Common Name	Scientific Name	References (See at end of each section)									
		ND	NRCS	NRCS	NRCS	TFC	PFAF	FG	Other	Other	Other
Apple, Prairie Yellow	*Malus ioensis*						PFAF				
Apricot, Hardy	*Prunus armeniaca*	ND									
Arrowwood	*Vibernum dentatum*	ND						FG			
Ash, Green	*Fraxinus pennsylvanica*	ND									
Ash, Mountain	*Sorbus acupuaria*	ND									
Aspen	*Populus tremuloides*	ND		PG		TFC					
Birch, Paper	*Betula papyifera*	ND		PG							
Boxelder	*Acer negundo*	ND									
Buckeye, Ohio	*Aesculus glabra*	ND		PG							
Buffaloberry	*Shepherdia argentea*	ND			PFS	TFC					
Caragana (Siberian Pea Shrub)	*Caragana arborescens*	ND		PG		TFC					
Cherry, Black	*Prunus serotina*			PG					OHDNR		
Cherry, Carmine Jewel	*Prunus var. Carmen Jewel*								DUTCH		
Cherry, Mayday	*Prunus padus*								DUTCH		
Cherry, Nanking	*Prunus tomentosa*	ND				TFC					
Cherry, Pin	*Prunus pennsylvanica*								?		
Cherry, Sand	*Prunus besseyi*	ND				TFC					
Chokeberry, Black	*Aronia melanocarpa*							FG			
Chokecherry, Common	*Prunus virginiana*	ND		PG		TFC					
Chokecherry, Schubert	*Prunus virginiana 'Schubert'*							FG			
Cotoneaster, Pekin	*Cotoneaster lucidus*	ND				TFC					
Cottonwood, Native	*Populus deltoides*	ND			PFS				?		
Cottonwood, Siouxland	*Populus x 'Siouxland'*								MNDOT		
Cottonwood, Silver	*Populus alba*										
Crabapple, Dolgo	*Malus x hybrid*	ND							SCHMIDT		
Crabapple, Midwest Manchurian	*Malus baccata var. mandishurica 'Midwest'*			PG					MSU		
Crabapple, Siberian	*Malus baccata sp.*	ND									
Cranberry	*Viburnum trilobum*	ND						FG			
Currant, Black Riverview	*Ribes americanum 'Riverview'*			PG							
Currant, Golden	*Ribes odoratum*	ND		PG		TFC					
Dogwood, Gray	*Cornus amomum 'Indigo'*	ND			PFS						
Dogwood, Indigo Silky	*Cornus racemosa*		PMP		PFS						
Dogwood, Redosier	*Cornus sericea*	ND		PG		TFC		FG			
Elderberry, American	*Sambucus canadensis*				PFS			FG			
Elm, Siberian	*Ulmus pumila*	ND			PFS	TFC					
Hackberry, Common Northern	*Celtis occidentalis*	ND			PFS	TFC					
Hackberry, Oahe	*Celtis occidentalis 'Oahe'*		PMP								
Hawthorne, Downy	*Crategus mollis*								UWis		
Hawthorne, Homestead Arnold	*Crategus mollis arnoldiana*	ND									
Hazelnut	*Corylus avellana*								Uconn		
Honeylocust, Thornless	*Gleditsia triacanthos inermis*	ND			PFS	TFC		FG			
Honeysuckle, Arnold's Red	*Lonicera tarica 'Arnolds Red'*	?									
Honeysuckle, Freedom	*Lonicera x 'Freedom*	ND									
Indigo, False	*Amorpha fruitocosa*	ND		PG							
Ironwood	*Ostrya virginiana*	ND									
Juneberry (Serviceberry)	*Amelanchier alnifolia*	ND		PG							
Lilac, Common	*Syringa vulgaris*	ND		PG			TFC				
Lilac, Legacy	*Syringa villosa 'Legacy'*	ND		PG							
Linden, American	*Tilia americana*	ND		PG				FG			
Linden, Littleleaf	*Tilia cordata*	ND									
Locust, Black	*Robinia pseudoacacia*				PFS						
Maple, Amur	*Acer ginnala*	ND		PG							
Maple, Northern Sugar	*Acer saccharum*			PG							
Maple, Red	*Acer rubrum*				PFS			FG			

Maple, Silver	*Acer saccarinum*	ND			PFS						
Maple, Tatarian	*Acer tataricum*	ND									
Nannyberry	*Viburnum lentago*	ND			PFS						
Oak, Bur	*Quercus macrocarpa*	ND			PFS	TFC					
Oak, Red	*Quercus rubra*			PG							
Oak, Swamp White	*Quercus bicolor*			PG							
Pear, McDermand Ussurian	*Pyrus ussuriensis 'McDermand'*	ND									
Plum, American	*Prunus americana*	ND			PFS	TFC					
Poplar, Hybrid	*Populus sp.*	ND				TFC					
Rose, Hansen Hedge	*Rosa sp. 'Hansen'*	ND									
Rose, Prairie Rose	*Rosa arkansana*						PFAF		MW		
Rose, Woods	*Rosa woodsii*			PG							
Seaberry	*Hippophae rhamnoides*	ND									
Sumac, Aromatic	*Rhus aromatica*	ND		PG				FG			
Sumac, Konza	*Rhus aromatica var serotina*		PMP								
Sumac, Smooth	*Rhus glabra*	ND			PFS						
Sumac, Staghorn	*Rhus typhina*	ND			PFS			FG			
Sycamore	*Platanus occidentalis*			PG							
Walnut, Black	*Juglans nigra*	ND			PFS						
Willow, Golden	*Salix alba 'Vitellina'*	ND				TFC					
Willow, Laurelleaf	*Salix pentandra*	ND									
Willow, Peachleaf	*Salix amygdaloides*			PG		TFC					
Willow, Sandbar	*Salix exigua*	ND			PFS						
Willow, Sharpleaf	*Salix acutifolia*						PFAF				
Willow, Weeping	*Salix alba*								PADD	USFS	
Willow, Encampment White	*Salix alba 'Encampment'*	ND									
Winterberry	*Euonymus bungeana*	ND									
Wolfberry (Silverberry)	*Elaeagnus commutata*			PG			PFAF				
VINES											
Grape, Riverbank	*Vitis riparia*						PFAF		PDW		
Woodbine	*Parthenocissus inserta*				PFS					LIND	
CONIFERS											
Cedar, Eastern Red	*Juniperus virginiana*	ND			PFS	TFC					
Juniper, Rocky Mtn	*Juniperus scopulorum*	ND			PFS	TFC					
Pine, Eastern White	*Pinus strobus*				PFS						
Pine, Ponderosa	*Pinus ponderosa*	ND		PG							
Pine, Red	*Pinus resinosa*				PFS						
Pine, Scotch (Scots)	*Pinus sylvestris*	ND			PFS	TFC					
Spruce, Black Hills	*Picea glauca var. densata*	ND		PG							
Spruce, Colorado Blue	*Picea pungens*	ND		PG		TFC					
Spruce, Norway	*Picea abies*	ND							MBG	USFS	NS.Com

