

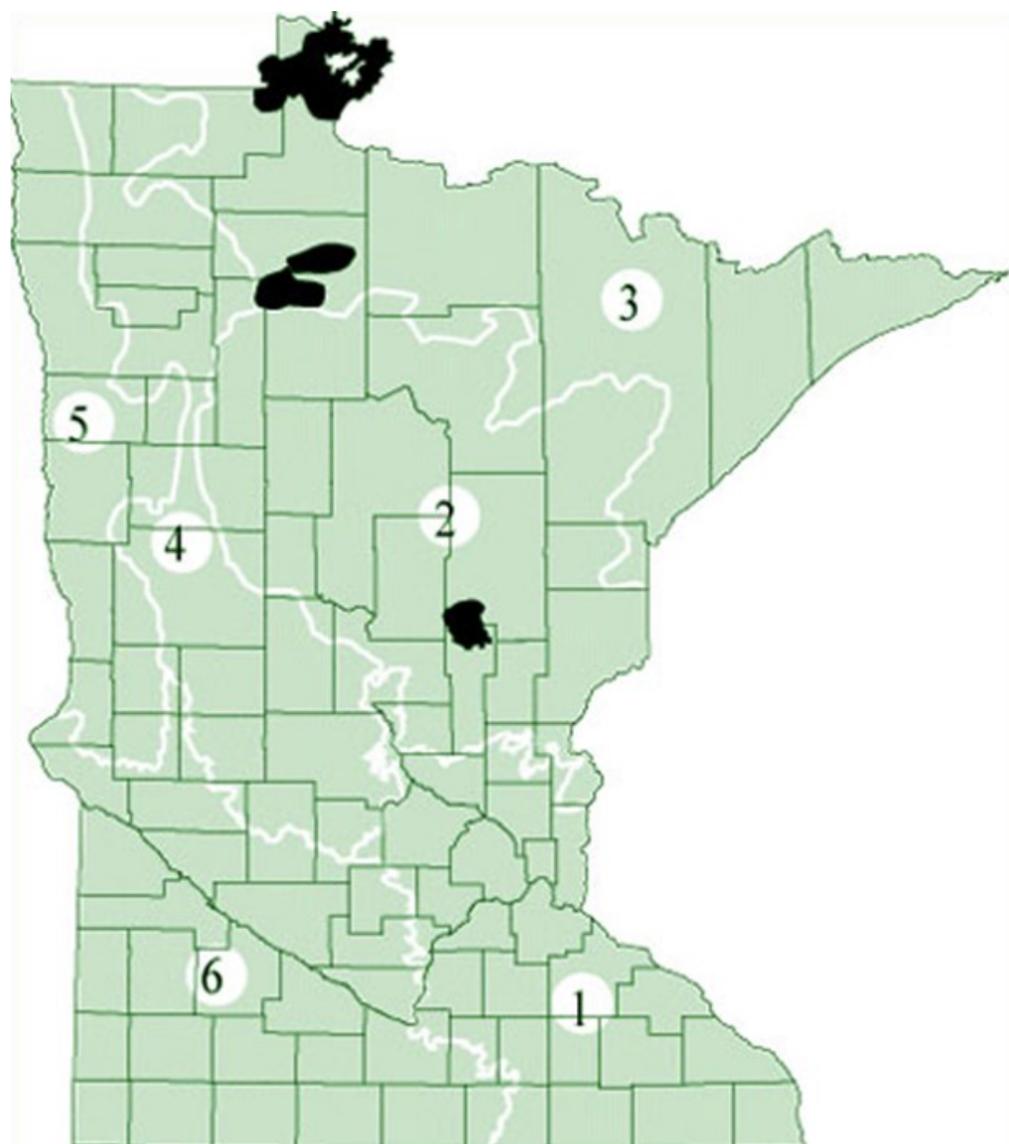
Tough Trees and Shrubs for Tough Sites

By Gary Johnson, Mike Zins, Marc Shippee, and Dan Petters

Successful landscapes begin with the selection of plant materials appropriate for the site conditions. This fact sheet is designed as a reference guide to woody plant materials that tolerate tough sites. Recommendations are made for trees and shrubs that survive better than others in the following soil and site conditions: poorly drained soils, droughty soils, alkaline (high pH) soils, compacted soils and sites exposed to deicing salts. Detailed descriptions for each of these conditions are provided on the next page. The map shows the six major ecoregions in Minnesota.

