow oval form, strong central leader), ‘Golden Globe’ (zone 6, 80’ wide, 30’-40’ wide, denser branching habit), Emperor™ (‘Woodstock’, uniform oval form, strong central leader, good branching habit, good yellow fall color), Presidential Gold™ (‘The President’, 50’ high, 40’ wide, broadly pyramidal to oval, bright yellow fall color, strong central leader and full branching when young), ‘Saratoga’ (40’ high, 30’ wide, distinct central leader, somewhat oval, good yellow fall color), Windover Gold® (upright oval form, golden fall color, vigorous growth)
Scientific Name: *Gleditsia triacanthos* var. *inermis*
Common Name: Thornless Common Honeylocust

**Environmental Conditions:**

**Hardiness Zone:** 4b (selected cultivars into 4a and 3b)

**Soil Moisture:**

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<td>prolonged periods of dry soil</td>
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**Sun/Shade:** full sun
**Salt:** some observed tolerance
**pH:** ≤ 8.2

**Insect/Disease Factors:** over-planting has encouraged severe insect problems in many areas, including spider mite borers, leaf spot, cankers, powdery mildew, wiches' broom, Honeylocust plant bug (*‘Moraine’* and *Skyline®* have shown some resistance, green-leaved strains more tolerant such as *Shademaster®*, yellow-leaved strains very susceptible such as *Sunburst®*), mimosa webworm (*‘Moraine’* resistant, ‘Green Glory’ moderately resistant, *Imperial®* very susceptible), Thyronectria canker (*Halka™* resistant, *Imperial®, Shademaster®, Skyline®, and TrueShade®* partially resistant, ‘Moraine’, *Skyline®* and *Sunburst®* susceptible), and Nectria canker (*Sunburst®* susceptible)

**Growth Characteristics:**

- **Height:** 40’-80’
- **Width:** 30’-70’
- **Form/Habit:** oval to rounded, open, spreading
- **Rate:** fast

**Ornamental Characteristics:**

- **Flower:** inconspicuous, not ornamentally important
- **Fruit:** long brown pods, most cultivars have little to no fruit
- **Seasonal Foliage Color:** light green in summer (dark green cultivars available), yellow in fall
- **Bark:** attractive, dark gray-brown, develops scaly platy ridges and deep furrows with age
- **Other:** drops leaves early

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** small leaves easy for fall clean-up

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars** *(all typically less than 50’ high):* *Halka™* (‘Christie’, zone 4a (3b), full branching, develops heavier caliper at an early age, essentially fruitless), ‘Moraine’ (zone 3b, denser than species, upper branches ascending, lower branches more pendulous, dark green summer foliage, golden yellow fall color, fruitless form, reportedly susceptible to storm damage), *Shademaster®* (‘PNI 2835’, zone 3b, high vase shaped canopy, dark green summer foliage, late to turn yellow-green in fall, essentially fruitless), *Skyline®* (‘Skycole’, zone 3b, upright, broadly pyramidal, strong central leader, tight upright branching, dark green summer foliage, good yellow fall color), *Spectrum™*, (‘Speczem’, rounded form, foliage has bright golden-yellow tips, essentially fruitless), *True Shade®* (fast growing, shiny dark bark, essentially fruitless)

* Avoid ‘Rubylace’ and *Sunburst®* (‘Suncole’)
Scientific Name: *Gymnocladus dioicus*
Common Name: Kentucky Coffeetree

**Environmental Conditions:**
- **Hardiness Zone:** 4a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** \( \leq 8.2 \)

**Insect/Disease Factors:** relatively pest free

**Growth Characteristics:**
- **Height:** 50’-70’
- **Width:** 40’-50’
- **Form/Habit:** very sparse branching when young, oval to vase shaped, upward arching branches, open, unique and irregular, coarse yet particularly interesting and picturesque in winter, provides filtered shade in summer, male trees often more upright
- **Rate:** medium

**Ornamental Characteristics:**
- **Flower:** greenish-white or yellowish-white pyramidal clusters, late spring, 8”-12” on female trees, 3”-4” on male trees, female has rose fragrance
- **Fruit:** leathery, reddish-brown to black, 4”-10” long pods in fall, persist throughout winter
- **Seasonal Foliage Color:** emerges late spring with pinkish-purplish tinge, changing to blue-green in summer, potentially good yellow in fall
- **Bark:** attractive, gray-brown to dark brown, rough, with hard thin and scaly ridges curling outward exposing an orange-brown color

**Transplant Issues:** easy to transplant B&B or \( \leq 2” \) caliper bare root

**Management Issues:** use of male tree eliminates fruit litter problem

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** ‘Espresso’ (male non-fruiting form)
Scientific Name: *Liquidambar styraciflua*
Common Name: American Sweetgum

**Environmental Conditions:**

- **Hardiness Zone:** 5b, northern seed source recommended or reliably cold hardy cultivar
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** ≤ 7.5

**Insect/Disease Factors:** none serious or limiting

**Growth Characteristics:**
- **Height:** 50’-75’ (80’-120’ in the wild)
- **Width:** 40’-65’
- **Form/Habit:** pyramidal when young, oval to round with age, straight trunk
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** not ornamentally important, present as leaves are emerging and expanding
- **Fruit:** 1”-1 ½” ball of dehiscent capsules, persist into winter
- **Seasonal Foliage Color:** glossy deep green in summer, great variability in fall, yellow/orange/red/purple tones, typically excellent fall color
- **Bark:** grayish-brown, somewhat rounded ridges and deep furrows

**Transplant Issues:** transplant B&B, not bare root

**Management Issues:** fruit litter may be objectionable

**Suggested Uses:** narrow or wide street tree lawns/pits, parks

**Cultivars:**
- Cherokee™ (‘Ward’, burgundy to red fall color, produces corky bark early, virtually seedless), Emerald Sentinel® (‘Clydesform’, 30’ high, 12-15’ wide, yellow-orange fall color, slower growing than species), Gold Dust® (‘Goduzam’, reliably cold hardy in zone 5, gold and green variegated, strongly star-shaped leaves, fall color adds pink and burgundy tones), Grandmaster™ (‘Grazam’, reliably cold hardy in zone 5, retains pyramidal form with age, star-shaped leaves, orange to reddish-purple fall color), Happidaze® (‘Hapdel’, heavy crown, well spaced branching, deep maroon fall color), Moraine™ (most cold hardy cultivar, reportedly to zone 4b, uniform, upright-oval habit, fast growing, bright red to burgundy fall color), ‘Rotundiloba’ (not as hardy, zone 6 (5b), rounded leaf lobes, fruitless), ‘Worplesdon’ (mixed reports on hardiness, possibly not as hardy, only zone 6, uniquely lobed leaves, apricot-orange or purple fall color)
Scientific Name: *Liriodendron tulipifera*
Common Name: Tuliptree or Tulip Poplar

**Environmental Conditions:**
- **Hardiness Zone:** 5a (4b), northern seed source recommended
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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**Insect/Disease Factors:** none serious or limiting

**Growth Characteristics:**
- **Height:** 70’-90’ (can grow 150’+ in wild)
- **Width:** 35’-50’
- **Form/Habit:** somewhat pyramidal in youth, oval with age
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** tulip shaped, 2” upright, pale green, deep orange at base, late spring to early summer
- **Fruit:** cone like cluster of woody samaras
- **Seasonal Foliage Color:** bright green in summer, yellow in fall
- **Bark:** gray to gray-brown, furrowed with tight, lighter colored, interlacing, round to flat ridges

**Transplant Issues:** difficult to transplant B&B or bare root, B&B transplanting in small caliper is best

**Management Issues:** soft bark easily damaged by mechanical injury, leaf yellowing followed by leaf drop can be a real problem if trees do not receive adequate water

**Suggested Uses:** wide street tree lawns/pits or parks due to size and drought sensitivity

**Cultivars:** ‘Fastigiatum’ or ‘Arnold’ (narrow form, 50’-60’ high, 15’-25’ wide)
Scientific Name: *Maclura pomifera* var. *inermis* (male)
Common Name: Osage Orange
Environmental Conditions:
- Hardiness Zone: 5b
- Soil Moisture:

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<tr>
<th>occasionally saturated or very wet soil</th>
<th>consistently moist, well drained soil</th>
<th>occasional periods of dry soil</th>
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- Sun/Shade: full sun
- Salt: some observed tolerance
- pH: ≤ 8.2
Insect/Disease Factors: relatively pest free
Growth Characteristics:
- Height: 30’-50’
- Width: 30’-50’
- Form/Habit: irregular, rounded, typically low branching, stiff interlacing branches, sometimes branches show pendulous tendency
- Rate: fast
Ornamental Characteristics:
- Flower: not ornamentally important
- Fruit: baseball size green-yellow fruit on female trees in fall
- Seasonal Foliage Color: bright, glossy medium to dark green in summer, yellow-green to good yellow in fall
- Bark: attractive, orange-brown inner bark seen though shredding gray-brown outer bark
Transplant Issues: easy to transplant B&B
Management Issues: use of male tree eliminates fruit litter problem, var. *inermis* is completey thornless (except for juvenile stems, which occasionally have thorns)
Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™, useful as a windbreak
Cultivars: ‘Wichita’ (thornless male, upright-spreadig habit), ‘Whiteshield’(thornless male, upright oval form) availability of any cultivar may be limited
Scientific Name: *Metasequoia glyptostroboides*