Eastern Red-cedar

Eastern Red-cedar *(Juniperus virginiana)*

General Description

A small tree with a short trunk and irregular, pyramidal crown native to the eastern United States. Dwarf or compact forms of this juniper are used as ornamentals. The largest tree in North Dakota is 51 feet tall with a canopy spread of 30 feet.

Leaves and Buds

Bud Arrangement - Continuous.

Bud Color - Same as leaves, hard to distinguish from leaves.

Bud Size - 1/8 inch.

Leaf Type and Shape - Simple scale and awl-like leaves.

Leaf Margins - Sawtooth serrations

Leaf Surface - Prickly.

Leaf Length - Variable lengths, indeterminate growth, juvenile leaves in pairs 1/5 to 1/4 inch, ending in a spiny point.

Leaf Width - 1/16 inch.

Leaf Color - Concave and glaucous above, green and convex below.

Flowers and Fruits

Flower Type - Unisexual, usually dioecious.

Flower Color - Female, green; male, yellow-brown.

Fruit Type - Cones, globose or ovoid, and deeply pitted, typical juniper "berry", mature in one year; 1 to 3 ovate seeds.

Fruit Color - Shiny brown seeds in dark blue, berry-like cones with heavy glaucous coating.

Form

Growth Habit - Fairly dense pyramidal when young, much more open to slightly pendulous when mature.

Texture - Medium, summer and winter.

Crown Height - 30 to 45 feet.

Crown Width - 15 to 30 feet.

Bark Color - Gray-brown, exfoliating in long strips.

Root System - Deep, penetrating taproot.

Environmental Requirements

Soils

Soil Texture - Moist, deep loam to sand.

Soil pH - 6.0 to 8.0. Will tolerate alkaline and saline conditions.

Windbreak Suitability Group - 1, 1K, 3, 4, 4C, 5, 6D, 6G, 7, 8, 9C, 9L.

Cold Hardiness

USDA Zone 2.

Water

Drought tolerant, but prefers moist soils.

Light

Full sun. Tolerates shade only in youth.

Uses

Conservation/Windbreaks

Small to medium evergreen for farmstead and field windbreaks.

Wildlife

Fruit matures in one season. Provides food for birds and mammals. Nesting and winter cover for a variety of birds. Browse for whitetail deer.

Agroforestry Products

Wood - Used for fence posts, cedar chests, pencils, and medicines. Heartwood is decay resistant.

Food - Berry-like cones used in alcohol products.

Medicinal - Native Americans used for coughs, head colds and dysentery.

Urban/Recreational

Good for ornamental landscaping. The species, as well as most cultivars, turn brown in the winter.

Cultivated Varieties

Canaert Red-cedar (*Juniperus virginiana* 'Canaertii') - Dense, tufty, green colored selection. One of few cultivars to retain summer color in winter.

Taylor Juniper (*J. virginiana* 'Taylor') - A new cultivar from Nebraska with a very narrow, erect growth habit of interest for landscape use.

Related Species

Rocky Mountain juniper (*J. scopulorum*)

Pests

Common diseases include cedar-apple rust (Gymnosporangium) and Kabatina tip blight. Common insect pests include spider mites. Red cedars should not be planted near apple, crabapple, juneberries, or hawthorns due to increased risk of damage by Gymnosporangium rusts. Cedar oil extract of *Juniperus* species has been effective control of clothes moths.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

EASTERN REDCEDAR

Juniperus virginiana L.

Plant Symbol = JUVI

Contributed by: USDA NRCS Plant Materials Program

Robert H. Mohlenbrock
USDA NRCS 1991
Southern Wetland Flora
@USDA NRCS PLANTS

Uses

Windbreaks: Plant eastern redcedar in the outer rows of multi-row plantings where it will not be overtopped by taller trees. It can be used in single-row windbreaks when a dense, medium height barrier is desired.

Wildlife: This species provides food and cover for numerous birds and mammals. Winter food and protection is particularly important for pheasant, mule deer and whitetail deer.

Recreation and Beautification: It is suitable for screen plantings. Its year-long coloration and attractiveness to wildlife adds variety to recreational plantings.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Juniperus virginiana L., eastern redcedar, is a small evergreen tree, commonly 10 to 40 feet, of pyramidal shape becoming rounder in age. Fruits pale-blue with whitish bloom, fleshy 'berries' (cones), 1/4 inch diameter, ripening the first season, seeds 1 to 2 in each cone, bony-coated; flowers small, cone-like on end of short twigs, male and female borne on separate plants. Leaves opposite, scalelike, covering older twigs closely in alternating pairs to 1/8 inch long, on new shoots awl shaped, sharp pointed and spreading, 1/4 inch long, dark green. Stem single with upright or spreading branches, bark reddish-brown, thin and shreddy, branchlets very slender; roots deep, widely spreading.

Adaptation and Distribution

It is native to eastern North America, where it occurs strongly on limestone derived soils. and is cultivated in Wyoming and Colorado for shelterbelts and ornamental uses below 6,000 feet. This species has a wide distribution and is found on many types of soil ranging from acid sands to those derived from limestone. It does best on dry soils in full sunlight, and is winter hardy and tolerant of droughty and salty soils. Like most junipers, it is very slow growing and is moderately long lived.

Eastern redcedar is distributed throughout the east , and lower and upper midwest. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment

Seedlings should be planted in a firm weed free bed at a spacing of 3 to 6 feet. Seedlings should be placed in a hole or furrow large enough to contain the entire root system without bending.

Management

Weed and other competing vegetation must be controlled the first two years of establishment. This plant will survive in moist, deep loam to sand at pH of 6.0 to 8.0, will tolerate alkaline and saline conditions. This plant is invasive in poorly managed

or extensively grazed pastures and rangelands, especially those with neutral pH soils.