Minnesota's Ecoregions

1. Southeast
2. Central
3. Northeast
4. North Central
5. Northern Tallgrass Prairie
6. Southwest



Tough Site Categories

Poorly drained soils

A well-drained landscape soil should drain a 24-inch column of water in 24 hours or less. To determine if your site is well-drained, conduct a percolation test by augering or digging a hole 24 inches deep. Fill the hole with water and allow to drain completely. Fill the hole with water a second time soon after the first filling is completely drained. The second filling should take 24 hours or less to completely drain. If the hole still contains water after 24 hours, it is considered poorly drained . . .to some degree. One that takes much longer to drain is a problem for trees.

Droughty soils

These soils are characterized by excessively rapid percolation rates (24 inches of water drains in a few minutes or less), and a low organic matter content (< 1%) that can be determined by a lab soil test.

Alkaline soils

An alkaline soil will have a pH greater than 7.0. Most trees perform best in acidic soils (< 7.0) to slightly alkaline (7.5). There are relatively few trees that perform well at pH ranges above 8.0.

Compacted soils

This is primarily a problem with fine-textured soils (clays, silts). Compaction may be gauged with a penetrometer or with a digging spade. If a spade easily penetrates the soil to a depth of two spade blades (about 18 inches), the soil is not compacted. If the hole needs to be dug with a pick axe, it's a compacted soil. Soil compaction will result in stressed plants, performing less than ideally and more likely to suffer from secondary problems such as diseases and insect pests.

Deicing salts

Deicing salts damage plants in two forms: accumulation of deicing salt run-off in the landscape soil, and drift of deicing salt spray. Salt spray damage is the most widespread and troublesome in Minnesota. Trees and shrubs within 60 feet of high-use roads are most at-risk for this type of damage.

Trees and shrubs native to Minnesota are coded 1 - 6, following their name, to match the ecoregion/s where they are native. Those non-native to Minnesota are listed with their USDA Hardiness Zone/s. **Bold** lettering indicates an evergreen species. Y= yes, I= intermediate, S= sometimes, No=extremely sensitive.

Large Trees (over 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Balsam Fir (<i>Abies balsamea</i>)	1 2 3 4	I			Y	
Black Maple (<i>Acer saccharum</i> subsp. <i>nigrum</i>)	1 6		Y	Y	I	
Red Maple (<i>Acer rubrum</i>)	1 2 3 4 6	Y	S	I	Y	
Green Mountain Sugar Maple (<i>Acer saccharum</i> 'Green Mountain')	1 2 3 4 5 6		I	I	I	
Yellow Birch (<i>Betula alleghaniensis</i>)	1 2 3 4 6	Y		Y	S	
River Birch (<i>Betula nigra</i>)	1 2 3 4 5 6	Y	S	No	Y	I
Paper Birch (<i>Betula papyrifera</i>)	1 2 3 4 6	I	S	I	Y	Y
Bitternut Hickory (<i>Carya cordiformis</i>)	Zone 4-9	S	S	Y	S	Y (spray)
Northern Catalpa (<i>Catalpa speciosa</i>)	Zone 4-8	Y	Y	Y	Y	I
Common Hackberry (<i>Celtis occidentalis</i>)	1 2 3 4 5 6	Y	Y	Y	Y	I
Manchurian Ash (<i>Fraxinus mandshurica</i>)	Zone 3-6	I	Y	Y	Y	

Large Trees (over 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Blue Ash (<i>Fraxinus quadrangulata</i>)	Zone 4-7	Y	Y	Y	Y	I (spray)
Ginkgo (<i>Ginkgo biloba</i>)	Zone 4-8	S	Y	Y	Y	Y
Coffeetree (<i>Gymnocladus dioicus</i>)	1 6		Y	Y	Y	Y
Black Walnut (<i>Juglans nigra</i>)	1 2 3 4 5 6	I	I	I	Y	Y (spray)
Tamarack (<i>Larix laricina</i>)	1 2 3 4	Y		Y	Y	Y (spray)
European Larch (<i>Larix decidua</i>)	Zone 2-6	I			Y	Y
Norway Spruce (<i>Picea abies</i>)	Zone 2-7		I	I	S	I
White Spruce (<i>Picea glauca</i>)	1 2 3 4 5	S	S	I	Y	
Colorado Blue Spruce (<i>Picea pungens</i>)	Zone 2-7		S	Y	Y	Y
Ponderosa Pine (<i>Pinus ponderosa</i>)	Zone 3-7		Y	Y		Y (soil)
Red Pine (<i>Pinus resinosa</i>)	1 2 3		Y			