Common Name: Dawn Redwood

Environmental Conditions:

- **Hardiness Zone:** 5b
- **Soil Moisture:**
  
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  Sun/Shade: full sun
  
  Salt: unknown
  
  pH: \( \leq 8.2 \)

Insect/Disease Factors: none serious or limiting, although mites can cause defoliation under drought stress

Growth Characteristics:

- **Height:** 70'-100'
- **Width:** 25'-50'
- **Form/Habit:** pyramidal, single straight trunk, tapered with a buttressed base, develops an irregular fluted character and armpit-like depressions below the branch attachments to central leader
- **Rate:** fast

Ornamental Characteristics:

- **Flower:** not ornamental important
- **Fruit:** 1” pendulous cones
- **Seasonal Foliage Color:** bright green in summer, brown in fall, often pinkish/orange-brown to red-brown
- **Bark:** reddish brown, fissured, finely shredding and exfoliating

Transplant Issues: easy to transplant B&B

Management Issues: lower branch attachments would require removal for typical street tree use

Suggested Uses: exceptionally wide street tree lawns/pits with pruning or parks due to size, low branching, and drought sensitivity

Cultivars: formerly limited availability of both cultivars, current availability unknown, ‘National’ and ‘Sheridan Spire’ were selected for narrow growth habits, ‘Sheridan Spire’ is likely more upright, compact and columnar growing than ‘National’, ‘National’ may be more susceptible to canker problems than species
Scientific Name: *Nyssa sylvatica*
Common Name: Black Tupelo, also known as Sour Gum or Black Gum

Environmental Conditions:

Hardiness Zone: 5a
Soil Moisture:

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Sun/Shade: full sun
Salt: some observed tolerance
pH: ≤ 7.5

Insect/Disease Factors: none serious or limiting

Growth Characteristics:

Height: 30’- 60’ (although rare, can grow to 100’+)
Width: 20’- 40’
Form/Habit: pyramidal when young, dense, horizontal branching, sometimes pendulous lower branches, varies with age between two distinct forms, either an irregular-rounded and often flat-topped form or an oval to pyramidal form
Rate: slow to medium

Ornamental Characteristics:

Flower: not ornamentally important
Fruit: not ornamentally important, fairly inconspicuous, ½” long blue-black drupes in pairs or clusters, eaten by birds and mammals
Seasonal Foliage Color: glossy green in summer, great variability in fall (yellow/orange/red/purple tones), typically excellent fall color
Bark: color variable, dark gray to brown, often silvery or almost black, texture variable, at times irregular ridges broken into short segments, other times almost scaly

Transplant Issues: difficult to transplant, use small caliper B&B only, slow to recover from transplanting
Management Issues: fruits (found on older trees) can stain sidewalk and may cause litter problem
Suggested Uses: narrow or wide street tree lawns/pits, parks
Cultivars: strongly weeping form ‘Autumn Cascades’ is available but not suitable for street tree use
Scientific Name: *Ostrya virginiana*

Common Name: American Hophornbeam (also known as Ironwood, but should not be confused with *Carpinus caroliniana*, which is more commonly called Ironwood)

Environmental Conditions:

- **Hardiness Zone:** 3b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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<th>Occasionally Saturated or Very Wet Soil</th>
<th>Consistently Moist, Well Drained Soil</th>
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- **Sun/Shade:** prefers full sun, tolerates partial shade
- **Salt:** very sensitive
- **pH:** ≤ 8.2

Insect/Disease Factors: none serious or limiting if healthy, two-lined chestnut borer can destroy stressed trees

Growth Characteristics:

- **Height:** 30’-50’
- **Width:** 20’-30’
- **Form/Habit:** oval to pyramidal in youth, oval to rounded with age, horizontal and drooping branching, should specify single-stem form as multi-stem form is available
- **Rate:** slow

Ornamental Characteristics:

- **Flower:** female visible in spring, but not showy, male visible in winter, 1” long catkins in clusters
- **Fruit:** small, greenish-white, inflated pods in tight hanging clusters (hop-like, hence the common name)
- **Seasonal Foliage Color:** dark green in summer, yellow in fall
- **Bark:** attractive, light grayish brown, shredded look

Transplant Issues: difficult to transplant B&B or bare root, slow to recover from transplanting

Management Issues: none of significance

Suggested Uses: narrow or wide street tree lawns/pits, parks

Cultivars: none known
Scientific Name: *Phellodendron amurense*
Common Name: Amur Corktree

**Environmental Conditions:**
- **Hardiness Zone:** 4b (3b)
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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</table>
Sun/Shade: | full sun |
Salt: | unknown |
pH: | ≤ 8.2 |

**Insect/Disease Factors:** relatively pest free

**Growth Characteristics:**
- **Height:** 30'-45'
- **Width:** 30'-40'
- **Form/Habit:** broadly vase-shaped to rounded, open with massive branches, often horizontally arranged, shorter trunk common
- **Rate:** slow

**Ornamental Characteristics:**
- **Flower:** not ornamentally important, inconspicuous
- **Fruit:** not ornamentally important, small, black
- **Seasonal Foliage Color:** often glossy dark green in summer, yellow to bronzy-yellow in fall
- **Bark:** attractive, light gray-brown, corky, furrowed

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** fruit on female trees may be a litter problem and can stain sidewalks, may naturalize when planted next to open areas, use male cultivar to avoid both potential problems

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:**
- ‘His Majesty’ (*P. sachalinense x P. amurense*, zone 3, male, fruitless, broadly vase-shaped, fast growing, yellow fall color),
- *Eye Stopper™* (‘Long Necker’, actually *P. lavallei* cultivar selected for bright yellow fall color, *P. lavallei* has a higher height at maturity, more upright branching, duller green leaves, and slightly less corky bark than *P. amurense*),
- *Macho®* (vigorous male, fruitless, broadly vase-shaped, thick leathery leaves, yellow fall color),
- *Shademaster®* (*PNI 4551*, sometimes listed as zone 3, male, fruitless, good branching structure, glossy foliage, yellow fall color),
- *Superfection™* (‘Supzam’, male, fruitless, upright-uniform branching habit)
Scientific Name: *Platanus x aceriflolia*
Common Name: London Planetree

Environmental Conditions:

- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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**Sun/Shade:** full sun  
**Salt:** some observed tolerance  
**pH:** ≤ 8.2

**Insect/Disease Factors:** over planting has encouraged disease and insect problems, of those cankerstain, anthracnose (hybrid shows considerable variation in resistance, ‘Columbia’ & ‘Liberty’ resistant to eastern strains, ‘Bloodgood’ moderately resistant to eastern strains, Metroshade™ reportedly resistant to eastern strains as are Ovation™ and Exclamation!™, and ‘Yardwood’ is likely resistant to eastern strains) and powdery mildew (‘Yardwood’ resistant, Metroshade™ reportedly resistant, conflicting reports on ‘Columbia’, ‘Liberty’, and ‘Bloodgood’) are common

**Growth Characteristics:**
- **Height:** 70’-100’
- **Width:** 65’-80’
- **Form/Habit:** pyramidal when young, open and spreading with age, develops massive branches
- **Rate:** medium

**Ornamental Characteristics:**
- **Flower:** not ornamentally important
- **Fruit:** 1” globe-shaped (syncarp), pendulous, on long stalks, mostly in pairs, persist into winter
- **Seasonal Foliage Color:** medium to dark green in summer, yellow-brown in fall
- **Bark:** extremely showy, mottled with cream, olive, and light brown colors

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** frost cracking is common, roots will heave sidewalks, bark/leaf/fruit litter may be a nuisance

**Suggested Uses:** wide street tree lawns/pits or parks due to size, suitable for CU-Structural Soil™

**Cultivars:** ‘Bloodgood’ (tolerates severe pruning, fast growing), ‘Columbia’ (zone 6, more deeply lobed leaves), Exclamation!™ (‘Morton Circle’, zone 4, uniform habit, conical in youth, dense growth, light fruiting), ‘Liberty’, Metroshade™ (‘Metzam’, cinnamon colored new growth), Ovation™ (‘Morton Euclid’, Zone 4, fast growing, uniform habit), ‘Yardwood’ (possibly not as hardy, reportedly only into zone 6, fast growing, bark exfoliates at younger age)
**Scientific Name:** *Prunus sargentii*  
**Common Name:** Sargent Cherry  
**Environmental Conditions:**  
**Hardiness Zone:** 4b (5a for reliable flowering)  
**Soil Moisture:**  