Pests and Potential Problems
It is relatively free of serious insect and disease problems. It is the alternate host for the cedar-apple rust disease which does very little harm to this species but causes serious damage to apples and other pome fruits.

Cultivars, Improved, and Selected Materials (and area of origin)
Eastern redcedar seedlings are available from most commercial nurseries and government nurseries dealing with conservation species. 'Canaert' and 'Taylor' are two cultivars.

Prepared By & Species Coordinator:
USDA NRCS Plant Materials Program

Edited: 05Feb2002 JLK; 060801 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Eastern redcedar

Juniperus virginiana

Growth Form: pyramidal to irregular
Crown Density: dense
Size: 15-20 feet high
10-20 foot spread
Drought Resistance: excellent
Cold Hardiness: excellent
Growth Rate: slow
Life Span: long
Elevational Range: to 7,500 feet
Soil Conditions: tolerates alkaline and salts well
Possible Insect Problems: spider mites
Possible Disease Problems: rust
Wildlife Value: high: song and game birds; hoofed browsers, good cover
Seasonal Color: rusty red
Miscellany: very adaptable to site conditions

Taken from: Trees for Conservation, a buyer's guide, Colorado State Forest Service

Rocky Mountain Juniper

Rocky Mountain Juniper (*Juniperus scopulorum*)

General Description

A small to medium tree, typically with a dense pyramidal crown. Native to western North Dakota. Seedling plantings may exhibit a wide variety of forms. Many denser growing cultivars are used as ornamentals. The largest tree in North Dakota has a trunk circumference of 7½ feet.

Leaves and Buds

Bud Arrangement - Continuous.

Bud Color - Same as leaves, hard to distinguish from leaves.

Bud Size - 1/8 inch.

Leaf Type and Shape - Simple scale and awl-like leaves.

Leaf Margins - Entire.

Leaf Surface - Prickly.

Leaf Length - Variable lengths, indeterminate growth, the current year's foliage is awl-shaped or scalelike, 1/4 to 1/3 inch.

Leaf Width - Variable 1/16 inch.

Leaf Color - Dark or light bluish-green, glaucous or light green, variable. Little fall or winter color change.

Flowers and Fruits

Flower Type - Unisexual, usually dioecious.

Flower Color - Female, red to green; male, yellow.

Fruit Type - Cones (typical juniper "berry"), ovoid, and deeply pitted, mature second year; 1 to 3 seeds.

Fruit Color - Shiny brown seeds in dark blue berry-like glaucous cones.

Form

Growth Habit - Variable pyramidal to narrow crowns, normally with numerous long, upward-reaching branches.

Texture - Fine, summer and winter.

Crown Height - 20 to 40 feet.

Crown Width - 12 to 20 feet.

Bark Color - Reddish-brown coloration to the underbark, shredding bark. Older bark has shallow fissures in a network of flat ridges.

Root System - Variable, shallow in moist areas, deep in dry soils.

Environmental Requirements

Soils

Soil Texture - Prefers deep moist well-drained loam, but will tolerate sandy soils.

Soil pH - 6.0 to 8.0. Tolerates salts and high pH.

Windbreak Suitability Group - 1, 1K, 3, 4, 4C, 5, 6, 6D, 6G, 7, 8, 9C, 9L.

Cold Hardiness

USDA Zone 3.

Water

Extremely drought tolerant once established, but likes moist soils.

Light

Full sun.

Uses

Conservation/Windbreaks

Small to medium evergreen for farmstead and field windbreaks. Most stress tolerant species available for conservation use.

Wildlife

Excellent for cover, nesting, and food.

Agroforestry Products

Wood - Used for fence posts, cedar chests, pencils, and medicines. Heartwood is decay resistant.

Food - Fruit used in alcohol products.

Medicinal - Used for cancer treatment, and colds, coughs, sore throats, diarrhea, bleeding, fevers, pneumonia, stomach aches, and topical pain reliever for arthritis. Source of pinene, a terpenoid volatile oil and source of podophyllotoxin, an antibiotic.

Urban/Recreational

Good for ornamental landscaping. Does not turn brown in winter like Eastern Red-cedar.

Cultivated Varieties

Only a selected group of cultivars are listed. There are many broad-spreading cultivars of lesser landscape value.

Blue Creeper™ Juniper (*Juniperus scopulorum* 'Monam') - A patented atypical Rocky Mountain Juniper with a low 1 to 2 feet spreading growth habit. Undoubtedly a hybrid. Excellent bluish color year round.

Cologreen Juniper (*J. scopulorum* 'Cologreen') - Semi-compact, bright green upright form.

Gray Gleam Juniper (*J. scopulorum* 'Gray Gleam') - Semi-compact upright form with silvery, gray-blue foliage.

Grizzly Bear Juniper (*J. scopulorum* 'Grizzly Bear') - Introduced by Northwest Nursery, Valley City, North Dakota. Fairly compact, upright bluish juniper which merits greater popularity for planting.

Medora Juniper (*J. scopulorum* 'Medora') - A narrow, columnar form with blue-gray, tinged green, foliage introduced at NDSU, Fargo, North Dakota. Widely grown, proven performance.

Welch Juniper (*J. scopulorum* 'Welchii') - An older, somewhat compact cultivar with upright growth, silvery to bluish-green in color.

Winter Blue Juniper (*J. scopulorum* 'Winter Blue') - Another atypical Rocky Mountain Juniper which grows as a spreader with bluish color. Undoubtedly a hybrid.

Related Species

Eastern Red-cedar (*Juniperus virginiana*)

Pests

Common diseases include cedar-apple rust (Gymnosporangium) and Kabatina tip blight. Common insect pests include spider mites. Junipers should not be planted near apples, crabapples, juneberries, or hawthorns due to increased risk of damage by Gymnosporangium rusts. Extracts of *Juniperus* species are toxic to certain insect pests.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

ROCKY MOUNTAIN JUNIPER

Juniperus scopulorum Sarg.

Plant Symbol = JUSC2

Contributed by: USDA NRCS Plant Materials Program

USDA NRCS Bridger Plant Materials Center
Bridger, MT

Uses

Erosion control: Plant Rocky Mountain juniper in the outer rows of multi-row plantings where it will not be overtopped by taller trees. It can be used in single-row windbreaks when a dense, medium height barrier is desired.

