

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:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

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:**

Cultivar	Width	Form/Habit	Foliage	Fall Color	Other
‘Armstong’ occasionally listed under <i>A. rubrum</i>	15’-20’	columnar/fastigiated, upright branching	resembles <i>A. saccharinum</i> , 5-lobed, silvery undersides	yellow to orange	fast grower, flowers not showy
‘Armstong Two’	15’-20’	more dense, more tightly ascending branches than ‘Armstrong’	resemble <i>A. saccharinum</i> , 5-lobed, silvery undersides	better red than ‘Armstrong’, still not reliable red	fast grower, flowers not showy
Autumn Blaze® (‘Jeffersred’)	40’	broad oval, improved branch structure over <i>A. saccharinum</i> , dense, multi-stem form available	resemble <i>A. saccharinum</i> , deeply 5-lobed	excellent orange-red, long-lasting	fast grower, sparse flowering, nearly seedless
Autumn Fantasy™ (‘DTR102’)	40’	broadly oval to upright-oval	more closely resembling <i>A. saccharinum</i> , 5-lobed	consistently bright red	fast growing
Celebration™ (‘Celzam’)	20’-25’ maybe 40’	upright-pyramidal, strong branch angles	similar to <i>A. saccharinum</i> , dense	golden-yellow to red, reportedly turning from red to gold	red flower, seedless, fast growing in youth
‘Marmo’	35’-45’	broad columnar, strong central leader	5-lobed, intermediate between parents	excellent, often mottled red & green, at times varying burgundy to orange or gold, colors early	good growth rate, seedless
‘Morgan’ Canadian, can be known as ‘Indian Summer’ in U.S, sometimes listed under <i>A. rubrum</i>	40’	broadly oval, open habit		orange-red to red	very fast growing
Scarlet Sentinel™ occasionally still listed as <i>A. rubrum</i>	25’-35’	broad columnar to oval-rounded, ascending branches, improved branch structure over <i>A. saccharinum</i>	closely resembling <i>A. saccharinum</i> , 5-lobed	yellow to red	fast growing, bright red flowers, no fruit observed, reportedly shiny bark

* ‘Armstong’, ‘Armstong Two’, Autumn Blaze®, ‘Marmo’, and ‘Morgan’ sometimes listed as Zone 3

Scientific Name: *Acer miyabei*

Common Name: Miyabei Maple

Environmental Conditions:

Hardiness Zone: 5a (4b)

Soil Moisture:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	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 $\leq 2''$ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			Consistently Moist, well Drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: prefers full sun, tolerates full shade

Salt: some observed tolerance

pH: ≤ 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 'Schwerdleri', 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

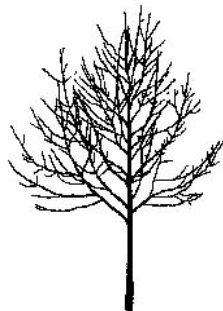
Other: foliage is typically very dense, foliage often held late

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

Management Issues: very likely to naturalize when planted next to open areas, 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



'Superform'
(one of the rounded to broadly oval forms)

***Acer platanoides* (Norway Maple) cultivars:**

Cultivar and Size	Noteworthy Foliage Characteristics	Other Noteworthy Characteristics
Rounded to Broadly Oval		
Champ Tree™ (‘National 2000’) 55’high x 40’wide	yellow in fall	
‘Crimson King’ 40’high x 30’wide	dark maroon in summer, turn darker or brown-out in fall	maroon-yellow flowers, slower growing
‘Deborah’ 50’high x 45’wide	thick, new growth emerges red-purple matures dark green in summer, yellow (orangey) in fall	straight central leader
‘Drummondii’ 35’high x 30’wide	variegated, light green edged with white in summer, yellowish in fall	
Emerald Lustre™ (‘Pond’) 50’high x 45’wide	glossy, wavy margin, new leaves have reddish tint	sometimes listed as zone 3, good branching at early age, faster growing
‘Emerald Queen’ 50’high x 40’wide	leathery, reddish tint in spring, bright yellow in fall	sometimes listed as zone 3, uniform growth, straight trunk, faster growing
‘Jade Glen’ 45’high x 45’wide	yellow in fall	open habit, faster growing
‘Princeton Gold’ 35’high x 30’wide	emerges bright yellow in spring, may fade in summer, darker yellow in fall	
Medallion™ (‘Medzam’) 45’high x 35’-40’wide	thick glossy, red and gold in fall	dense branching
‘Royal Red’ 40’high x 30’wide	glossy, dark maroon in summer, turn darker or browns out in fall	reportedly slightly hardier & slower growing than ‘Crimson King’
‘Schwedleri’ 50’high x 50’wide	emerges purplish-red in spring, matures to dark green in summer, orange to yellow in fall	flowers brownish
‘Summershade’ 50’high x 40’wide	leathery, leafs out late in spring and holds late in fall, yellow in fall	zone 4b, faster growing
‘Superform’ 50’high x 45’wide	yellow in fall	symmetrical, uniform branching angles, straight trunk
Oval to Upright Oval		
‘Cleveland’ 45’high x 25’-30’wide	good golden-yellow in fall	good branching habit
‘Columnare’ 50’high x 15’-20’wide	darker green in summer, golden-yellow in fall	sometimes listed as zone 3, moderate growth rate
Conquest™ (‘Conzam’) 30’-35’high x 8’-10’wide	dark maroon changes to deep green in summer, bright red in fall	dense branching
‘Crimson Sentry’ 25’high x 15’wide	dark maroon to purple in summer	sometimes listed as zone 4b, dense branching, almost pyramidal, slower growing than ‘CrimsonKing’
Easy Street™ (‘Ezeste’) 40’high x 20’wide	yellow in fall	almost pyramidal, faster growing
‘Fairview’ 45’high x 35’wide	reddish purple new growth, matures to bronze-green in summer	
‘Olmstead’ 40’high x 20’-25’wide		slower growing
Parkway™ (‘Columnarbroad’) 40’high x 25’wide	yellow in fall	sometimes listed as zone 3, strong central leader, good branching, faster growing