Large Trees (over 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
White Pine (<i>Pinus strobus</i>)	1 2 3 4	I	S	I		
White Pine (<i>Pinus strobus</i> 'Paton's Silver Splendor')	1 2 3 4	I	S	I		
London Planetree (<i>Platanus x acerifolia</i>)	Zone 4-8	I	Y	I	I	I (spray)
American Sycamore (<i>Platanus occidentalis</i>)	Zone 4-9	Y		Y	I	Y
Eastern Cottonwood (<i>Populus deltoides</i>)	1 2 3 4 5 6	Y	Y	Y	Y	Y (spray)
Bigtooth Aspen (<i>Populus grandidentata</i>)	1 2 3 4 5 6	I	I	I	Y	
White Oak (<i>Quercus alba</i>)	1 2 4 6		Y	I	S	I
Bicolor Oak (<i>Quercus bicolor</i>)	1 2 4 6	Y	Y	No	Y	I (soil)
Northern Pin Oak (<i>Quercus ellipsoidalis</i>)	1 2 3 4 5 6		Y	S		Y
Bur Oak (<i>Quercus macrocarpa</i>)	1 2 3 4 5 6	Y	Y	Y	Y	I (soil)
Eastern Pin Oak (<i>Quercus palustris</i>)	Zone 4-8	Y		No	Y	I (spray)

Large Trees (over 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Northern Red Oak (<i>Quercus rubra</i>)	1 2 3 4 6	S	Y	I	I	I (salt)
White Willow (<i>Salix alba</i>)	Zone 2-8	Y		I	Y	Y
American Basswood (<i>Tilia americana</i>)	1 2 3 4 5 6	I	I	Y	Y	S (spray)
Littleleaf Linden (<i>Tilia cordata</i>)	Zone 3-7	I	Y	Y	Y	I (soil)
Eastern Hemlock (<i>Tsuga canadensis</i>)	1 2 3	I	I	Y		
Accolade Elm (<i>Ulmus davidiana</i> var. <i>japonica</i> 'Morton')	Zone 4-8	S	Y	Y	Y	I
Triumph Elm (<i>Ulmus</i> 'Morton Glossy')	Zone 4-7	Y	Y	Y	Y	I
Jefferson Elm (<i>Ulmus americana</i> 'Jefferson')	Zone 5-9	S	S	Y	Y	I
Prairie Expedition Elm (<i>Ulmus americana</i> 'Lewis & Clark')	Zone 3-9	S	S	Y	Y	I
St. Croix Elm (<i>Ulmus americana</i> 'St. Croix')	Zone 3-9	S	S	Y	Y	I

Medium Trees (26 to 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
White Fir (<i>Abies concolor</i>)	Zone 3-7		Y	Y		
Boxelder (<i>Acer negundo</i>)	1 2 3 4 5 6	Y	Y	Y	Y	I (spray)
Silver Queen Silver Maple (<i>Acer saccharinum</i> 'Silver Queen')	Zone 3	Y	Y	I	Y	I (spray)
Ohio Buckeye (<i>Aesculus glabra</i>)	1	I	I	I	I	I (spray)
Grey Alder (<i>Alnus incana</i>)	Zone 2-6	Y		Y	Y	
Dakota Pinnacle® Asian White Birch (<i>Betula platyphylla</i> 'Fargo')	Zone 3-7	I	S	Y	Y	
Gray Birch (<i>Betula populifolia</i>)	Zone 3-7	Y	Y	I	Y	I (soil)
Katsura Tree (<i>Cercidiphyllum japonicum</i>)	Zone 4	Y		I		Y
Yellowwood (<i>Cladrastis kentukea</i>)	Zone 4-8	I	I	Y	I	I
Turkish Filbert (<i>Corylus colurna</i>)	Zone 4-7	I	Y	Y	I	
Cockspur Hawthorn (<i>Crataegus crus-galli</i>)	Zone 4	I	Y	Y	Y	