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<th>Hardiness Zone</th>
<th>Soil Moisture</th>
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<td>prolonged periods of dry soil</td>
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**Sun/Shade:** full sun  
**Salt:** some observed tolerance  
**pH:** ≤ 7.5  
**Insect/Disease Factors:** none incapacitating  
**Growth Characteristics:**  
**Height:** 40’-50’  
**Width:** 20’-30’, equal to height possible  
**Form/Habit:** vase-shaped to rounded  
**Rate:** medium to fast  
**Ornamental Characteristics:**  
**Flower:** showy, pink, early spring before leaves, hardy buds  
**Fruit:** small, purple-black cherries, summer, not showy  
**Seasonal Foliage Color:** emerges with reddish tinge in spring, glossy dark green in summer, yellow to bronze-red in fall  
**Bark:** attractive, polished mahogany-red color  
**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root  
**Management Issues:** cherries are short-lived trees (only 50 years in good site), fruit could stain sidewalk and be a nuisance in some situations  
**Suggested Uses:** narrow or wide street tree lawns/pits, parks  
**Cultivars:** ‘Columnaris’ (not true columnar, just narrower form with definite upright branching, 10’-20’ wide, likely shorter, 30’-40’ high, often flowers slightly later than species with emerging leaves instead of before leaves), **Pink Flair** (‘JFS-KW58’, zone 4a, may be hardy to zone 3, 25’ high, 15’ wide, upright narrow vase form, flowers a week or two later than typical species, consistent orange-red fall color)
Scientific Name: *Pyrus calleryana*

Common Name: Callery Pear

Environmental Conditions:
- Hardiness Zone: 5a
- Soil Moisture:
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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Sun/Shade: full sun

Salt: some observed tolerance

pH: ≤ 8.2

Insect/Disease Factors: susceptible to fireblight, see cultivars for resistance

Growth Characteristics:
- Height: 30’-50’
- Width: 20’-40’
- Form/Habit: pyramidal in youth, broadens with age to oval or rounded, dense branching and foliage
- Rate: fast

Ornamental Characteristics:
- Flower: showy, white clusters, spring before or as leaves emerge
- Fruit: ½” greenish to tan, in clusters
- Seasonal Foliage Color: glossy dark green in summer, fall color variable (yellow/orange/red/purple) but usually excellent
- Bark: brown, lightly ridged and furrowed with age, sometimes grayish and blocky with age as well
- Other: holds leaves late

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: branching angles and branch density combined with late holding leaves may make species prone to early winter ice/snow storm damage, cultivar ‘Bradford’ is no longer recommended because of tendency for severe limb breakage, newer cultivars with improved branching habits are available, graft incompatibility can be a problem

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars: see chart on following page, selections made for growth form, improved branching habit, flowering, fall color, and disease resistance, see small tree section for *Pyrus* under 30’
**Pyrus calleryana** (Callery Pear) cultivars:

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Zone</th>
<th>Form/Habit</th>
<th>Fall Foliage</th>
<th>Disease Resistance</th>
<th>Other</th>
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<tbody>
<tr>
<td>Aristocrat®</td>
<td>5a</td>
<td>broadly pyramidal, wider branch angles, more open</td>
<td>variable, yellow to deep red</td>
<td>slightly fireblight susceptible</td>
<td>later bloomer, sparser flowering, but still showy, wavy leaf margins</td>
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<tr>
<td>‘Autumn Blaze’</td>
<td>5a</td>
<td>rounded, can be irregular, more open, wider branch angles</td>
<td>early, reliable red</td>
<td>fireblight susceptible</td>
<td>leaves emerge with red tint in spring, drops leaves earlier</td>
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<tr>
<td>Burgundy Snow™ (‘Bursnozam’)</td>
<td>4</td>
<td>pyramidal</td>
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<td>burgundy flower centers, heavy flowering, leaves are not dark green</td>
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<tr>
<td>‘Cambridge’</td>
<td>4</td>
<td>upright, narrow-pyramidal, 15’ wide</td>
<td>bright orange</td>
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<tr>
<td>‘Capital’</td>
<td>5b</td>
<td>columnar, central leader, 15’ wide, more upright than ‘Whitehouse’</td>
<td>copper-red to red-purple</td>
<td>slightly fireblight susceptible</td>
<td>very glossy leaves</td>
</tr>
<tr>
<td>Chanticleer® (‘Glens’ Form’)</td>
<td>5a</td>
<td>upright, narrow-pyramidal, 15’-20’ wide, multiple leaders common, even branching</td>
<td>gold-red to plum</td>
<td>fireblight tolerant</td>
<td>heavier and later (a week) flowering, enters dormancy earlier</td>
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<td>same as ‘Cleveland Select’ same as ‘Stonehill’</td>
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<tr>
<td>‘Fauriei’</td>
<td>5a</td>
<td>pyramidal to rounded, wider branch angles, slower growing</td>
<td>early, variable</td>
<td>fireblight tolerant</td>
<td>heavy flowering, leaves leathery, drops leaves earlier</td>
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<td>sometimes listed as <em>P. calleryana</em> var. <em>fauriei</em> or <em>P. fauriei</em></td>
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<tr>
<td>Gladiator™ (‘Glazam’)</td>
<td>4</td>
<td>pyramidal, strong central leader, fast growing</td>
<td>likely variable</td>
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<tr>
<td>New Bradford® (‘Holmford’)</td>
<td>5</td>
<td>broadly oval to rounded</td>
<td>yellow to orange-red</td>
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<tr>
<td>‘Redspire’</td>
<td>5a</td>
<td>pyramidal to oval, dense, symmetrical, slower growing</td>
<td>often poor in north, variable</td>
<td>fireblight tolerant</td>
<td>heavy flowering, enters dormancy earlier, thick leaves</td>
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<tr>
<td>‘Trinity’</td>
<td>5b</td>
<td>broadly oval to rounded</td>
<td>consistent, orange-red</td>
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<td>heavy flowering, light green leaves</td>
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<tr>
<td>Valiant® ‘Valzam’</td>
<td>4</td>
<td>upright pyramidal, 15-20 wide</td>
<td>crimson-red</td>
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<tr>
<td>‘Whitehouse’</td>
<td>5b</td>
<td>narrow pyramidal, 15’-20’ wide, strong central leader</td>
<td>early, reddish purple</td>
<td>slightly fireblight susceptible, highly leaf-spot susceptible</td>
<td>leaves held late</td>
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</table>
Scientific Name: *Quercus acutissima*
Common Name: Sawtooth Oak

Environmental Conditions:
- Hardiness Zone: 5b or 6a
- Soil Moisture:

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- Sun/Shade: full sun
- Salt: some observed tolerance
- pH: \( \leq 7.5 \)

Insect/Disease Factors: none serious or limiting

Growth Characteristics:
- Height: 40’-50’
- Width: 35’-55’
- Form/Habit: broadly pyramidal in youth, oval-rounded to broad-rounded with age, dense
- Rate: medium (fast for an Oak)

Ornamental Characteristics:
- Flower: attractive, pendent, golden, 3-4” male catkins, early spring as leaves emerge
- Fruit: acorn, often heavy crops on older trees
- Seasonal Foliage Color: leaves emerge yellow to light green in spring, lustrous green in summer, yellow to golden brown in fall, late to turn color in fall
- Bark: attractive, gray-brown, deeply ridged and furrowed, almost corky on older trunks
- Other: young trees hold leaves throughout winter

Transplant Issues: transplant B&B

Management Issues: acorns on older trees may be a litter problem certain years

Suggested Uses: wide street tree lawns/pits or parks preferred due to size

Cultivars: ‘Gobbler’ is the name given to seedlings that produce early and abundant acorns for wild turkey food, extremely limited availability
Scientific Name: *Quercus bicolor*
Common Name: Swamp White Oak

Environmental Conditions:
- **Hardiness Zone:** 4a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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**Sun/Shade:** full sun
**Salt:** unknown
**pH:** \( \leq 7.5 \) (variable susceptibility to iron chlorosis in high pH soils)

Insect/Disease Factors: none serious or limiting

Growth Characteristics:
- **Height:** 50’-60’
- **Width:** 50’-60’
- **Form/Habit:** broad, rounded, open, typically has shorter trunk
- **Rate:** slow

Ornamental Characteristics:
- **Flower:** catkins, spring
- **Fruit:** acorn, heavy crops at 3-5 year intervals
- **Seasonal Foliage Color:** lustrous, leathery, dark green in summer (if soil has appropriate pH), yellowish in fall, sometimes red-purple in fall
- **Bark:** attractive, grayish brown, flaky and divided into deep longitudinal fissures with flat ridges

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: acorns may be a litter problem certain years