Scientific Name: *Acer pseudoplatanus*

Common Name: Sycamore Maple

Environmental Conditions:

Hardiness Zone: 5b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

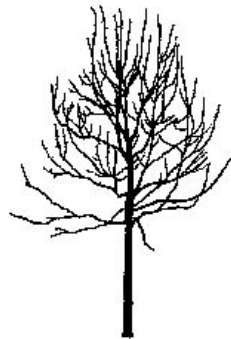
Other: more leathery foliage than *A. platanoides*

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:

Cultivar	occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
	1	2	3	4	5	6	7	8	9	10	11	12
Red Sunset® 'Bowhall'	1	2	3	4	5	6	7	8	9	10	11	12
'Autumn Flame' October Glory®	1	2	3	4	5	6	7	8	9	10	11	12
Northwood® 'Karpick'	1	2	3	4	5	6	7	8	9	10	11	12

*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

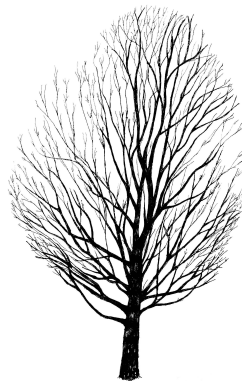
Bark: attractive silver-gray in youth

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:**

Cultivar	Zone	Width	Form/Habit	Fall Color	Flood Tolerance	Other
‘Autumn Flame’	3b	35’-55’	round, dense, good branch structure, symmetrical	red, early, long-lasting	medium	fruitless, red-brown 1 year old twigs, smaller leaves
‘Autumn Radiance’	4	40’	oval to rounded	red, early		
‘Autumn Spire’	3	20’-25’	broad columnar, upright branching	red, early		
‘Bowhall’	4	15’-25’	narrow columnar, upright, symmetrical	orange, variable	high	pale orange flowers, slower growing
‘Brandywine’	4	35’	oval to round	red to purple-red, late turning		
Fairview Flame®	4	30’	oval to round	scarlet red		
Fireball™ (‘Firzam’)	4	25’-30’	narrow pyramidal, dense, symmetrical	red and gold		
‘Karpick’	4	15’-25’	narrow columnar, upright, dense	yellow or red, variable	low	red twigs, red fruit, fast growing
Northfire™ (‘Olson’)	3	35’	oval, good branch structure	red, early		
Northwood®	3b (3a)	35’	round, somewhat irregular, straight trunk, good branch structure	orange-red	low	orange-red flowers, seedless
October Glory® (‘PNI 0268’)	5a	35’-45’	round	red, late turning, holds leaves late	medium	bright red flowers, glossy leaves
‘Red Rocket’	3	10’-15’	columnar	red		
‘Red Skin’	4	40’	round	reddish maroon, early		large thick leaves
Red Sunset® (‘Franksred’)	4b (4a)	35’-45’	oval to round, upright branching, good branch structure, symmetrical, clump form available	orange-red, leaves hold late	high	bright red fruit, thick glossy leaves
‘Schlesingeri’	4 (3)	45’	broad vase-shaped to rounded, dense	orange to red, often paler tones, early, often long-lasting color		
‘Somerset’	4	30’	oval to round	red		
‘Sun Valley’	4	35’	oval, dense, symmetrical	red		seedless

Scientific Name: *Acer saccharum*

Common Name: Sugar Maple

Environmental Conditions:

Hardiness Zone: 4 (3b with selection of appropriate genetic material)

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

* **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. saccharum*, 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: ≤ 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

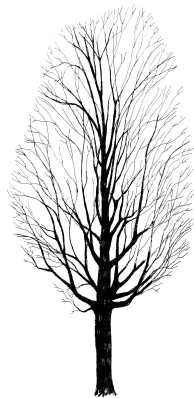
Bark: smooth gray bark in youth becomes furrowed with long scaly plates with age

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

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:

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

* ‘Arrowhead’, Adirondak®, Green Mountain®, Majesty®, ‘Seneca Chief’, ‘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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: unknown

pH: ≤ 8.2

Insect/Disease Factors: less susceptible (but not immune) to leaf scorch, leaf blotch and reportedly milder 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

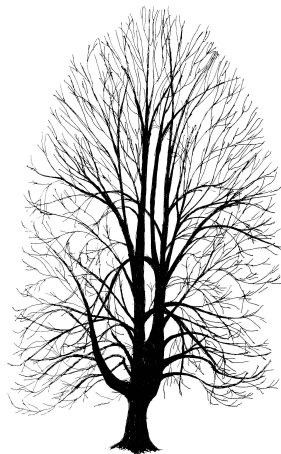
Bark: typically not ornamentally important, dark gray to brown, potentially becoming platy and exfoliating

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)



Scientific Name: *Alnus glutinosa*

Common Name: European Alder or Black Alder

Environmental Conditions:

Hardiness Zone: 4a

Soil Moisture:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

Sun/Shade: prefers full sun, tolerates partial shade

Salt: some observed tolerance

pH: ≤ 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 1/2" long, egg-shaped pine cone-like fruit, persists through winter