Medium Trees (26 to 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Downy Hawthorn (<i>Crataegus mollis</i>)	1 6	Y	Y	Y	Y	
Hardy Rubber-Tree (<i>Eucommia ulmoides</i>)	Zone 4b-7	Y	Y	Y		I
Honeylocust (<i>Gleditsia triacanthos</i> var. <i>inermis</i>)	1	I	Y	Y	Y	Y
Eastern Red Cedar (<i>Juniperus virginiana</i>)	1 2 4 5 6		Y	Y	I	Y
Tuliptree (<i>Liriodendron tulipifera</i>)	Zone 4/5-9			I	I	
Dawn Redwood (<i>Metasequoia glyptostroboides</i>)	Zone 4-8	Y	Y		Y	I (spray)
Common Mulberry Male Only (<i>Morus alba</i>)	Zone 4-8	I	Y	Y	Y	Y
Red Mulberry (<i>Morus rubra</i>)	1	Y		Y		Y (spray)
Ironwood (<i>Ostrya virginiana</i>)	1 2 3 4 5 6		Y	Y		I (spray)
Amur Corktree Male Only (<i>Phellodendron amurense</i>)	Zone 3-7		I	Y		
Black Hills Spruce (<i>Picea glauca</i> 'Densata')	Zone 3-5		I	I		I

Medium Trees (26 to 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Black Spruce (<i>Picea mariana</i>)	1 2 3 4	Y		Y	Y	
Serbian Spruce (<i>Picea omorika</i>)	Zone 4-7		I	I		I (soil)
Jack Pine (<i>Pinus banksiana</i>)	1 2 3 4		Y	Y		Y (spray)
Swiss Stone Pine (<i>Pinus cembra</i>)	Zone 3-7		Y	Y		Y (spray)
Quaking Aspen (<i>Populus tremuloides</i>)	1 2 3 4 5 6	I	Y			I (spray)
Amur Chokecherry (<i>Prunus maackii</i>)	Zone 2-6					I
Pin Cherry (<i>Prunus pensylvanica</i>)	1 2 3 4 5 6		Y	I		I
Chestnut Oak (<i>Quercus montana</i>)	Zone 4-8		I	Y		
Chinkapin Oak (<i>Quercus muehlenbergii</i>)	Zone 5-7	I	Y	Y		I
Black Willow (<i>Salix nigra</i>)	1 2 3 4 6	Y		I	Y	I
European Mountain-ash (<i>Sorbus aucuparia</i>)	Zone 3-6					Y (spray)

Medium Trees (26 to 50 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Showy Mountain-ash (<i>Sorbus decora</i>)	1 2 3 4	Y	I	I		Y (spray)
Bald-Cypress (<i>Taxodium distichum</i>)	Zone 4/5-11	Y	I	I	Y	Y (spray)
Northern White Cedar (<i>Thuja occidentalis</i>)	1 2 3 4	Y	I	Y	Y	I (soil)
Discovery Elm (<i>Ulmus davidiana</i> var. <i>japonica</i> 'Discovery')	Zone 3	S	Y	Y	Y	I

Small Trees (under 25 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Allegheny Serviceberry (<i>Amelanchier laevis</i>)	1 2 3 4 6	Y		I	S	Y (spray)
Speckled Alder (<i>Alnus incana</i> subsp. <i>rugosa</i>)	1 2 3 4 5 6	Y	I		Y	I (spray)
Minnesota Strain Redbud (<i>Cercis canadensis</i>)	Zone 4-8		I	Y	Y	
Pagoda Dogwood (<i>Cornus alternifolia</i>)	1 2 3 4 5 6	I		I	I	
Cornelian Cherry Dogwood (<i>Cornus mas</i>)	Zone 4-8	S	I	Y	I	I (spray)
American Smoketree (<i>Cotinus obovatus</i>)	Zone 4-8		I	Y		
Cotton Candy™ American smoketree (<i>Cotinus obovatus</i> 'Northstar')	Zone 4-8		Y	Y		
Chinese Junipers (<i>Juniperus chinensis</i>)	Zone 4-9		Y	Y	Y	Y
Chinese Juniper (<i>Juniperus chinensis</i> 'Keteleeri')	Zone 4-9		Y	Y	Y	Y
Summertime Amur Maackia (<i>Maackia amurensis</i> 'Summertime')	Zone 3-7		Y	Y		No