Wildlife: This species provides food and cover for numerous birds and mammals. Winter food and protection is particularly important for pheasant, mule deer, and whitetail deer.

Recreation and Beautification: The year-long coloration and attractiveness to wildlife makes this species useful for recreational plantings. It tends to stay green all winter.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Juniperus scopulorum Sarg., Rocky Mountain juniper, is a small evergreen tree to 35 feet, often with an irregular crown. A native of western North America, it occurs in mixed or pure stands of open scrub woodland over Wyoming and Colorado at elevations of 5,000 to 7,500 feet, often on dry, rocky ridges. It does well in cultivation, adapted to a wide range of soils and moisture conditions, and is winter hardy, slow growing and very long lived.

Fruits blue with whitish bloom, fleshy "berries" (cones), 1/4 inch in diameter, ripening the second season, seeds 1 to 2 inches each cone, bony-coated; flowers small, cone-like, borne separately on male and female plants; leaves opposite, scalelike, covering older twigs closely in alternating pairs to ¼ inch long, pale to dark green, on new shoots awl shaped, sharp pointed and spreading; stems short, often dividing near ground, branches thick and ascending, bark red to gray-brown, furrowed, thin and shreddy, branchlets very slender; roots deep, widely spreading.

Adaptation and Distribution

Below 7,500 elevation; water relations 10 precipitation equivalent; tolerant of droughty and moist, well-drained sites.

Rocky mountain juniper is distributed throughout the West. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment

Seedling should be planted in a firm weed free bed at a spacing of 3 to 6 feet. Seedling should placed in a hole or furrow large enough to contain the entire root system without bending.

Management

Care should be taken to protect young seedlings from feeding damage by small rodents, rabbits, and deer. Weeds and other competing vegetation must be controlled during the first and second years of establishment.

Pests and Potential Problems

Rocky Mountain juniper is relatively free of serious insect and disease problems. It is the alternate host for the cedar-apple rust disease which does very little harm to this species, but causes serious damage to apples and other pome fruits.

Cultivars, Improved, and Selected Materials (and area of origin)

Bridger-Select (Northern Great Plains composite) was developed as a selected pre-varietal release. Seedlings of Rocky Mountain juniper are available from most commercial nurseries in the Rocky Mountain area.

Prepared By & Species Coordinator:

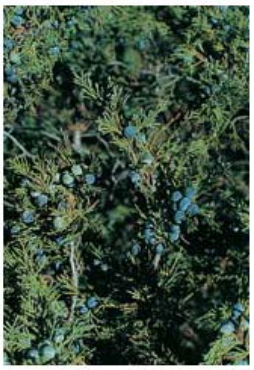
USDA NRCS Plant Materials Program

Edited: 05Feb2002 JLK; 060801 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Rocky Mountain juniper

Juniperus scopulorum



Growth Form: pyramidal to irregular
Crown Density: dense
Size: 15-50 feet high
10-35 foot spread
Drought Resistance: excellent
Cold Hardiness: excellent
Growth Rate: slow
Life Span: long
Elevational Range: to 9,000 feet
Soil Conditions: excellent alkaline tolerance
Possible Insect Problems: spider mites, bark beetles
Possible Disease Problems: juniper broom rust, juniper gall rusts, juniper true mistletoe
Wildlife Value: high: song and ground birds, large browsing mammals
Seasonal Color: evergreen
Miscellany: native

Taken from: Trees for Conservation, a buyer's guide, Colorado State Forest Service

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

EASTERN WHITE PINE

Pinus stobus L.

Plant Symbol = PIST

Contributed by: USDA NRCS New York State Office

Robert H. Mohlenbrock
USDA NRCS 1995
Northeast Wetland Flora
@ USDA NRCS PLANTS

Uses

Timber: The wood of white pine is light, durable, and easy to work. It is good lumber for toys, boxes, cabinet work, and similar items.

Christmas tree and ornamental: White pine is used occasionally in Christmas tree plantations and as ornamental planting in landscaping around homes and office buildings. It can also be sheared as a hedge.

Wildlife: It has fair wildlife value. Gray and red squirrels, deer, mice and 16 species of songbirds have been known to eat the seed.

Erosion control: White pine is frequently used for windbreaks and screens along fields new right-of-ways and around campsites.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Pinus strobus L, eastern white pine, is the largest conifer of the eastern and upper Midwest forests, reaching 150 feet in height and up to 40 inches in diameter. In dense stands, trees produce tall, cylindrical stems with pyramidal shaped crowns, characterized by distinctive, plate like branching, especially noticeable as the trees become older. On young growth, the bark remains rather thin, smooth, and greenish-brown in color. On older trees the bark becomes deeply fissured and dark grayish-brown in color. Its evergreen needles are in clusters of 5, soft, flexible, 2 1/2 to 5 inches long, and bluish-green in appearance. Its cones are about 4 to 8 inches long and 1 inch thick. These remain attached for 1 to several months after ripening in the autumn of the second season.

Adaptation and Distribution

Eastern white pine grows on a variety of soils ranging from light, sandy to heavy textured soils. White pine ranges across southern Canada from Manitoba to Newfoundland, throughout the northern and eastern states from Minnesota and northern Iowa to the Atlantic coast, and southward along the Appalachian mountains to northern Georgia and Alabama.

For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment

Seedlings of white pine are grown in nursery beds for field planting. They may either be left in the nursery for 2 to 3 years and directly planted into the field, or they may be transplanted after the second year and left in a transplant bed for 1 or 2 years before field plantings. This will produce a seedling approximately 12 to 16 inches in height with 1/4 to 1/2 inch caliper. Field establishment of seedlings is accomplished with tree planting procedures, using machine transplanters or hand planting.

Management
White pine seedlings require weed control for the first few years after outplanting. Chemical and/or mechanical control can be used, preferably starting the year before planting.

Management of white pine should focus on thwarting the white pine weevil where straight trunks and tree form is desired. Growing white pine where there will be partial shade on the developing saplings and pole-sized trees (especially on the terminal leader) seems to reduce infestation by the weevil. Thus growing white pine in mixed uneven aged stands is a good idea to avoid this pest and those described below.

Pests and Potential Problems
The white pine weevil is the tree's greatest insect pest affecting both timber quality and volume. Terminal leaders may be killed repeatedly and result in such serious stem crooks that the tree has reduced merchantable saw timber value.