Seasonal Foliage Color: dark glossy green in summer, typically no fall color, yellow possible

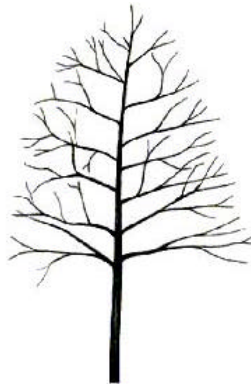
Bark: attractive, lustrous gray-green to green-brown in youth, polished brown with age

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: prefers full sun, tolerates partial shade

Salt: unknown

pH: ≤ 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

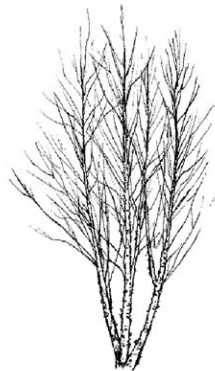
Other: Heritage® has larger leaves than straight species, Dura-Heat™ has smaller leaves than straight species

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



Clump Form

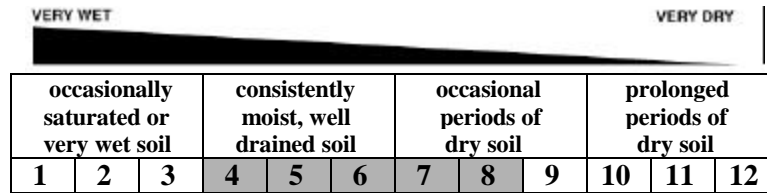
Scientific Name: *Betula populifolia* ‘Whitespire Sr.’ (cultivar formerly listed as *Betula platyphylla* var. *japonica*, Asian White Birch)

Common Name: Whitespire Sr. Gray Birch

Environmental Conditions:

Hardiness Zone: 4a

Soil Moisture:



Sun/Shade: full sun

Salt: unknown

pH: ≤ 7.5

Other: reportedly better heat tolerance than most Birch but not as good as previously listed River Birch cultivars Heritage® and Dura-Heat™

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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 currant season's growth curves inward toward central leader)



'Fastigiata'

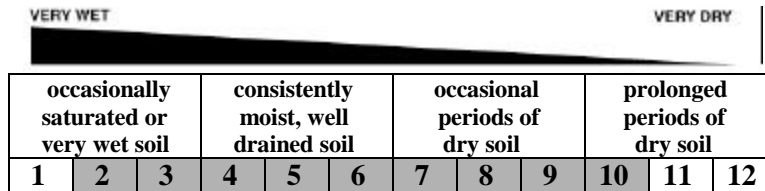
Scientific Name: *Catalpa speciosa*

Common Name: Northern Catalpa

Environmental Conditions:

Hardiness Zone: 4a

Soil Moisture:



Sun/Shade: full sun

Salt: unknown

pH: ≤ 8.2

Insect/Disease Factors: none serious or limiting

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 ≤ 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

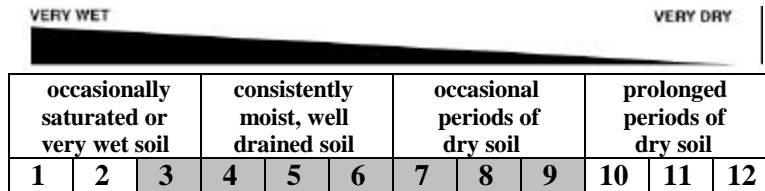
Scientific Name: *Celtis laevigata*

Common Name: Sugar Hackberry, Southern or Mississippi Hackberry

Environmental Conditions:

Hardiness Zone: 6a (cultivars reportedly zone 5)

Soil Moisture:



Sun/Shade: prefers full sun, tolerates partial shade

Salt: unknown

pH: ≤ 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*

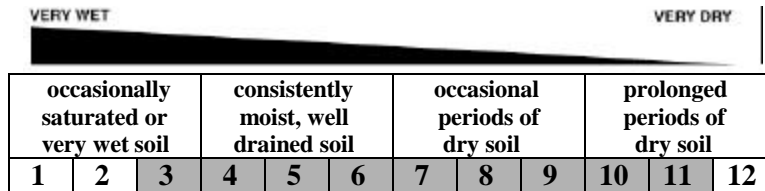
Transplant Issues: moderately difficult to transplant bare root, better success in transplanting bare root in fall, do not attempt to transplant > 2" caliper trees bare root, best planted B&B, somewhat slow to establish

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:



Sun/Shade: prefers full sun, tolerates partial shade

Salt: unknown

pH: ≤ 8.2

Other: good heat and wind tolerance

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)



Scientific Name: *Cercidiphyllum japonicum*

Common Name: Katsura Tree

Environmental Conditions:

Hardiness Zone: 5a

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: prefers full sun, tolerates partial shade

Salt: unknown

pH: ≤ 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"- ¾" 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

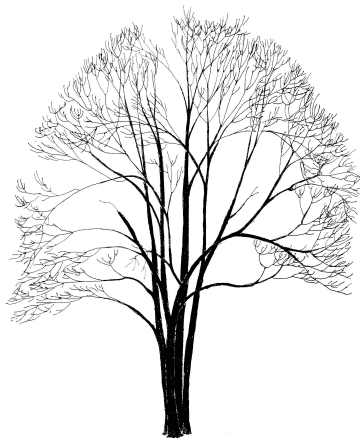
Other: yellow leaves in fall have a cotton-candy scent

Transplant Issues: easy to transplant B&B or ≤ 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:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