Small Trees (under 35 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Crabapple- most (<i>Malus</i> spp.)	Zone 4-8		Y	Y	Y	Y
Prairie Crabapple (<i>Malus ioensis</i>)	1		Y	I	I	I
Bristlecone Pine (<i>Pinus aristata</i>)	Zone 3		Y			I (soil)
American Plum (<i>Prunus americana</i>)	1 2 5 6	I	Y	I	S	
Common Hoptree or Waferash (<i>Ptelea trifoliata</i>)	1	Y	Y	Y		Y
Peachleaf Willow (<i>Salix amygdaloides</i>)	1 2 3 4 5 6	Y	S	S	Y	I
Peking Lilac (<i>Syringa reticulata</i> subsp. <i>pekinensis</i>)	Zone 3-7	I	Y	Y	Y	Y

Large Shrubs (12 to 20 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Sea Buckthorn (<i>Hippophae rhamnoides</i>)	Zone 3		I	Y	Y	Y
Mugo Pine (<i>Pinus mugo</i>)	Zone 3		I	Y	Y	Y
Smooth Sumac (<i>Rhus glabra</i>)	1 2 3 4 5 6		Y	I	Y	Y
Staghorn Sumac (<i>Rhus typhina</i>)	1 2 3 4 5 6		Y	I	Y	Y
Bebb's Willow (<i>Salix bebbiana</i>)	1 2 3 4 5 6	Y	Y	S	Y	I
Red Elderberry (<i>Sambucus racemosa</i>)	1 2 3 4 5 6	Y		Y	Y	Y
Common Lilac (<i>Syringa vulgaris</i>)	Zone 3-7	I	I	Y	Y	Y
Nannyberry (<i>Viburnum lentago</i>)	1 2 3 4 5 6	Y	I	Y		I

Medium Shrubs (6 to 12 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Indigo Bush (<i>Amorpha fruticosa</i>)	1 2 4 5 6	Y	I	Y	I	Y
Caragana Greenspires (<i>Caragana arborescens</i> 'Jefarb') Seedless Variety	Zone 2-7		Y	Y	Y	Y
Buttonbush (<i>Cephalanthus occidentalis</i>)	1 2	Y	I	Y	Y	Y
Gray Dogwood (<i>Cornus racemosa</i>)	1 2 3 4 5 6	Y	Y	Y	Y	
Redosier Dogwood (<i>Cornus sericea</i>)	1 2 3 4 5 6	Y	I	Y	Y	I
American Hazel (<i>Corylus americana</i>)	1 2 3 4 5		Y	Y	I	
Beaked Hazel (<i>Corylus cornuta</i>)	1 2 3 4 5		Y		I	
Eastern Wahoo (<i>Euonymus atropurpureus</i>)	1 6	S	I	Y	Y	
Common Witch-hazel (<i>Hamamelis virginiana</i>)	1 2			Y	Y	Y
Winterberry (<i>Ilex verticillata</i>)	1 2 3 4	Y		Y		Y
Savin Juniper (<i>Juniperus sabina</i>)	Zone 3-8		Y	Y	I	I

Medium Shrubs (6 to 12 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Beauty Bush (<i>Kolkwitzia amabilis</i>)	Zone 4-8		I	Y	Y	
Dropmore Scarlet Honeysuckle (<i>Lonicera</i> × <i>brownii</i> 'Dropmore Scarlet')	Zone 3-9		Y	Y	I	
Mockorange (<i>Philadelphus</i> spp.)	Zone 3-8		I	Y	Y	I/S
Minnesota Snowflake Mockorange (<i>Philadelphus</i> × <i>virginialis</i> 'Minnesota Snowflake')	Zone 3-8		I	Y	Y	I/S
Common Ninebark (<i>Physocarpus opulifolius</i>)	1 2 3	Y	Y	Y	Y	Y
Cherry Prinsepia (<i>Prinsepia sinensis</i>)	Zone 4-8		I	Y	I	
Common Elderberry (<i>Sambucus canadensis</i>)	1 2 3 4 5 6	Y	I	Y		I
Silver Buffaloberry (<i>Shepherdia argentea</i>)	5 6		Y	I	I	Y
Vanhoutte Spirea (<i>Spiraea</i> × <i>vanhouttei</i>)	Zone 3-8	I	Y	Y	Y	Y
Chinese Lilac (<i>Syringa</i> × <i>chinensis</i>)	Zone 3-7		I	Y		