The pales weevil is an insect that often attacks white pine seedlings in areas where white pine timber has been cut recently. Cone crops may be destroyed by the pine cone beetle. This insect compounds the problem of infrequent seed years and is a serious threat to white pine management.

Diseases, including white pine blister rust, red ring rot, root rot, wood decay, and certain needle fungi, cause losses in white pine stands. Such natural elements as snow, ice, and wind may also cause damage to white pine.

Cultivars, Improved, and Selected Materials (and area of origin)
There are no documented varieties for reforestation purposes. Local or regional ecotypes are typically utilized for this purpose. There are several varieties available for ornamental applications. Seeds and seedlings are available from most eastern conifer nurseries.

Prepared By & Species Coordinator:
John Dickerson (retired), USDA NRCS New York State Office, Syracuse, New York

Edited: 05Feb2002 JLK; 060809 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Ponderosa Pine

Ponderosa Pine *(Pinus ponderosa)*

General Description

A large tree native to southwestern North Dakota that is pyramidal when young, becoming irregularly-oblong and open-crowned with age. The largest tree in North Dakota is 73 feet tall with a canopy spread of 26 feet.

Leaves and Buds

Bud Arrangement - In whorls.

Bud Color - Reddish-brown scales on buds which are pressed closely together.

Bud Size - Oblong, cylindrical and 3/4 inch long.

Leaf Type and Shape - Needles in fascicles of 2 and 3, mostly 3.

Leaf Margins - Minutely toothed and the tip has a sharp point.

Leaf Surface - Relatively smooth.

Leaf Length - 4 to 9 inches.

Leaf Width - Needles.

Leaf Color - Dark green to yellowish-green.

Flowers and Fruits

Flower Type - Monecious, separate male and female strobili. Strobili develop into cones.

Flower Color - Female strobili are yellow; male strobili are red.

Fruit Type - Cones 3 to 5 inches long with sharp thorn at tip of scales. Two winged seeds per cone scale, triangular-shaped, 1/4 inch long, with a wing about 1 inch long.

Fruit Color - Brown cone, dark brown seeds.

Form

Growth Habit - Pyramidal when young, gradually lose lower limbs as they grow taller and become less regular in shape.

Texture - Coarse, summer and winter.

Crown Height - 50 to 70 feet.

Crown Width - 25 to 30 feet.

Bark Color - Brown-black on young trees, turning yellowish-brown to cinnamon-red, with large, flat, scaly plates with age.

Root System - Shallow to deep-rooted, fibrous type root system, but with a strong taproot.

Environmental Requirements

Soils

Soil Texture - Grows best on deep, well-drained loam soils, but will tolerate sandy soils.

Soil pH - 6.0 to 8.0. Tolerates saline and alkaline soils.

Windbreak Suitability Group - 1, 1K, 3, 4, 4C, 5, 6D, 6G, 7, 8, 9C, 9L.

Cold Hardiness

USDA Zone 3.

Water

Prefers moist, well-drained soils for best growth. Tolerates drought. Does not tolerate flooding or poorly-drained soils.

Light

Full sun, not shade tolerant.

Uses

Conservation/Windbreaks

Tall evergreen for farmstead or field windbreaks.

Wildlife

Food and nesting sites for birds. Squirrels eat the seeds. Porcupines eat the inner bark on older trees and eat entire trees and limbs on smaller trees.

Agroforestry Products

Wood - Principle use is in millwork, including windows, doors, shelving, molding, knotty-pine paneling and dimension lumber. Sap used as glue and source of turpentine oils.

Food - Native Americans used inner bark and seed as food, sap was used as a chewing gum. Source of pyrone used as a FDA approved flavoring to bread and cakes.

Medicinal - *Pinus* species have been used as an antiseptic, an expectorant, a poultice to treat boils, rheumatism, backaches and other inflammations.

Urban/Recreational

Excellent for landscaping private and public grounds.

Cultivated Varieties

Rocky Mountain Ponderosa Pine or Western Yellow Pine (*Pinus ponderosa* var. *scopulorum*)

Related Species

Lodgepole Pine (*Pinus contorta* var. *latifolia*)

Scotch Pine (*P. sylvestris*)

Pests

Common diseases include Cyclaneusma needle cast. Western gall rust and Lophodermium needle cast are locally common. Common insect pests include tip moth, sawfly, pine needle scale, and giant conifer aphid. Extracts of some *Pinus* species are toxic to certain insect and disease pests.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

PONDEROSA PINE
Pinus ponderosa P. & C. Lawson
Plant Symbol = PIPO

Contributed by: USDA NRCS National Plants Data Center

Banner, R. 2002.
Utah State University Extension.

Alternate Names
Big heavy, black jack, bull pine, ponderosa white pine, Sierra brown bark pine, silver pine, western pitch pine, western red pine, western yellow pine, yellow pine, Yosemite pine.

Uses
Erosion control: Ponderosa pine is a rapid growing tree with the ability to firmly anchor into most soil types. For this reason, it is suitable for use as a windbreak species. It can also be used with other natives to provide cover and erosion control on rehabilitated sites.

Ethnobotanic: Native Americans used various parts of ponderosa pine for medicinal, building and household, food, and ceremonial purposes. Needles were used as dermatological and gynecological aids.

They were also used to reduce coughs and fevers. The pitch was used as an ointment for sores and scabby skin, backaches, rheumatism, earaches, inflamed eyes, and as a sleeping agent for infants.

The boughs of the plant were used in sweat lodges for muscular pain, as decoctions for internal hemorrhaging, and as infusions for pediatric treatments.

The roots of ponderosa pine were used to make blue dye and needles were used as insulation for underground storage pits. The wood was used extensively for fence posts, boards for general construction, and to fabricate snowshoes. Single logs were used to make dugout canoes. Bark was used to cover houses.

Most parts of the plant were used for food, including the pitch, seeds, cones, bark, buds, and cambium. The pollen and needles were used in healing ceremonies.

Ornamental value: Ponderosa pine has a lush green color and pleasant odor that makes it popular for ornamental plantings. It has been planted, sometimes out of its natural range, because of its aesthetic qualities. Ponderosa pine is used as borders of forested highways, but is not planted within the right-of-way. The large stature of the tree limits its use to open spaces.