Suggested Uses: wide street tree lawns/pits or parks preferred due to size

Cultivars: Regal Prince® (‘Long’, *Q. robur x Q. bicolor*, zone 4, columnar to narrow oval habit, 20’ wide, glossy bright green summer foliage, yellow fall color, highly mildew resistant), Roschill® (‘Asjes’, *Q. robur x Q. bicolor*, zone 4, narrow oval habit, 20’ wide, glossy pure green summer foliage, yellow fall color, good mildew resistance)
Scientific Name: Quercus coccinea
Common Name: Scarlet Oak

Environmental Conditions:
- Hardiness Zone: 5a
- Soil Moisture:

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- Sun/Shade: full sun
- Salt: unknown
- pH: \( \leq 7.5 \)

Insect/Disease Factors: none serious or limiting

Growth Characteristics:
- Height: 60'-70' (can reach 100'+ in wild)
- Width: 40'-50'
- Form/Habit: round, open
- Rate: slow

Ornamental Characteristics:
- Flower: catkins, spring as leaves emerge
- Fruit: acorn
- Seasonal Foliage Color: glossy dark green in summer, russet-red to brilliant scarlet in fall, late to turn color in fall
- Bark: gray-brown
- Other: leaves persist throughout winter, particularly on young trees

Transplant Issues: difficult to transplant B&B or bare root

Management Issues: acorns may be a litter problem certain years

Suggested Uses: wide street tree lawns/pits or parks preferred due to size

Cultivars: none available
Scientific Name: *Quercus imbricaria*
Common Name: Shingle Oak

Environmental Conditions:
- **Hardiness Zone:** 5a (4b if hardy parent material selected)
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** \( \leq 7.5 \)

Insect/Disease Factors: none serious or limiting

Growth Characteristics:
- **Height:** 40’-60’ (can grow 80’-100’)
- **Width:** 40’-65’
- **Form/Habit:** pyramidal to upright-oval in youth, broad-rounded outline with age, often lower lateral branches droop
- **Rate:** slow

Ornamental Characteristics:
- **Flower:** pale yellow-green catkins, spring as leaves emerge
- **Fruit:** acorn
- **Seasonal Foliage Color:** leaves unfold reddish in spring, lustrous dark green in summer, yellow-brown to russet-red in fall
- **Bark:** gray-brown, shallow furrows, close low ridges that broaden with age
- **Other:** leaves persist throughout winter

Transplant Issues: difficult to transplant B&B or bare root, slow to recover from transplanting

Management Issues: acorns may be a litter problem certain years although reportedly less of a litter problem than with other oaks, accepts pruning well

Suggested Uses: wide street tree lawns/pits or parks preferred due to size

Cultivars: none known
Scientific Name: *Quercus macrocarpa*
Common Name: Bur Oak or Mossycup Oak

**Environmental Conditions:**
- **Hardiness Zone:** 3a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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**Sun/Shade:** full sun

**Salt:** unknown

**pH:** ≤ 8.2

**Insect/Disease Factors:** none serious or limiting

**Growth Characteristics:**
- **Height:** 60'-80' (can grow 100'+)
- **Width:** 60'-90', typically equal or slightly greater than height
- **Form/Habit:** weakly pyramidal to oval in youth, broadly rounded and open with age
- **Rate:** slow

**Ornamental Characteristics:**
- **Flower:** pale yellowish catkins, spring as leaves emerge
- **Fruit:** acorn, heavy crops at 3-5 year intervals
- **Seasonal Foliage Color:** leathery, lustrous dark green in summer, yellow-green to yellow-brown in fall
- **Bark:** dark gray to gray-brown, rough, corky, thick, developing deep ridges and furrows

**Transplant Issues:** difficult to transplant B&B or bare root, transplant small caliper trees

**Management Issues:** acorns may be a litter problem certain years

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size, suitable for CU-Structural Soil™

**Cultivars:** none known
Scientific Name: *Quercus muehlenbergii*
Common Name: Chinkapin Oak, sometimes called Yellow Chestnut Oak

**Environmental Conditions:**
- **Hardiness Zone:** 5a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** ≤ 8.2

**Insect/Disease Factors:** none serious or limiting

**Growth Characteristics:**
- **Height:** 30’-50’
- **Width:** 30’-60’, usually greater than height at maturity
- **Form/Habit:** round
- **Rate:** medium in youth, slow with age

**Ornamental Characteristics:**
- **Flower:** not ornamentally important, inconspicuous
- **Fruit:** acorn
- **Seasonal Foliage Color:** lustrous dark yellow-green in summer, yellow to orange-brown to brown in fall
- **Bark:** gray, rough and flaky

**Transplant Issues:** difficult to transplant B&B or bare root, only transplant B&B

**Management Issues:** acorns may be a litter problem certain years

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size, suitable for CU-Structural Soil™

**Cultivars:** none known
Scientific Name: *Quercus palustris*

Common Name: Pin Oak

**Environmental Conditions:**

**Hardiness Zone:** 5a

**Soil Moisture:**

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**Sun/Shade:** full sun

**Salt:** sensitive

**pH:** ≤ 7.0 (iron chlorosis in high pH soils)

**Insect/Disease Factors:** over planting has encouraged problems, including gypsy moth, oak wilt, galls, and cankers, resistant to anthracnose

**Growth Characteristics:**

**Height:** 50’-70’ (can reach 100’+)

**Width:** 40’-50’

**Form/Habit:** pyramidal in youth, oval with age, strong central leader, distinct branching habit – upper branches upright, middle branches horizontal, and lower branches descending

**Rate:** fast for an oak

**Ornamental Characteristics:**

**Flower:** pale yellow-green catkins, spring as leaves emerge

**Fruit:** acorns

**Seasonal Foliage Color:** glossy dark green (if soil has appropriate pH) in summer, scarlet in fall

**Bark:** gray-brown, thinner, smooth, develops narrow ridges and shallow furrows with age

**Other:** young trees hold leaves throughout winter

**Transplant Issues:** only transplant B&B, moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root

**Management Issues:** acorns may be a litter problem certain years, descending lower branches may need pruning where clearance is needed

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size

**Cultivars:** none known
Scientific Name: *Quercus phellos*

Common Name: Willow Oak

Environmental Conditions:

- **Hardiness Zone:** 6a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

  

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- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** \( \leq 7.5 \) (iron chlorosis in high pH soils)
- **Other:** specify northern seed source if needed

Insect/Disease Factors: susceptible to trunk borers, scale, and oak wilt, although rarely serious or limiting, resistant to anthracnose

Growth Characteristics:

- **Height:** 40’-60’ (can reach 100’+ in ideal conditions)
- **Width:** 30’-60’
- **Form/Habit:** pyramidal in youth, oval to round with age, dense crown, lower branches sometimes descending/pendulous
- **Rate:** medium

Ornamental Characteristics:

- **Flower:** pale yellow-green catkins, spring as leaves emerge
- **Fruit:** acorn, small
- **Seasonal Foliage Color:** light green in spring, dark green in summer (if soil has appropriate pH), color variable in fall (brown, yellow, bronze-orange, russet-red)
- **Bark:** gray-brown, becoming lightly ridged and furrowed with age
- **Other:** leaves persist throughout winter

Transplant Issues: best transplanted B&B

Management Issues: acorns may be a litter problem certain years, descending/pendulous lower branches may require removal where clearance is needed

Suggested Uses: wide street tree lawns/pits or parks preferred due to size

Cultivars: none known
Scientific Name: *Quercus robur*
Common Name: English Oak

**Environmental Conditions:**

- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** some observed tolerance
- **pH:** ≤ 8.2

**Insect/Disease Factors:** powdery mildew is a serious problem, **Attention!**, Crimson Spire™, Regal Prince®, Rosehill®, Skymaster™, and Skyrocket™ show varying levels of resistance

**Growth Characteristics:**
- **Height:** 40’-60’ (can reach 75’-100’+)
- **Width:** 40’-60’
- **Form/Habit:** broadly rounded, open
- **Rate:** slow to medium

**Ornamental Characteristics:**
- **Flower:** pale yellow-green catkins, spring as leaves emerge
- **Fruit:** acorn
- **Seasonal Foliage Color:** dark green to blue-green in summer, brown in fall
- **Bark:** grayish black, deeply furrowed

**Transplant Issues:** moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, best transplanted B&B

**Management Issues:** acorns may be a litter problem certain years

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size, suitable for CU-Structural Soil™