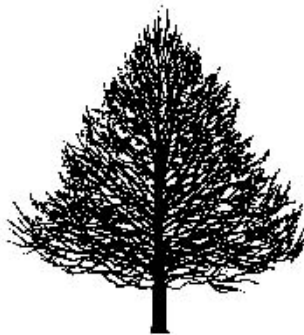
Bark: gray-brown, flakes and scales with age on trunk and older branches, exposing orange-brown inner bark

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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



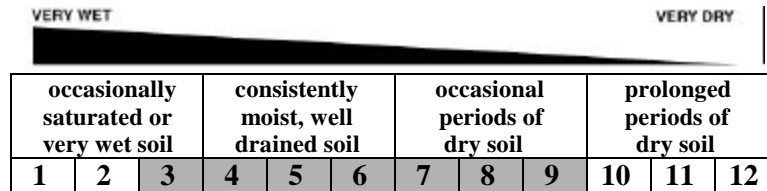
Scientific Name: *Fraxinus americana*

Common Name: White Ash

Environmental Conditions:

Hardiness Zone: 4a (some cultivars to 3)

Soil Moisture:



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

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

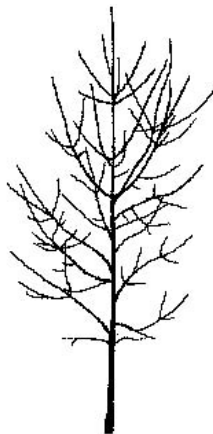
Bark: gray to gray-brown, narrow interlacing ridges create diamond shaped furrows

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:**

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

Scientific Name: *Fraxinus excelsior* 'Hessei'

Common Name: Hessei European Ash

Environmental Conditions:

Hardiness Zone: 4b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

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* ‘Northern Gem’ and ‘Northern Treasure’ (*F. nigra* x *F. mandshurica*)

Common Name: Northern Gem and Northern Treasure Ash

Environmental Conditions:

Hardiness Zone: 3

Soil Moisture:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
	2	3	4	5	6	7	8	9	10	11	12

Sun/Shade: full sun

Salt: unknown

pH: ≤ 8.2

Insect/Disease Factors: ash yellows susceptibility unknown

Growth Characteristics:

Height: 50’

Width: ‘Northern Gem’ 50’, ‘Northern Treasure’ 30’

Form/Habit: ‘Northern Gem’ is broadly oval, ‘Northern Treasure’ is upright oval

Rate: moderate to fast

Ornamental Characteristics:

Flower: not ornamentally important, inconspicuous

Fruit: nearly seedless

Seasonal Foliage Color: thick, glossy green in summer, pale orangish-yellow in fall

Bark: not ornamentally important, likely scaly and flaky as *F. nigra*

Other: leaves arch downward

Transplant Issues: available 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 specific to cultivars

Scientific Name: *Fraxinus pennsylvanica*

Common Name: Green Ash

Environmental Conditions:

Hardiness Zone: 2a

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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)

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

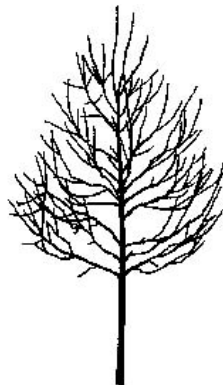
Bark: gray to gray-brown, narrow interlacing ridges create diamond shaped furrows

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)



'Patmore'

Fraxinus pennsylvanica (Green Ash) cultivars

Common:					
Cultivar	Zone	Form/Habit	Foliage	Fruit	Other
Cimmaron® (‘Cimmzam’)	4	upright-oval, 30’ wide, straight central leader, good branch structure	thick, glossy, dark green in summer, burgundy changing to orange in fall, leaf-out late, holds leaves late	non-fruiting	
‘ Marshall ’	3a	broadly oval, irregular at times	glossy dark green in summer, bright yellow in fall	usually but not always non-fruiting	fewer insect and disease problems than species
‘ Patmore ’	3a (2b)	oval to broadly pyramidal, straight trunk, good branch structure, symmetrical	glossy, dark green in summer, long-lasting yellow in fall	non-fruiting	relatively pest free
‘ Summit ’	3b	upright, oval to pyramidal, 25’-35’ wide straight trunk, good central leader, symmetrical	semi-glossy, excellent golden yellow in fall	light and infrequent crops	thicker bark, more resistant to mechanical damage
Urbanite®	5b	broadly pyramidal to oval	thick, leathery, lustrous dark green in summer, bronze-red in fall	none observed	thicker bark appears more sun -scald resistant
Available					
Cultivar	Zone	Form/Habit	Foliage	Fruit	
‘ Bergeson ’	3 (2)	upright, oval, dense, rapid grower	lustrous dark green in summer, yellow in fall	non-fruiting	
Centerpoint™	4	broadly oval to rounded, symmetrical	very glossy, yellowish in fall	non-fruiting	
ChampTree™ (‘ National 1999 ’)	4	rounded, upright spreading branches	glossy, yellow in fall	non-fruiting	
DakotaCentennial™ (‘ Wahpeton ’)	3	oval to broadly pyramidal, tends to maintain central leader, good branch structure	glossy, bright green changes to dark green in summer, deep yellow in fall	non-fruiting	
Georgia Gem™ (‘ Oconee ’)	6	upright-oval	larger leaves, glossy, dark green in summer, yellowish in fall	non-fruiting	
Newport™ (‘ Bailey ’)	3b	oval, straight trunk, good branching	glossy dark green in summer, yellow in fall	non-fruiting	
Prairie Spire™ (‘ Rugby ’)	3	upright-oval to narrow pyramidal, 20’ wide, dense branching	glossy, bright green changes to dark green in summer, golden yellow in fall	non-fruiting	
Skyward™ (‘ Wandell ’)	5b	narrowly pyramidal, 20’ wide, dense	thick, semi-lustrous, bronze-red to purple in fall	non-fruiting	
var. lanceolata	3	oval to rounded	lanceolate, golden yellow in fall		