Medium Shrubs (6 to 12 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Northern White Cedar (<i>Thuja occidentalis</i>) Shrub Forms	1 2 3 4	Y	I	Y	Y	I
Arrowwood Viburnum (<i>Viburnum dentatum</i>)	1	Y	I		Y	I (spray)
Wayfaring Tree (<i>Viburnum lantana</i>)	Zone 4-7		Y	Y		

Small Shrubs (under 6 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Bearberry (<i>Arctostaphylos uva-ursi</i>)	1 2 3 5		Y			Y
Black Chokeberry (<i>Aronia melanocarpa</i>)	1 2 3	Y	I		Y	Y
New Jersey Tea (<i>Ceanothus americanus</i>)	1 2 3 4 6		Y	Y		
Sweet Pepperbush (<i>Clethra alnifolia</i>)	Zone 3-9	Y		I	I	I
Sweet Fern (<i>Comptonia peregrina</i>)	2 3		Y			Y
<i>Cotoneaster</i> spp.	Zone 4		Y	Y		
Bush Cinquefoil (<i>Dasiphora fruticosa</i>)	2 3 4 5		Y	Y	Y	Y (spray)
Dwarf Bush-honeysuckle (<i>Diervilla lonicera</i>)	1 2 3 4 5		Y	I	Y	Y
Leatherwood (<i>Dirca palustris</i>)	1 2 3 4 6	Y		S		I
Common Juniper (<i>Juniperus communis</i>)	1 2 3 4 5 6	S	Y	Y	Y	I
Creeping Juniper (<i>Juniperus horizontalis</i>)	Zone 3-9		Y	Y	Y	I

Small Shrubs (under 6 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Sugar Mountain® Blue Sweetberry Honeysuckle (<i>Lonicera caerulea</i>)	Zone 1		S	Y		
Sakhalin Honeysuckle (<i>Lonicera maximowiczii</i> var. <i>sachalinensis</i>)	Zone 3-10				Y	
Sweet Lifeberry® Goji Berry (<i>Lycium barbarum</i> 'SMNDSL')	Zone 5-9		Y			
Northern Bayberry (<i>Myrica pensylvanica</i>)	Zone 3-7	Y	Y		I	Y (spray)
Little Devil Ninebark (<i>Physocarpus opulifolius</i> 'Donna May')	1 2 3	Y	Y	Y	Y	Y
Western Sandcherry (<i>Prunus pumila</i> var. <i>besseyi</i>)	2 3 4 5 6		Y	I		Y
Sandcherry (<i>Prunus pumila</i>)	1 2 3 4 5 6		Y	I		Y
Labrador Tea (<i>Rhododendron groenlandicum</i>)	2 3 4 5	Y	I		Y	
Fragrant Sumac (<i>Rhus aromatica</i>)	1		Y	Y		Y
Skunkbush Sumac (<i>Rhus trilobata</i>)	Zone 4-8		Y	I	Y	Y

Small Shrubs (under 6 feet)

Common (<i>Scientific</i>) name	Ecoregion	Poor drainage	Droughty	Alkaline	Compacted	Salt
Alpine Currant (<i>Ribes alpinum</i>)	Zone 2-7		Y	I	Y	I
Rugosa Rose (<i>Rosa rugosa</i>)	Zone 2-7		Y		I	Y (spray)
Bumalda Spirea (<i>Spirea x bumalda</i>)	Zone 4-8		I	I	I	
Snowberry (<i>Symphoricarpos albus</i>)	1 2 3 4 5 6	S	Y	Y	Y	I
Coralberry (<i>S. orbiculatus</i>)	1 2 4	S	Y	Y	I	I
Lowbush Blueberry (<i>Vaccinium angustifolium</i>)	1 2 3 4		Y			I

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