**Cultivars:**
- **Attention!** (‘DTR 105’, columnar form, dense, 15’ wide, dark green foliage, bronze fall color, good mildew resistance)
- **Crimson Spire™** (‘Crimschmidt’, *Q. alba* x *Q. robur*, columnar form, 15’ wide, faster growing, dark green mildew resistant foliage, reddish fall color)
- **Regal Prince®** (‘Long’, *Q. robur* x *Q. bicolor*, zone 4, columnar to narrow oval habit, 20’ wide, glossy bright green summer foliage, yellow fall color, highly mildew resistant)
- **Rosehill®** (‘Asjes’, *Q. robur* x *Q. bicolor*, zone 4, narrow oval habit, 20’ wide, glossy pure green summer foliage, yellow fall color, good mildew resistance)
- **Skymaster™** (‘Pyramich’, narrow when young, pyramidal with age, 25’-30’ wide, strong central leader, good branching angles, reportedly mildew resistant)
- **Skyrocket™** (uniform columnar habit, 15’ wide, leaves out early, yellow-brown fall color, reportedly moderately mildew resistant)
- **‘Fastigiata’** (columnar form, 15’-20’ wide, not recommended due to variability from seed propagation, resulting in potential iron chlorosis in high pH soils and powdery mildew susceptibility)
Scientific Name: *Quercus rubra*
Common Name: Northern Red Oak

**Environmental Conditions:**

- **Hardiness Zone:** 3b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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<thead>
<tr>
<th>Occurrence</th>
<th>Hardiness Zone</th>
<th>Sun/Shade</th>
<th>Salt</th>
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<th>Insect/Disease Factors</th>
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- **Sun/Shade:** full sun
- **Salt:** some observed tolerance
- **pH:** ≤ 7.5

**Insect/Disease Factors:** oak wilt is a serious problem in more southern areas, resistant to anthracnose

**Growth Characteristics:**
- **Height:** 60’-80’ (can grow 90’-100’ in wild)
- **Width:** 50’-70’
- **Form/Habit:** round
- **Rate:** fast for an oak

**Ornamental Characteristics:**
- **Flower:** catkins, spring
- **Fruit:** acorn, heavy crops at 3-5 year intervals
- **Seasonal Foliage Color:** emerge reddish in spring, lustrous dark green in summer, russet-red to bright red in fall, sometimes disappoints with only yellow-brown fall color
- **Bark:** gray, nearly black with age, wide flat-topped silver-gray ridges, separated by shallow fissures, deeply ridged and furrowed on older trunks

**Transplant Issues:** only transplant B&B, moderately difficult to transplant bare root

**Management Issues:** acorns may be a litter problem certain years

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size

**Cultivars:** none available
Scientific Name: *Quercus shumardii*
Common Name: Shumard Oak

**Environmental Conditions:**

**Hardiness Zone:** 5b or 6a

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**Sun/Shade:** full sun

**Salt:** unknown

**pH:** $\leq 8.2$

**Insect/Disease Factors:** seldom serious or limiting

**Growth Characteristics:**
- **Height:** 60’-80’ (can reach 100’+ in wild)
- **Width:** 45’-65’
- **Form/Habit:** pyramidal in youth, oval to round with age
- **Rate:** slow to medium

**Ornamental Characteristics:**
- **Flower:** pale yellow-green catkins as leaves emerge
- **Fruit:** acorn
- **Seasonal Foliage Color:** dark green in summer, yellow-bronze possible in fall, russet-red in fall typical
- **Bark:** gray-brown, developing somewhat platy ridges and furrows with age

**Transplant Issues:** moderately difficult to transplant B&B, best to transplant B&B

**Management Issues:** acorns may be a litter problem certain years, best to prune in late summer or fall due to “bleeding” in spring

**Suggested Uses:** wide street tree lawns/pits or parks preferred due to size

**Cultivars:** none available
Scientific Name: *Robinia pseudoacacia*
Common Name: Black Locust

**Environmental Conditions:**
- **Hardiness Zone:** 4b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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**Sun/Shade:** prefers full sun, tolerates full shade
**Salt:** some observed tolerance
**pH:** ≤ 8.2

**Insect/Disease Factors:** borers can be a serious problem, leaf miners may also be problematic

**Growth Characteristics:**
- **Height:** 40’-50’ common, can grow 70’-80’
- **Width:** 20’-35’
- **Form/Habit:** open, irregular-oval, upright branching
- **Rate:** fast

**Ornamental Characteristics:**
- **Flower:** pendulous, white, 4”-8” long clusters, late spring, fragrant
- **Fruit:** brown-black, flat, 2”-4”long pod, may persist into winter
- **Seasonal Foliage Color:** dull blue-green in summer, yellow-green in fall
- **Bark:** dark gray, with interlacing ridges, ropy appearance

**Transplant Issues:** easy to transplant B&B, ‘Pyramidalis’ (although cultivar not recommended) and ‘Purple Robe’ are easy to transplant ≤ 2” caliper bare root

**Management Issues:** fruit litter could be problematic, as well as thorns, in certain locations

**Suggested Uses:** narrow or wide street tree lawns/pits (widely used as street tree in Europe), parks, suitable for CU-Structural Soil™, good in very difficult reclamation sites (fixes own nitrogen)

**Cultivars:** ‘Frisia’ (spines are red on young shoots, yellow foliage in summer, does not retain yellow color as well in cooler climates), ‘Globe’ and ‘Bessoniana’ are cultivars under 30’ tall, see the small tree section for information on these cultivars

* ‘Pyramidalis’ (sometimes called ‘Fastigiata’, narrower, columnar form, spineless, sparse flowering) is not recommended as it is not as hardy as species and is subject to dieback
Scientific Name: *Sorbus alnifolia*
Common Name: Korean Mountainash

Environmental Conditions:
- **Hardiness Zone:** 4b
- **Soil Moisture:**
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

  
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<td><strong>Very Wet</strong></td>
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  **Sun/Shade:** prefers full sun, tolerates partial shade
  **Salt:** unknown
  **pH:** ≤ 8.2

  **Insect/Disease Factors:** *Sorbus* have potentially many minor pest problems and two major problems – fireblight and borers (borers are particularly problematic if tree is stressed or weakened). *S. alnifolia* is considered the least susceptible to borer injury but is reportedly slightly susceptible to fireblight

  **Growth Characteristics:**
  - **Height:** 30’-40’ (can grow 50’-60’, although rarely)
  - **Width:** 20’-30’, can reach equal to height
  - **Form/Habit:** pyramidal in youth, oval to rounded with age
  - **Rate:** medium to fast

  **Ornamental Characteristics:**
  - **Flower:** showy, white loose clusters, late spring, heavy flowering alternate years
  - **Fruit:** pink-red to orange-red berries in loose clusters, fall, persistent
  - **Seasonal Foliage Color:** lustrous dark green in summer, yellow to orange in fall
  - **Bark:** smooth silvery gray

  **Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

  **Management Issues:** harder wooded than other *Sorbus*, hence storm damage less likely

  **Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

  **Cultivars:** none available
Scientific Name: *Styphnolobium japonicum* (*Sophora japonica*)
Common Name: Japanese Pagodatree or Scholar-tree

Environmental Conditions:
- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil
  - Sun/Shade: full sun
  - Salt: some observed tolerance
  - pH: ≤ 8.2

Insect/Disease Factors: twig die-back and stem canker common in colder zones, although not considered serious and are rarely limiting. **Millstone™** less susceptible to stem canker than species, **Regent®** and ‘Princeton Upright’ resistant to leafhoppers

Growth Characteristics:
- **Height:** 40’-60’
- **Width:** 35’-55’
- **Form/Habit:** oval to round, upright spreading branches
- **Rate:** medium to fast

Ornamental Characteristics:
- **Flower:** showy, creamy white, 6”-12” long clusters, summer
- **Fruit:** bright green changing to yellow-brown pods in clusters, may persist through winter
- **Seasonal Foliage Color:** lustrous bright green in summer, yellowish in fall, late to turn color in fall
- **Bark:** grayish brown, furrowed with age, green bark on young branches (1-5 year old wood)

Transplant Issues: easy to transplant B&B

Management Issues: none of significance

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars: **Millstone™** (‘Halka’, good form, symmetrical, uniform, dense branching, deeper green foliage), ‘Princeton Upright’ (similar to ‘Regent’ except narrower, upright form, 25’-35’ wide), **Regent®** (fast growing, reportedly straighter trunk, flowers at younger age than species, deeper green foliage, resistance to leaf-chewing insects)
Scientific Name: *Taxodium distichum*
Common Name: Common Baldcypress

**Environmental Conditions:**

**Hardiness Zone:** 5a (4 with appropriate selection of genetic material)

**Soil Moisture:**

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<tr>
<th>Soil Moisture</th>
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**Sun/Shade:** full sun

**Salt:** some observed tolerance

**pH:** ≤ 7.5

**Insect/Disease Factors:** none serious or limiting, ‘Shawnee Brave’ has mite resistant foliage

**Growth Characteristics:**

**Height:** 50’-70’

**Width:** 20’-40’

**Form/Habit:** columnar when young, slender pyramidal with age, horizontal branching, often with pendulous branchlets, straight tapered trunk is very short and buttressed at base