Scientific Name: *Ginkgo biloba*

Common Name: Ginkgo, sometimes called Maidenhair Tree

Environmental Conditions:

Hardiness Zone: 4b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: some observed tolerance

pH: ≤ 8.2

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

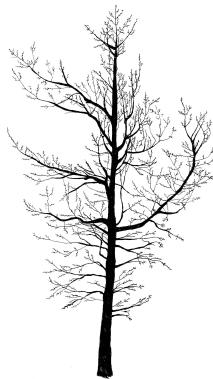
Suggested Uses: narrow or wide street tree lawns/pits, parks, suitable for CU-Structural Soil™

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 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), 'Saratoga' (40' high, 30' wide, distinct central leader, somewhat oval, good yellow fall color),

Shangri-la® (45' high, 30' wide, uniform, compact pyramidal, good dense branching habit, good yellow fall color, faster growing)



Scientific Name: *Gleditsia triacanthos* var. *inermis*

Common Name: Thornless Common Honeylocust

Environmental Conditions:

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

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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, witches' 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 Truershade® partially resistant, 'Morraine', 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

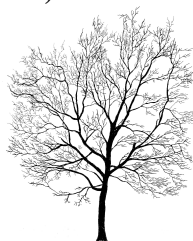
Transplant Issues: easy to transplant B&B or ≤ 2" caliper bare root

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 except 'Green Glory', 'Fairview' (zone 3b, fast growing, essentially fruitless), 'Green Glory' (zone 3b, similar to 'Moraine' pyramidal, strong central leader, fast growing, holds foliage late, essentially fruitless), Halka™ ('Christie', zone 4a (3b), full branching, develops heavier caliper at an early age, essentially fruitless), Imperial® ('Impcole', zone 4a (3b), shorter, 30'-35' high, broadly rounded, good horizontal branching angles, 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), 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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 ≤ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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 1/2" 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

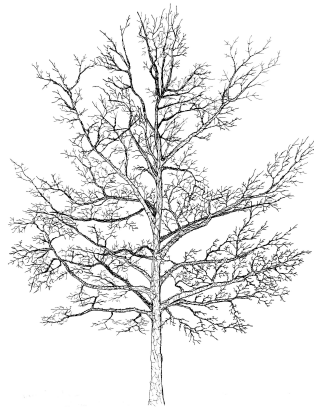
Bark: grayish-brown, somewhat rounded ridges and deep furrows

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: **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), '**Moraine**' (most cold hardy cultivar, reportedly to zone 4b, uniform, upright-oval habit, fast growing, bright red to burgundy fall color), '**Rotundaloba**' (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)



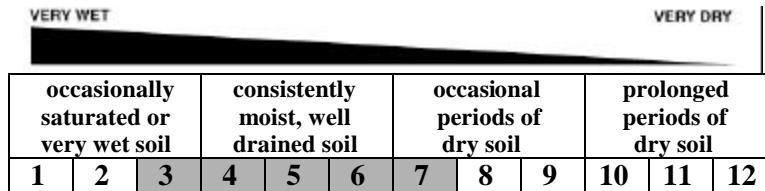
Scientific Name: *Liriodendron tulipifera*

Common Name: Tuliptree or Tulip Poplar

Environmental Conditions:

Hardiness Zone: 5a (4b), northern seed source recommended

Soil Moisture:



Sun/Shade: full sun

Salt: sensitive

pH: ≤ 8.2

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

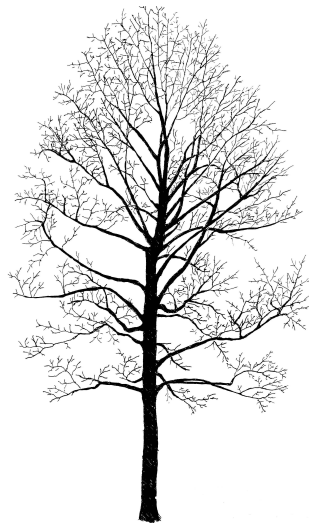
Bark: gray to gray-brown, furrowed with tight, lighter colored, interlacing, round to flat ridges

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

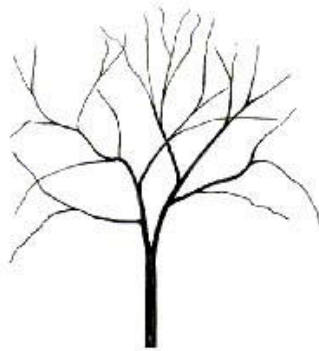
Bark: attractive, orange-brown inner bark seen though shredding gray-brown outer bark

Transplant Issues: easy to transplant B&B

Management Issues: use of male tree eliminates fruit litter problem, var. *inermis* is completely 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: 'Double O' (male, thornless except juvenile stems), 'Park' (thornless male), 'Wichita' (thornless male, upright-spreading habit), availability of any cultivar may be limited



Scientific Name: *Metasequoia glyptostroboides*

Common Name: Dawn Redwood

Environmental Conditions:

Hardiness Zone: 5b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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 ornamentally 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: very limited availability, '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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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, 1/2" 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