Wildlife: Red-winged blackbirds, chickadees, mourning doves, finches, evening grosbeak, jays, Clark's nutcracker, nuthatches, rufous-sided towhee, turkeys, chipmunks and squirrels consume the seeds of ponderosa pine. Blue and spruce grouse use ponderosa pine needles for nesting material. Mice, porcupines, and other rodents use the bark for nesting material. The trees are also important to various birds for cover, roosting and nesting sites.

Wood production: Ponderosa pine is one of the most important timber species in the western United States. The annual production of ponderosa pine is ranked third behind Douglas fir and hem-fir. Approximately 1.3 billion board feet of ponderosa pine lumber is produced annually out of Oregon, the largest supplier in the United States. It is popularly used for the construction of buildings.

Description
General: Pine Family (Pinaceae). Ponderosa pine is a large tree that lives 300 to 600 years and reaches heights of 30 to 50 m tall and 0.6 to 1.3 m in diameter. The oldest trees can exceed 70 m in height and 2 m in diameter. The bottom one-half of the

straight trunk is typically without branches. The crown of ponderosa pine is broadly conical to round-shaped. The bark is characteristically orange-brown with a scaly plate-like appearance. Twigs are stout, up to 2 cm think, orange-brown, and rough. Needles are 12 to 28 cm long, thin and pointed with toothed edges, occur in bundles of three, and give a tufted appearance to the twig. Buds are up to 2 cm long, 1 cm wide, red-brown with white-fringed scale margins. Male cones are orange or yellow and are located in small clusters near the tips of the branches. The female cone is oval, woody, 8 to 15 cm long, with a small prickle at the tip of each scale. Flowering occurs from April to June of the first year, and cones mature and shed winged seeds in August and September of the second year.

Distribution: Ponderosa pine is distributed from southern British Columbia through Washington, Oregon, and California, and east to the western portions of Texas, Oklahoma, Nebraska, North Dakota, and South Dakota. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site (http://plants.usda.gov).

Habitat: Ponderosa pine trees occur as pure stands or in mixed conifer forests in the mountains. It is an important component of the Interior Ponderosa Pine, Pacific Ponderosa Pine-Douglas fir, and Pacific Ponderosa Pine forest cover types.

In the northwest, it is typically associated with Rocky Mountain Douglas fir, lodgepole pine, grand fir, and western larch. In California it is associated with California white fir, incense cedar, Jeffrey pine, sugar pine, coast Douglas fir, California black oak, and western juniper. In the Rocky Mountains and Utah, it is associated with Rocky Mountain Douglas fir, blue spruce, lodgepole pine, limber pine, and quaking aspen. In the Black Hills, it is associated with quaking aspen, white spruce, and paper birch. In Arizona and New Mexico, it is associated with white fir, Rocky Mountain Douglas fir, blue spruce, quaking aspen, gamble oak, and southwestern white pine at higher elevations and Rocky Mountain juniper, alligator juniper, and Utah juniper at lower elevations (Oliver & Riker 1990).

Shrubs and grasses typically associated with ponderosa pine within its range include ceanothus, sagebrush, oak, snowberry, bluestem, fescue, and polargrass.

Adaptation
The USDA hardiness zones for ponderosa pine range from 3 to 7. It grows on a variety of soils from shallow to deep, and from gravelly sands to sandy clay loam. It is found growing on bare rock with its roots in the cracks and crevices. It has a low tolerance to alkalinity, preferring soils with a pH of 6.0 to 7.0. It grows best in zones with 30 to 60 cm average annual precipitation on well-drained soils. Once established it also survives hot and dry conditions, exhibiting medium to good drought tolerance. Fifty percent shade reduces the growth rate significantly. It withstands very cold winters.

Ponderosa pine is a climax species at the lower elevations of the coniferous forest and a mid-successional species at higher elevations where more competitive conifers are capable of growing. It generally grows at elevations between sea level and 3,000 m. The populations at higher elevations usually occur within the southern part of its range (Oliver & Riker 1990).

Establishment
Site preparation is needed to control competition, which compromises seedling survival and growth. Seeds are sown in late March to early April. The seed is sown for an initial density of 237 seedlings/m^2 (22 seedlings/ft^2). Transplant stock should be one or two years old, with less than 2 prior transplantings, and 15 to 30 cm in height. Space the plants 1 to 3 m apart depending on the site.

Initial seedling survival is reduced under moisture stress. Older seedlings can tolerate limited moisture. Competition from other vegetation should be controlled for the first three to six years until the trees become well established.

Management
Ponderosa pine can be over-irrigated in poorly drained soils, or drowned out on high water table sites.

It responds well to thinning, which should be done as stands become older to develop larger crowns, resulting in heavier seed crops for wildlife. More forage for deer and elk become available from associated plants by opening the canopy. The use of repellents or other control measures may be necessary to prevent overuse of the trees by rodents.

Ponderosa pine is resistant to fire due to its thick bark. Low intensity surface fires control competitive species like scrub oak and shade-tolerant conifers. Ponderosa pine seedlings can also survive low intensity burns.

Pests and Potential Problems
Approximately 200 insect species affect ponderosa pine from its cone stage to maturity. Pine cone beetles cause tree death by transmitting blue stain fungus to the tree. Their larvae also consume the phloem, restricting the flow of nutrients to the top of the tree.

Western pine beetle is a common cause of death for older trees, drought stressed trees, and even healthy, vigorous trees during epidemics.

Bark beetles are naturally present in all stands. Harvesting methods that leave large amounts of logging slash can allow bark beetle populations to explode and kill vigorous trees up to 0.5 m in diameter.

The ponderosa pine budworm, also known as the sugar-pine tortrix, eats new needles on trees in New Mexico and Colorado. Several years' worth of damage will affect the health of the tree. Early research suggests that some insecticides may help to control infestations.

Dwarf mistletoe is the most widespread parasite that causes branch and stem deformation. It germinates on ponderosa pine branches and forces its roots into the phloem of the host branch, creating stem cankers that leave the wood weak and unsuitable for use as lumber. This weakens the tree and leaves it susceptible to fungal infections and insect attacks. Root diseases, rusts, trunk decays, and needle and twig blights also cause significant damage.

Seeds and Plant Production
Ponderosa pine is propagated by seed. Cones are ready for collection in October and November when they turn reddish brown. Mature seed is firm and brown in color. Cones should be dried on canvas tarp in a well-ventilated area immediately after they have been collected. The seeds will drop from the cones as they dry.