**Rate:** medium

**Ornamental Characteristics:**

**Flower:** not ornamentally important

**Fruit:** 1” globose cones, green to purple when young, brown at maturity

**Seasonal Foliage Color:** late to leaf out, bright light green in spring, soft green in summer, orange-brown to russet-brown in fall

**Bark:** attractive, reddish-brown and gray-brown, fibrous

**Transplant Issues:** difficult to transplant B&B or bare root, slow to recover from transplanting

**Management Issues:** none of significance

**Suggested Uses:** wide street tree lawns/pits with pruning or parks due to size, form and low branching habit

**Cultivars:** limited availability, ‘Shawnee Brave’ (zone 5b, narrower, mite resistant foliage, reportedly tolerates high pH soils). ‘Monarch of Illinois’ (wider-spreading)

**Related Species:** *Taxodium ascendens, Pondcypress*, zone 5b, 50’-60’ high, 10’-15’ wide, upright columnar habit
Scientific Name: *Tilia americana*
Common Name: Basswood

**Environmental Conditions:**
- **Hardiness Zone:** 3a
- **Soil Moisture:**
  - Occasionally saturated or very wet soil
  - Consistently moist, well drained soil
  - Occasional periods of dry soil
  - Prolonged periods of dry soil

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- **Sun/Shade:** full sun
- **Salt:** sensitive
- **pH:** \( \leq 8.2 \)

**Insect/Disease Factors:** various pests are potentially problematic, although most are rarely serious, foliage feeding insects can damage and almost completely defoliate, scales and linden mites can be serious, susceptible to Japanese beetles

**Growth Characteristics:**
- **Height:** 60’-80’, can grow 100’+
- **Width:** 30’-60’
- **Form/Habit:** pyramidal in youth, oval to rounded with age
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** light yellow, drooping clusters attached to pale greenish-yellow leaf-like bracts, early to mid-summer, very fragrant, attracts bees, flowers before *T. cordata* and *T. tomentosa*
- **Fruit:** not ornamentally important, small nutlets, globose, attached to bracts, late summer
- **Seasonal Foliage Color:** dark green in summer, green-yellow to pale yellow in fall (if any color), can develop unattractive brownish cast in early fall (late season discoloration)
- **Bark:** not ornamentally important, gray to brown with narrow, flat-topped ridges, very tough and fibrous
- **Other:** buds and twigs have potential winter interest, as they vary in color from brown to reddish to greenish and every combination of those colors

**Transplant Issues:** easy to transplant B&B

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:**
- **American Sentry®** (‘McKSentry’, uniform pyramidal symmetrical habit), ‘Boulevard’ (narrow pyramidal, yellow fall color), ‘Fastigiata’ or ‘Pyramidal’ (columnar in youth, pyramidal with age, reaching 25’ wide, may be slightly shorter, 50’ high, ascending branches, dark green foliage, availability may be limited), **Legend®** (‘DTR 123’, zone 4, also listed to zone 2, broadly pyramidal, good central leader and branch structure, thick dark green leaves resistant to late season discoloration, red stem and bud color), ‘Lincoln’ (slender, upright, compact form, yellow fall color, listed as having lighter green foliage, also listed as having dark green foliage), ‘Redmond’ (*T. americana* x *T. euchlora*, densely pyramidal, larger leaves, buds/stems/foliage all resemble *T. americana* rather than *T. euchlora*, buds reddish, stems are red-green-brown mix, sometimes listed as having lighter green foliage)

![Tree Image](image)
Scientific Name: *Tilia cordata*
Common Name: Littleleaf Linden

**Environmental Conditions:**
- **Hardiness Zone:** 3b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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*prolonged drought will lead to leaf scorch*

- **Sun/Shade:** full sun
- **Salt:** sensitive
- **pH:** ≤ 8.2

**Insect/Disease Factors:** various pests are potentially problematic for *Tilia*, although most are rarely serious, aphids (highly susceptible) and Japanese beetles (especially Greenspire®) can be serious problems for *T. cordata*

**Growth Characteristics:**
- **Height:** 50’-70’
- **Width:** 30’-50’
- **Form/Habit:** pyramidal in youth, upright-oval to pyramidal-rounded with age, dense, some cultivars available in multi-stem form (Greenspire®)
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** yellowish, drooping clusters attached to pale greenish-yellow leaf-like bracts, mid-summer, very fragrant, attracts bees, flowers after *T. americana* but before *T. tomentosa*
- **Fruit:** not ornamentally important, small nutlets, globose, attached to bracts, late summer
- **Seasonal Foliage Color:** dark shiny green in summer, yellow-green to yellow in fall
- **Bark:** not ornamentally important, gray-brown, ridged and furrowed on older trunks

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** *many are known, the following are more readily available selections*
- **Chancellor®** (‘Chancole’, fast growing, narrow in youth, becoming tightly pyramidal with age, 20’-30’ wide, symmetrical, upward branching, good branch angles, straight trunk, dense, gold-yellow fall color)
- **Corinthian®** (‘Corzam’, pyramidal, compact, 15’-25’ wide, straight central leader, uniform limb spacing, straight trunk, foliage smaller, thicker, glossier, and reportedly more blue-green), ‘Glenleven’ (reportedly very cold hardy, fast growing, pyramidal to narrow-oval, straight trunk, symmetrical branching, larger leaves, less dense than some other cultivars), **Greenspire®** (‘PNI 6025’, zone 4, pyramidal to broad-oval, strong central leader, symmetrical branching habit), **Shamrock®** (‘Baileyi’, zone 4, broadly pyramidal, more vigorous and more open habit than Greenspire®, symmetrical branching at an early age)

‘Glenleven’
Scientific Name: *Tilia x euchlora* (*T. cordata* x *T. dasystyla*)
Common Name: Crimean Linden

**Environmental Conditions:**
- **Hardiness Zone:** 4
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil
  
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*reportedly more drought resistant than *T. cordata*

- **Sun/Shade:** full sun
- **Salt:** sensitive
- **pH:** \( \leq 8.2 \)

**Insect/Disease Factors:** various pests are potentially problematic for *Tilia*, although most are rarely serious, *T. x euchlora* more resistant to aphids than *T. cordata*

**Growth Characteristics:**
- **Height:** 40’-60’
- **Width:** 20’-30’
- **Form/Habit:** broadly pyramidal in youth and often with age, sometimes more rounded with age, pendulous lower branches, dense
- **Rate:** medium-fast

**Ornamental Characteristics:**
- **Flower:** yellowish, drooping clusters attached to pale greenish-yellow leaf-like bracts, mid-summer, likely very fragrant and attractive to bees
- **Fruit:** not ornamentally important, small nutlets, globose, attached to bracts, late summer
- **Seasonal Foliage Color:** lustrous dark green in summer, green to yellow-green in fall
- **Bark:** not ornamentally important, gray-brown, ridged and furrowed on older trunks
- **Other:** buds and twigs are often more green in color

**Transplant Issues:** easy to transplant B&B or \( \leq 2” \) caliper bare root

**Management Issues:** basal suckering on grafted trees can be a maintenance problem, specify ‘own roots’ when possible

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** ‘Laurelhurst’ (compact, broadly pyramidal, straight trunk)
Scientific Name: *Tilia tomentosa*
Common Name: Silver Linden

**Environmental Conditions:**

- **Hardiness Zone:** 5a
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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</table>

* tolerance better than *T. cordata*

- **Sun/Shade:** full sun
- **Salt:** unknown
- **pH:** < 8.2
- **Other:** tolerates heat better than *T. cordata*

**Insect/Disease Factors:** various pests are potentially problematic for *Tilia*, although most are rarely serious, aphids can be serious problem for *T. tomentosa*, less susceptible to Japanese beetles than other *Tilia*, ‘Sterling Silver’ resistant to Japanese beetles, ‘Satin Shadow’ reportedly resistant to Japanese beetles

**Growth Characteristics:**

- **Height:** 50’-70’
- **Width:** 35’-55’
- **Form/Habit:** pyramidal in youth, pyramidal to upright-oval with age, generally dense and symmetrical
- **Rate:** medium

**Ornamental Characteristics:**

- **Flower:** yellowish, drooping clusters attached to pale greenish-yellow leaf-like bracts, mid-summer, very fragrant, latest flowering *Tilia*
- **Fruit:** not ornamentally important, small nutlets, egg-shaped with a point, attached to bracts, late summer, often light seed crop
- **Seasonal Foliage Color:** shiny dark green above, silvery and pubescent on underside in summer, green-yellow to yellow in fall
- **Bark:** not ornamentally important, smooth light gray, eventually becoming gray-brown, ridged and furrowed on older trunks

**Transplant Issues:** moderately difficult to transplant B&B or bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2” caliper trees bare root, slower to recover from transplanting than other *Tilia*