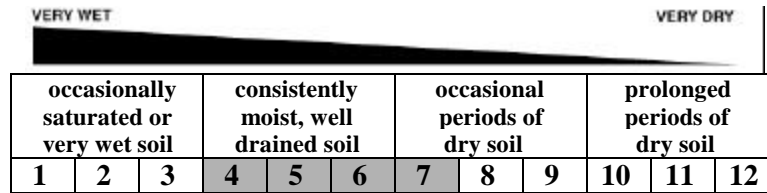
Scientific Name: *Ostrya virginiana*

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:



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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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 bronzyyellow 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. lavalleyi* cultivar selected for bright yellow fall color, *P. lavalleyi* 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)



Scientific Name: *Platanus x acerifolia*

Common Name: London Planetree

Environmental Conditions:

Hardiness Zone: 5b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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, 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), **'Liberty'**, **Metroshade™** (**'Metzam'**, cinnamon colored new growth), **'Yardwood'** (possibly not as hardy, reportedly only into zone 6, fast growing, bark exfoliates at younger age)



'Bloodgood'

Scientific Name: *Prunus sargentii*

Common Name: Sargent Cherry

Environmental Conditions:

Hardiness Zone: 4b (5a for reliable flowering)

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

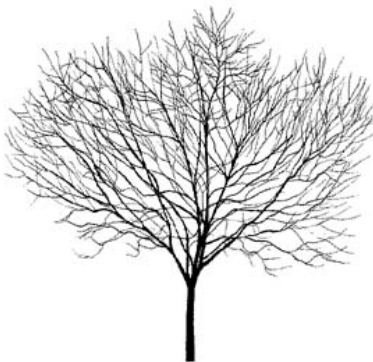
Bark: attractive, polished mahogany-red color

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)



Scientific Name: *Pyrus calleryana*

Common Name: Callery Pear

Environmental Conditions:

Hardiness Zone: 5a

Soil Moisture:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

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

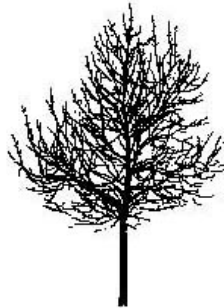
Other: holds leaves late

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'



'Autumn Blaze'

Pyrus calleryana (Callery Pear) cultivars

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

Scientific Name: *Quercus acutissima*

Common Name: Sawtooth Oak

Environmental Conditions:

Hardiness Zone: 5b or 6a

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: some observed tolerance

pH: ≤ 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

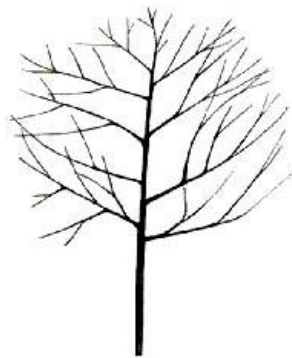
Other: young trees hold leaves throughout winter

Transplant Issues: transplant B&B

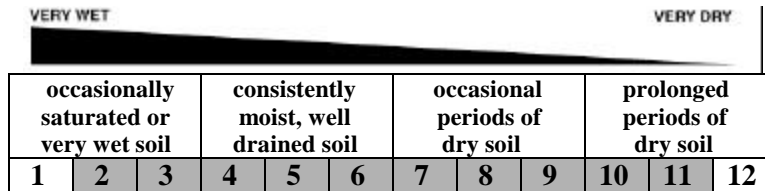
Management Issues: acorns on older trees may be a litter problem certain years

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

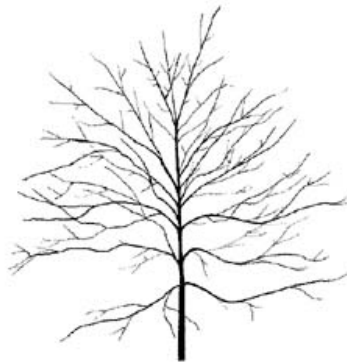
Cultivars: 'Gobbler' is the name given to seedlings that produce early and abundant acorns for wild turkey food, extremely limited availability



Scientific Name: *Quercus bicolor*
Common Name: Swamp White Oak
Environmental Conditions:
Hardiness Zone: 4a
Soil Moisture:



Sun/Shade: full sun
Salt: unknown
pH: ≤ 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 $\leq 2''$ 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: none known



Scientific Name: *Quercus coccinea*

Common Name: Scarlet Oak

Environmental Conditions:

Hardiness Zone: 5a

Soil Moisture:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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

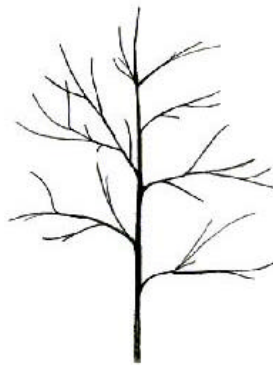
Other: leaves persist throughout winter

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

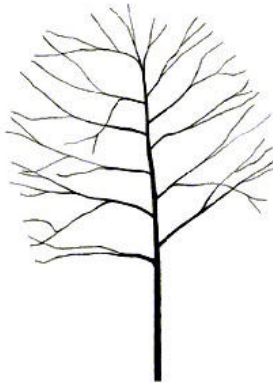
Bark: gray, rough and flaky

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

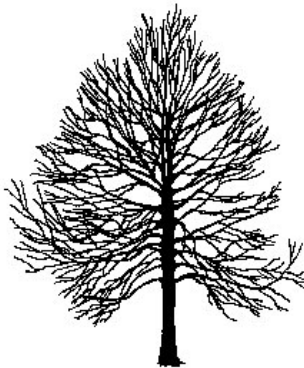
Other: young trees hold leaves throughout winter