Several germination methods for ponderosa pine have been utilized, each with their own variations. In general, seeds undergo an imbibation treatment before stratification. Seeds are placed in mesh bags and soaked in cold running water for 48 hours. One variation is to soak the seeds in a 40% bleach solution for 10 minutes with hand agitation prior to placing them under running water. The mesh bags are place in plastic bags and stored at 1^{o}C for 2 to 8 weeks. They should be checked daily for mold. Seeds are sown into containers and covered with media. The media should be kept moist throughout germination. Germination will occur at an average greenhouse temperature of 20^{o}C. Alternating greenhouse temperatures of 21-25^{o}C during the day and 16-18^{o}C at night is an appropriate environment for germinating seeds. Germination will occur in approximately 15 days.

Seedlings are thinned and watered daily throughout the establishment phase. They should not be moved outdoors until after the last frost of the year.

Seeds can be dried to between 5 and 8% moisture and placed in airtight plastic bags, then stored for long periods of time in freezers set at –15^{o}C.

Cultivars, Improved and Selected Materials (and area of origin)
Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

References
Agricultural Research Center. 2004. *GRIN taxonomy* (http://www.ars-grin.gov/cgi-bin/npgs/html/index, 27 May 2004). USDA, Beltsville.

Banner, R. 2002. *Ponderosa pine* (http://extension.usu.edu/rangeplants/Woody/ponderosapine.htm, 29 July, 2004). Utah State University Extension, Logan.

Forest Research Nursery. 2004. *Native plant network* (http://www.nativeplantnetwork.org, 27 May 2004). College of Natural Resources, University of Idaho, Moscow.

Frankis, M.P. 1998. *Pinus ponderosa. Earle, C.J., Gymnosperm database* (http://www.conifers.org/, 27 May 2004). Bonn University, Bonn, Germany.

Miller, A. 1997. *Ponderosa pine species facts* (http://www.wwpa.org/ppine.htm, 16 June 2004). Western Wood Products Association, Portland.

Moerman, D. 2003. *Native American ethnobotany database* (http://herb.umd.umich.edu/, 27 May 2004). University of Michigan, Dearborn.

Oliver, W.W. and R.A. Ryker. 1990. *Ponderosa pine. Burns, R.M. and B.H. Honkala, Silvics of North America. Agriculture Handbook 654*. USDA Forest Service, Washington, D.C.

Rewerts, M.S. 2004. *Ponderosa pine budworm* (http://www.ext.colostate.edu/pubs/insect/05567.html , 29 July, 2004). Colorado State University Extension, Fort Collins.

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

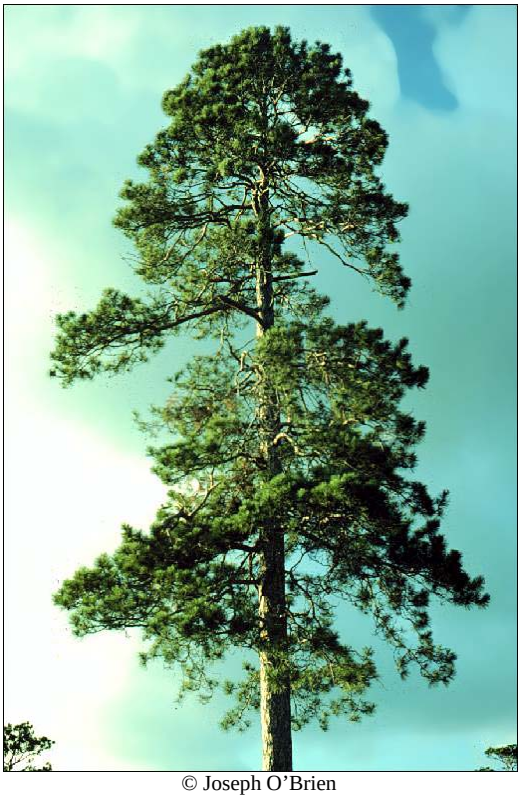
Plant Fact Sheet

RED PINE

Pinus resinosa Soland.

Plant Symbol = PIRE

Contributed by: USDA NRCS National Plant Data Center



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USDA, Forest Service, St. Paul Field Office

Alternate Names
Norway pine, eastern red pine, pin rouge

Uses
Economic: Red pine wood is moderately hard and straight grained. It is grown primarily for the production of wood used for poles, lumber, cabin logs, railway ties, post, pulpwood, and fuel. The bark is occasionally used for tanning leather (Sargent 1961).

Ethnobotanic: The inner bark of Pinus resinosa was pounded as a poultice for any kind of inflamed wound, sore, or ulcer when white pine bark was not available (Fielder 1975).

Landscaping & Wildlife: Red pine is an attractive tree that is used in recreational areas because of its colorful bark. Red pine provides cover for many species of mammals and birds. Deer, small mammals and songbirds feed on the seed.

Agroforestry: Pinus resinosa is used in tree strips for windbreaks. They are planted and managed to protect livestock, enhance crop production, and control soil erosion. Windbreaks can help communities with harsh winter conditions better handle the impact of winter storms and reduce home heating costs during the winter months and cooling cost in the summer**.**

Status
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Description
General: Red pine (*Pinus resinosa*) is a medium sized tree, up to twenty-five meters high and seventy-five centimeters in diameter (Farar 1995). The leaves are soft and flexible evergreen needles, in clusters of two, slender, 4"-6" long, dark green borne in dense tufts at the ends of branchlets. The fruit is ovoid-conic, with thin scales, becoming light chestnut-brown at maturity. The bark is thick and slightly divided by shallow fissures into broad flat ridges covered by thin loose red-brown scales (Sargent 1961). The root system is moderately deep, wide spreading, and very wind firm.

Distribution:
Red pine is native to northeastern United States. This species ranges from Newfoundland and Manitoba, south to the mountains of Pennsylvania, west to Minnesota (Dirr 1990). For current distribution, please consult the Plant profile page for this species on the PLANTS Web site.

Adaptation
Red pine occurs most often on well drained, dry, highly acid, sandy soils of outwash plains, and gravelly ridges (Barnes & Wagner 1981). It is frequently found where the soil fertility is low, in pure stands or mixed with species such as jack pine, white pine, aspens, oaks, and white birch. This species prefers full sun and is shade intolerant and extremely cold tolerant. *Pinus resinosa* is easily cultivated in nurseries and easily raised in plantations (Ibid.).