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:**

- **Green Mountain®** (‘PNI 6051’, fast growing, symmetrical, dense canopy), **Satin Shadow™** (‘Sashazam’, possibly more cold hardy, symmetrical, reportedly resistant to Japanese beetles), **Sterling Silver** (also listed as ‘Sterling’, dense canopy, resistant to Japanese beetle and Gypsy Moth)
Scientific Name: *Ulmus americana*
Common Name: American Elm Cultivars

Environmental Conditions:

**Hardiness Zone:** varies, 3b to 5a (see cultivar listing below)

**Soil Moisture:**

<table>
<thead>
<tr>
<th>Occasionally saturated or very wet soil</th>
<th>Consistently moist, well drained soil</th>
<th>Occasional periods of dry soil</th>
<th>Prolonged periods of dry soil</th>
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</table>

**Sun/Shade:** full sun

**Salt:** some observed tolerance

**pH:** ≤ 8.2

**Insect/Disease Factors:** all cultivars listed below show moderate to excellent resistance to Dutch elm disease, although resistance to elm yellows (a fatal disease sometimes known as Phloem Necrosis) and elm leaf beetle (an insect that can cause severe damage in some areas) varies

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Elm Yellows</th>
<th>Elm Leaf Beetle</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘New Harmony’</td>
<td>purportedly resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>‘Valley Forge’</td>
<td>purportedly resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>‘Delaware #2’</td>
<td>susceptible</td>
<td>unknown</td>
</tr>
<tr>
<td>‘Jefferson’</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>‘Princeton’</td>
<td>unknown</td>
<td>resistant</td>
</tr>
<tr>
<td>‘Washington’</td>
<td>moderately susceptible</td>
<td>unknown</td>
</tr>
</tbody>
</table>

*‘Liberty’ is highly susceptibility to elm yellows and is not recommended due to variability of resistance to Dutch elm disease

**Growth Characteristics:**

**Height:** 60’-80’, can grow over 100’

**Width:** 40’-80’

**Form/Habit:** vase-shaped

**Rate:** medium to fast

**Ornamental Characteristics:**

**Flower:** not ornamentally important, inconspicuous

**Fruit:** ½” disc-shaped, matures in spring

**Seasonal Foliage Color:** lustrous green to dark green, often yellow in fall

**Bark:** dark gray, fissured, with broad, deep, intersecting ridges

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** *Most promising new cultivars: ‘New Harmony’* (zone 5 (4)), broadly vase-shaped, more rounded than ‘Valley Forge’, yellow fall color, ‘Valley Forge’ (zone 5, upright arching, vase-shaped, classic American Elm shape, dense, yellow fall color), ‘Jefferson’ (not currently available but will be in the next few years, holds dark green color late into the fall, strong U-shaped branch unions)

**Available:** ‘Delaware #2’ (zone 3b (3a), broadly rounded vase-shaped, sometimes irregular habit, fast growing, bright green foliage), ‘Princeton’ (zone 4 (3b), upright vase-shaped, symmetrical, fast growing, leathery dark green foliage, yellow fall color), ‘Washington’ (zone 3b, classics vase-shape, glossy foliage)
**Scientific Name:** *Ulmus x species*

**Common Name:** Elm Hybrids

**Environmental Conditions:**
- **Hardiness Zone:** varies, 3b to 5a (see cultivar listing below)
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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<td><strong>Very Dry</strong></td>
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</table>

**Sun/Shade:** full sun

**Salt:** some observed tolerance

**pH:** ≤ 8.2

**Insect/Disease Factors:** all cultivars listed are resistant to Dutch elm disease, resistance to elm yellows (a fatal disease sometimes known as Phloem Necrosis) and elm leaf beetle (an insect that can cause severe damage in some areas) varies, see chart on page 114

**Growth Characteristics:**
- **Height:** 50’-70’
- **Width:** 40’-60’ typical, can equal height with age
- **Form/Habit:** varies with cultivar, see cultivar chart on following page
- **Rate:** medium to fast, many cultivars are noted as fast growing on cultivar chart on following page

**Ornamental Characteristics:**
- **Flower:** not ornamentally important, inconspicuous
- **Fruit:** ½” disc-shaped, matures in spring
- **Seasonal Foliage Color:** green to dark green in summer (all cultivars listed as dark green except Vanguard™ and Commendation™), yellow in fall
- **Bark:** gray to brown, ridged or scaly, varies with these hybrids, can be attractive but none considered highly ornamental as *U. parvifolia* species and cultivars except ‘Frontier’ (gray-green bark with orange lenticels due to *U. parvifolia* partial parentage)

**Transplant Issues:** easy to transplant B&B or ≤ 2” caliper bare root (except ‘Frontier’, which is difficult to transplant bare root)

**Management Issues:** plants propagated on ‘own roots’ are preferred, specify when possible

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** see chart on following page

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'Shomstead'
**Ulmus x species (Elm Hybrids):**

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Growth Rate and Size (if differs from previous page)</th>
<th>Form/Habit</th>
<th>Foliage (if differs from previous page)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zone 3</strong></td>
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</tr>
<tr>
<td>‘Discovery’ (possibly 2b)</td>
<td>more compact, 45’ high, 35’ wide</td>
<td>upright oval to vase-shaped in youth, develops arching vase-shape with age, symmetrical</td>
<td></td>
</tr>
<tr>
<td>‘New Horizon’</td>
<td>fast growing</td>
<td>upright, full crown</td>
<td>large leaves, fall color unknown</td>
</tr>
<tr>
<td><strong>Zone 4</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>‘Prospector’</td>
<td>typically shorter, 40’ high, 30’ wide, fast growing</td>
<td>vase-shaped, American Elm-like but more dense</td>
<td>larger leaves, emerges with orange tint</td>
</tr>
<tr>
<td>‘Regal’</td>
<td></td>
<td>pyramidal to oval, open, sometimes upright branching, potentially good wide branching angles, strong central leader</td>
<td>not glossy, little fall color</td>
</tr>
<tr>
<td>‘Sapporo Autumn Gold’</td>
<td>fast growing</td>
<td>conical in youth, potentially vase-shaped and American Elm like, upright and irregular branching, densely branched</td>
<td>emerges with red tint</td>
</tr>
<tr>
<td>‘Urban’ (4a)</td>
<td>fast growing</td>
<td>pyramidal to broadly columnar, strong central leader</td>
<td></td>
</tr>
<tr>
<td>Vanguard™ (‘MortonPlainsman’)</td>
<td>grows into mid-summer</td>
<td>upright vase-shaped</td>
<td>waxy, glossy, slightly folded</td>
</tr>
<tr>
<td><strong>Zone 4 to 5</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Accolade™ (‘Morton’)</td>
<td>fast growing</td>
<td>vase-shaped, arching, American Elm-like</td>
<td>glossy</td>
</tr>
<tr>
<td>Danada Charm™ (‘Morton Red Tip’)</td>
<td>fast growing</td>
<td>vase-shaped, arching, very American Elm-like</td>
<td>glossy, emerges red</td>
</tr>
<tr>
<td><strong>Zone 5</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commendation™ (‘Morton Stalwart’)</td>
<td>fast growing</td>
<td>upright oval, symmetrical</td>
<td>larger leaves</td>
</tr>
<tr>
<td>‘Frontier’</td>
<td>may have slightly smaller stature, fast growing</td>
<td>pyramidal to upright oval when young, develops vase-shape with age</td>
<td>glossy, emerges with reddish tint, red to reddish-purple in fall, long lasting fall color</td>
</tr>
<tr>
<td>‘Homestead’ (5a)</td>
<td></td>
<td>pyramidal to oval, usually becoming arching with age, dense branching when young, symmetrical</td>
<td>dense foliage</td>
</tr>
<tr>
<td>‘Patriot’</td>
<td></td>
<td>stifflly upright, vase-shaped, may stay narrower</td>
<td></td>
</tr>
<tr>
<td>‘Pioneer’</td>
<td>fast growing</td>
<td>broad pyramidal in youth, rounded with age, some branches arching, dense</td>
<td>larger leaves</td>
</tr>
<tr>
<td>Triumph™ (‘Morton Glossy’)</td>
<td></td>
<td>upright oval to vase-shaped, arching, strong branching, symmetrical</td>
<td>glossy</td>
</tr>
</tbody>
</table>
**Ulmus x species (Elm Hybrids) Disease Resistance:** all listed cultivars are Dutch elm disease resistant