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: 'Green Pillar' (also called 'Emerald Pillar', columnar form, delayed graft incompatibility may be a problem), 'Crownright' and 'Sovereign' (lower branches are more upright) were taken out of production due to delayed graft incompatibility problems



Scientific Name: *Quercus phellos*

Common Name: Willow Oak

Environmental Conditions:

Hardiness Zone: 6a

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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, 15’-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, leafs 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

Sun/Shade: full sun

Salt: unknown

pH: ≤ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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), '**Idahoensis**' (commonly called **Pink Idaho Locust**, *Robinia x ambigua*, zone 3, 25'-40' high, 15'-30' wide, rose-pink flowers), '**Purple Robe**' (zone 3, only 40' high, rounded form, dark pink flowers, new growth has purple tint, bronze-green summer foliage, still yellowish in fall)

* '**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

*see small tree section for *Robinia* cultivars under 30' tall



Scientific Name: *Sorbus alnifolia*

Common Name: Korean Mountainash

Environmental Conditions:

Hardiness Zone: 4b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

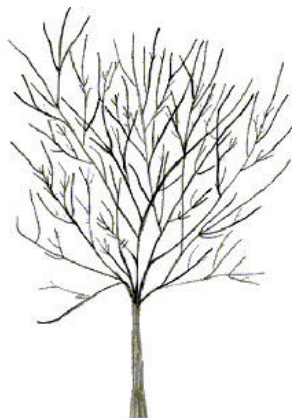
Bark: smooth silvery gray

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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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)

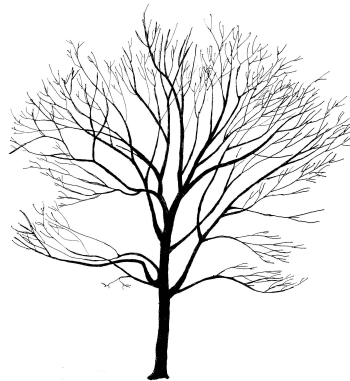
Transplant Issues: easy to transplant B&B

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)



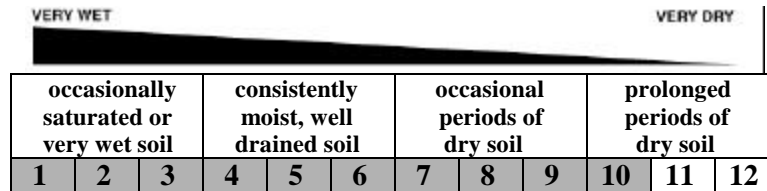
Scientific Name: *Taxodium distichum*

Common Name: Common Baldcypress

Environmental Conditions:

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

Soil Moisture:



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

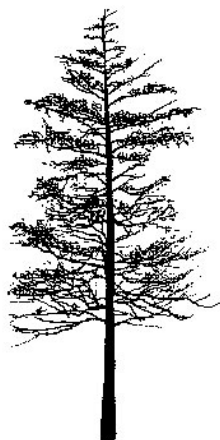
Bark: attractive, reddish-brown and gray-brown, fibrous

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)



Scientific Name: *Tilia americana*

Common Name: Basswood

Environmental Conditions:

Hardiness Zone: 3a

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: sensitive

pH: ≤ 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

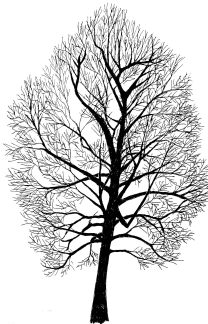
Other: buds and twigs have potential winter interest, as they vary in color from brown to reddish to greenish and every combination of those colors

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: '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™ ('Wandell', zone 4, distinctly pyramidal, good central leader, excellent branching structure, slightly smaller foliage, 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/foilage all resemble *T. americana* rather than *T. euchlora*, buds reddish, stems are red-green-brown mix, sometimes listed as having lighter green foliage), 'Sentry' (uniform symmetrical habit, branches silver-gray in youth)



Scientific Name: *Tilia cordata*

Common Name: Littleleaf Linden

Environmental Conditions:

Hardiness Zone: 3b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

*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), **Fairview™**

(fast growing, evenly spaced branching, thick and leathery foliage, less formal look than other cultivars due to a less dense habit), '**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 narrow-oval, strong central leader, symmetrical branching habit), '**Olympic**' (zone 4, symmetrical form, broadly pyramidal, better branching), '**Rancho**' (upright-oval, 20'-30' wide, vigorous, smaller leaves, good branch angles, heavy flowerings, very fragrant flower, partially resistant to Japanese beetles), **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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

*reportedly more drought resistant than *T. cordata*

Sun/Shade: full sun

Salt: sensitive

pH: ≤ 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

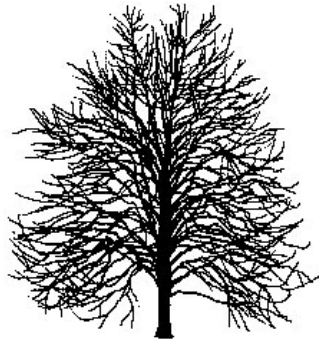
Other: buds and twigs are often more green in color

Transplant Issues: easy to transplant B&B or ≤ 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

*tolerates drought 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), Sterling Silver™ (‘Wandell’, fast growing, symmetrical, dense canopy, resistant to Japanese beetles), Satin Shadow™ (‘Sashazam’, possibly more cold hardy, symmetrical, reportedly resistant to Japanese beetles)