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Elm Yellows</th>
<th>Elm Leaf Beetle</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Discovery’</td>
<td>resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>‘New Horizon’</td>
<td>unknown</td>
<td>moderately susceptible</td>
</tr>
<tr>
<td>‘Prospector’</td>
<td>resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>‘Regal’</td>
<td>unknown</td>
<td>susceptible</td>
</tr>
<tr>
<td>‘Sapporo Autumn Gold’</td>
<td>unknown</td>
<td>susceptible</td>
</tr>
<tr>
<td>‘Urban’</td>
<td>resistant</td>
<td>very susceptible</td>
</tr>
<tr>
<td>Vanguard™ (‘Morton Plainsman’)</td>
<td>reportedly resistant</td>
<td>moderately resistant</td>
</tr>
<tr>
<td>Accolade™ (‘Morton’)</td>
<td>reportedly resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>Danada Charm™ (‘Morton Red Tip’)</td>
<td>reportedly resistant</td>
<td>unknown but likely resistant</td>
</tr>
<tr>
<td>Commendation™ (‘Morton Stalwart’)</td>
<td>reportedly resistant</td>
<td>unknown</td>
</tr>
<tr>
<td>‘Frontier’</td>
<td>tolerant, likely resistant</td>
<td>moderately resistant</td>
</tr>
<tr>
<td>‘Homestead’</td>
<td>resistant</td>
<td>susceptible</td>
</tr>
<tr>
<td>‘Patriot’</td>
<td>resistant</td>
<td>resistant</td>
</tr>
<tr>
<td>‘Pioneer’</td>
<td>resistant</td>
<td>susceptible</td>
</tr>
<tr>
<td>Triumph™ (‘Morton Glossy’)</td>
<td>reportedly resistant</td>
<td>unknown</td>
</tr>
</tbody>
</table>

**Ulmus x spp (Elm Hybrids) Parentage:**

- **Accolade™ (‘Morton’)**
  
  \((U. japonica \times U. wilsoniana)\)

- **Commendation™ (‘Morton Stalwart’)**
  
  \(((U. japonica \times U. wilsoniana ‘Morton’) \times (U. pumila \times U. carpinifolia))\)

- **Danada Charm™ (‘Morton Red Tip’)**
  
  \((U. japonica \times U. wilsoniana)\)

- **‘Discovery’** (not hybrid, \(U. davidiana\) var. \(japonica\))

- **‘Frontier’**
  
  \((U. parvifolia \times U. carpinifolia)\)

- **‘New Horizon’**
  
  \((U. japonica \times U. pumila)\)

- **‘Homestead’**
  
  (complex, involving \(U. pumila, U. x hollandica,\) and \(U. carpinifolia\))

- **‘Patriot’**
  
  (complex, crossing ‘Urban’ (complex parentage listed below) with a selection of \(U. wilsoniana\)),

- **‘Pioneer’**
  
  \((U. glabra \times U. carpinifolia)\)

- **‘Prospector’**
  
  (not hybrid, \(U. wilsoniana)\)

- **‘Regal’**
  
  (complex, cross ‘Commelin’ (\(U. x hollandica\) ‘Vegata’ \times \(U. carpinifolia\) #1) with ‘N215’ (\(U. pumila \times U. carpinifolia\) ‘Hoersholmiensis’))

- **‘Sapporo Autumn Gold’**
  
  \((U. japonica \times U. pumila)\)

- **Triumph™ (‘Morton Glossy’)**
  
  \(((U. japonica \times U. wilsoniana ‘Morton’) \times ((U. japonica \times U. pumila ‘Morton Plainsman’)))\)

- **‘Urban’**
  
  (complex, involving \(U. x hollandica\) ‘Vegata’, \(U. carpinifolia,\) and \(U. pumila\))

- **Vanguard™ (‘Morton Plainsman’)**
  
  \((U. japonica \times U. pumila)\)
Scientific Name: *Ulmus parvifolia*
Common Name: Chinese Elm or Lacebark Elm

Environmental Conditions:
- **Hardiness Zone:** 5b
- **Soil Moisture:**
  - occasionally saturated or very wet soil
  - consistently moist, well drained soil
  - occasional periods of dry soil
  - prolonged periods of dry soil

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<td>Sun/Shade:</td>
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<tr>
<td><strong>Salt:</strong></td>
<td>some observed tolerance</td>
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<tr>
<td><strong>pH:</strong></td>
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**Insect/Disease Factors:** species shows reliably good resistance to Dutch elm disease, elm yellows, and elm leaf beetle, as well as Japanese beetle

**Growth Characteristics:**
- **Height:** 40’-75’
- **Width:** 30’-75’
- **Form/Habit:** variable, rounded or vase-shaped, often with pendulous branchlets, some almost American Elm-like with upright-spreading branches, while others are broader than tall with broad-spreading branches
- **Rate:** medium to fast

**Ornamental Characteristics:**
- **Flower:** not ornamentally important, inconspicuous, late summer to early fall
- **Fruit:** 1/3” disc-like samara, ripens in fall
- **Seasonal Foliage Color:** lustrous dark green in summer, color varies in fall, yellow to reddish purple
- **Bark:** extremely ornamental, exfoliates and mottles in combinations of gray, green, orange, and brown, often with burnt orange corky lenticles

**Transplant Issues:** transplant B&B

**Management Issues:** none of significance

**Suggested Uses:** narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

**Cultivars:** New cultivars selected for various ornamental characteristics and/or cold hardiness are becoming increasingly available. The following newer cultivars are hardy to Zone 5 and currently available: ‘Dynasty’ (early introduction, so readily available cultivar, upright vase-shaped, 50’ high, 45’ wide, dull orange to red fall color but bark extremely inferior to following cultivars and often not even considered ornamental), Allee® (‘Emerald Vase’ or ‘Emer II’, upright-spreading form, 70’ high, 60’ wide, dense canopy, trunk irregularly fluted, excellent bark pattern – even on surface roots and 1’-2’ diameter branches, bark has burnt orange corky lenticels, subdued yellow fall color), Athena® (‘Emerald Isle’ of ‘Emer I’, broad-spreading habit, rounded/globe-shaped, 40’ high, 55’ wide, dense canopy, excellent bark pattern begins 2’ off the ground, bark has burnt orange corky lenticels, leathery foliage, very dark green-almost black-in summer, bronze-brown in fall), Bosque® (‘UPMTF’, listed as zone 6, narrow crown, 30’ wide, foliage is fine-textured and smaller than species, multi-color exfoliating bark), ‘Ohio’ (moderately vase-shaped, probably 40’-50’ high, 35’-45’ wide, perhaps larger, appears more loose and open, attractive gray-orange exfoliating bark, smaller leaves, grass green summer foliage, grayish-red fall color, fruit ripens red-purple color), ‘Pathfinder’ (vase-shaped, probably 35’-45’ high, 30’-40’ wide, perhaps larger, sometimes strong central leader, bark likely similar to ‘Ohio’, yellow-green leaves in summer, grayish-red in fall, fruit ripens red-purple color), *Three cultivars selected for cold hardiness (possibly into zone 4) that may become more available in the near future: ‘Hallelujah’ (fast growing, excellent foliage and bark detail), ‘Matthew’ (upright vase-shape, strong branches, bark exfoliates at early age), and ‘Zettler’ (strong, upright habit, excellent branching structure)
Scientific Name: Zelkova serrata
Common Name: Japanese Zelkova

Environmental Conditions:
- Hardiness Zone: 5b
- Soil Moisture:

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</table>

- Sun/Shade: full sun
- Salt: some observed tolerance
- pH: ≤ 8.2

Insect/Disease Factors: none serious or limiting

Growth Characteristics:
- Height: 50'-70' (can reach 120' in wild)
- Width: 40'-60'
- Form/Habit: vase-shaped, generally upright arching branches, short trunked
- Rate: medium, possibly fast in youth

Ornamental Characteristics:
- Flower: not ornamentally important, usually present as leaves are emerging
- Fruit: not ornamentally important, ripens in fall
- Seasonal Foliage Color: medium or dark green in summer, variable color in fall, often russet-yellow, but full range possible - brown/yellow/orange/red/purple
- Bark: extremely ornamental, reddish brown and cherry-like in youth, exfoliates and mottles with age in oranges, grays and browns

Transplant Issues: easy to transplant B&B or ≤ 2” caliper bare root

Management Issues: narrow crotch angles and poor branch attachments which may give rise to splitting and form damage when older

Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

Cultivars:
- Common: following three are fast growing selections (‘Halka’ is fastest, followed by Green Vase®, then Village Green™), Green Vase® (60’-70’ high, upright vase-shaped, orange-brown to bronze-red fall color), ‘Halka’ (60’-70’ high, graceful arching branches, often better branch attachment, most American Elm-like, summer foliage color not dark green like other cultivars, yellowish fall color), Village Green™ (50’-60’ high, broadly vase-shaped, width equal to height, dark green foliage, rusty red fall color)
- Available: ‘Green Veil’ (listed as zone 4, dark green leaves, branchlets somewhat pendulous, not as fast growing as most common three cultivars listed above), ‘Illinois Hardy’ (possibly more cold hardy, zone 5a), ‘Musashino’ (narrower, upright form, 20’ wide, yellow fall color), ‘Spring Grove’ (dark green foliage, wine red fall color)