Sterling Silver™

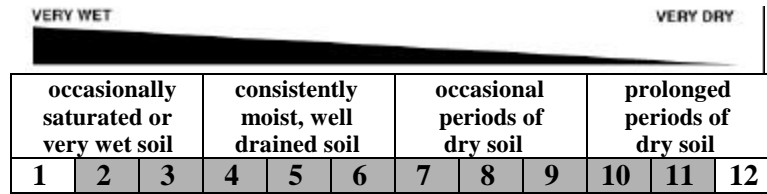
Scientific Name: *Ulmus americana*

Common Name: American Elm Cultivars

Environmental Conditions:

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

Soil Moisture:



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 ('Valley Forge' thought to have the highest resistance), 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

Cultivar	Elm Yellows	Elm Leaf Beetle
'New Harmony'	resistant	resistant
'Valley Forge'	resistant	resistant
'Delaware #2'	susceptible	unknown
'Princeton'	unknown	resistant
'Washington'	moderately susceptible	unknown

* 'Liberty' is highly susceptible 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

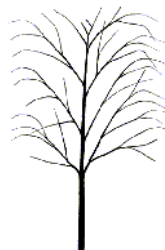
Management Issues: none of significance

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)

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, classic 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:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

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

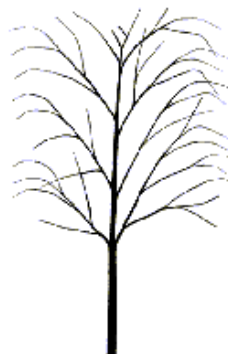
Bark: gray to brown, ridged or scaly, varies with these hybrids, can be attractive but none considered highly ornamental as *U. parvifolia* species and cultivars except **'Frontier'** (gray-green bark with orange lenticels due to *U. parvifolia* partial parentage)

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



'Homestead'

Ulmus x species (Elm Hybrids):

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

Ulmus x species (Elm Hybrids) Disease Resistance: all listed cultivars are Dutch elm disease resistant

Cultivar	Elm Yellows	Elm Leaf Beetle
'Discovery'	resistant	resistant
'New Horizon'	unknown	moderately susceptible
'Prospector'	resistant	resistant
'Regal'	unknown	susceptible
'Sapporo Autumn Gold'	unknown	susceptible
'Urban'	resistant	very susceptible
Vanguard™ ('Morton Plainsman')	reportedly resistant	moderately resistant
Accolade™ ('Morton')	reportedly resistant	resistant
Danada Charm™ ('Morton Red Tip')	reportedly resistant	unknown but likely resistant
Commendation™ ('Morton Stalwart')	reportedly resistant	unknown
'Frontier'	tolerant, likely resistant	moderately resistant
'Homestead'	resistant	susceptible
'Patriot'	resistant	resistant
'Pioneer'	resistant	susceptible
Triumph™ ('Morton Glossy')	reportedly resistant	unknown

Ulmus x spp (Elm Hybrids) Parentage:

Accolade™ ('Morton')

(*U. japonica* x *U. wilsoniana*)

Commendation™ ('Morton Stalwart')

((*U. japonica* x *U. wilsoniana* 'Morton') x (*U. pumila* x *U. carpinifolia*))

Danada Charm™ ('Morton Red Tip')

(*U. japonica* x *U. wilsoniana*)

'Discovery'

(not hybrid, *U. davidiana* var. *japonica*)

'Frontier'

(*U. parvifolia* x *U. carpinifolia*)

'New Horizon'

(*U. japonica* x *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* x *U. carpinifolia*)

'Prospector'

(not hybrid, *U. wilsoniana*)

'Regal'

(complex, cross 'Commelin' (*U. x hollandica* 'Vegata' x *U. carpinifolia* #1) with 'N215' (*U. pumila* x *U. carpinifolia* 'Hoersholmiensis'))

'Sapporo Autumn Gold'

(*U. japonica* x *U. pumila*)

Triumph™ ('Morton Glossy')

((*U. japonica* x *U. wilsoniana* 'Morton') x ((*U. japonica* x *U. pumila* 'Morton Plainsman'))

'Urban'

(complex, involving *U. x hollandica* 'Vegata', *U. carpinifolia*, and *U. pumila*)

Vanguard™ ('Morton Plainsman')

(*U. japonica* x *U. pumila*)

Scientific Name: *Ulmus parvifolia*

Common Name: Chinese Elm or Lacebark Elm

Environmental Conditions:

Hardiness Zone: 5b

Soil Moisture:

VERY WET												VERY DRY		
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil					
1	2	3	4	5	6	7	8	9	10	11	12			

Sun/Shade: full sun

Salt: some observed tolerance

pH: ≤ 8.2

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'** (one of the first introductions, hence is more easily 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), **'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'—attractive gray-orange exfoliating, 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:

VERY WET			VERY DRY								
occasionally saturated or very wet soil			consistently moist, well drained soil			occasional periods of dry soil			prolonged periods of dry soil		
1	2	3	4	5	6	7	8	9	10	11	12

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

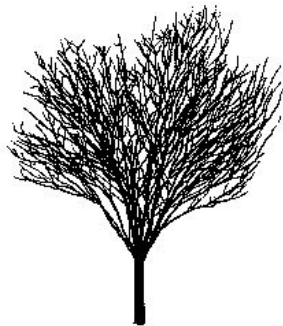
Management Issues: narrow crotch angles and poor branch attachments which may give rise to splitting and form damage when older

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)



Green Vase®