Establishment
Propagation by Seed: Cones ripen from August to October with natural seed dispersal occurring between October and November. However, seeds can be artificially harvested by kiln drying ripe cones for nine hours at 130ºF (Dirr & Heuser 1987). Fresh seed has no dormancy and will germinate immediately upon sowing. Stored seed requires two months cold stratification. Optimum temperature for germination is 77ºF (Ibid.).

Management
Most red pine natural stands originate after a forest fire. Fire is necessary for regeneration because it prepares a seedbed by reducing much of the humus, and competition from other trees and shrubs, decreases the number of cone-destroying insects, and thins out the overstory (Farrar 1995). Once established, red pine requires little care. Tip and shoot moths sometime attack it.

Cultivars, Improved and Selected Materials (and area of origin)
Materials are available through nurseries within its range. Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

References

Barnes, B.V. & W.H. Wagner, Jr. 1981. *Michigan trees*. The University of Michigan Press, Ann Arbor, Michigan.

Britton, N.L. 1908. *North American trees*. Henry Holt & Company, New York, New York.

Dirr, M.A. 1990. *Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation, and uses*. 4th ed. Stipes Publishing Co., Champaigne, Illinois.

Dirr, M.A. 1997 *Dirr's hardy trees and shrubs: an illustrated encyclopedia*. Timber Press, Portland, Oregon.

Farrar, J.L. 1995. *Trees of the northern United States and Canada*. Iowa State University Press, Ames, Iowa.

Graves, A.H. 1956. *Illustrated guide to trees and shrubs*. Harper & Brothers, Publishers, New York, New York.

Grimm, W.C. 1967. *Familiar trees of America*. Harper & Row, Publishers, New York, New York.

O'Brien, J. 2002. *Images of Northern Forests-red pine*. USDA, Forest Service, St. Paul Field Office, St. Paul, Minnesota. Accessed: 10jan02. <http://www.na.fs.fed.us/spfo/for_images/miscimage.htm>

Peattie, D.C. 1950. *A natural history of trees of eastern and central North America*. Houghton Mifflin Company, Boston, Massachusetts.

Preston, R.J., Jr., 1989. *North American trees*. 4th ed. Iowa State University Press, Ames, Iowa.

Rehder, A. 1990. *Manual of cultivated trees and shrubs: hardy in North America*. 2nd ed. Dioscorides Press, Portland, Oregon.

Sargent, C.S. 1961. *Manual of the trees of North America*. Vol. 1. Dover Publications, Inc., New York, New York.

Burns, R. M. & B. H. Honkala, 1990. *Silvics of North America- Volume 1 Conifers.* USDA Forest Service Handbook 654. U.S. Government Printing Office, Washington, D.C.

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Scotch Pine

Scotch Pine
(Pinus sylvestris)

General Description

A medium to large tree, typically pyramidal when young, becoming more rounded and open with age. Orange-brown peeling bark. Bark is relished by porcupines, which can cause extensive damage. The largest tree in North Dakota is 46 feet tall with a canopy spread of 34½ feet.

Leaves and Buds

Bud Arrangement - Buds are in whorls.

Bud Color - Brown and resin coated.

Bud Size - Oblong-ovate, 1/4 to 1/2 inch long, and pointed.

Leaf Type and Shape - Two needles per fascicle, usually twisted.

Leaf Margins - Edges are minutely toothed.

Leaf Surface - Semi-rough.

Leaf Length - Needles 1½ to 3½ inches long, and persist for 3 years.

Leaf Width - Narrow needles.

Leaf Color - Medium green.

Flowers and Fruits

Flower Type - Monoecious, separate male and female strobili that develop into cones.

Flower Color - Female strobili are purple; male strobili are reddish-tan.

Fruit Type - Cone with diamond-shaped scales, 1½ to 2½ inches long, two winged seeds per cone scale.

Fruit Color - Dull gray-brown cones, brownish-gray seeds.

Form

Growth Habit - Pyramidal when young, branches thin and form becomes flat to round-topped with age.

Texture - Medium-coarse, summer and winter.

Crown Height - 25 to 50 feet.

Crown Width - 20 to 35 feet.

Bark Color - Flaky, peeling, orange-brown in upper two-thirds of mature tree. Thick, grayish or reddish, fissured at the base of the tree.

Root System - Shallow rooted, but forms a tap root on dry sites.

Environmental Requirements

Soils

Soil Texture - Prefers moist, well-drained soils, but will tolerate drier sites.

Soil pH - 5.0 to 7.5.

Windbreak Suitability Group - 1, 3, 4, 5, 6D, 6G.

Cold Hardiness

USDA Zone 3.

Water

Does not tolerate flooding. Not very drought resistant, but requires a well-drained site.

Light

Full sun.

Uses

Conservation/Windbreaks

Medium to tall evergreen for farmstead or field windbreaks.

Wildlife

Provides nesting sites and winter cover.

Agroforestry Products

Wood - Not used for dimension lumber. Extensively planted for Christmas trees.

Food - *Pinus* species are a source of pyrone, a sugar substitute.

Medicinal - *Pinus* species are used to treat bronchitis, skin diseases, wounds, and as a source of pinosylvinean, an antibiotic.

Urban/Recreational

Ornamental landscape tree for homes and public grounds. Orange, peeling bark provides visual accents.

Cultivated Varieties

Russian and Northern European seed sources are hardiest.

Waterer Scotch Pine (*Pinus sylvestris* 'Watereri') - Dense-gowing, bluish-green selection. Handsome landscape plant.

Related Species

Jack Pine (*Pinus banksiana*)

Ponderosa Pine (*P. ponderosa*)

Swiss Mountain Pine (*P. uncinata*) - A tree form of Mugo Pine which merits landscape use in the Northern Plains.

Pests

Common diseases include Cyclaneusma needle cast. Western gall rust and Lophodermium needle cast are locally common. Common insect pests include tip moth, sawfly, pine needle scale, and giant conifer aphid.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

SCOTS PINE

Pinus sylvestris L.

Plant Symbol = PISY

Contributed by: USDA NRCS Plant Materials Program

USDA NRCS National Plant Materials Center
Beltsville, MD

Uses

Windbreaks: Plant Scots pine in the central or leeward rows of multi-row plantings. It is also recommended for planting as single-row windbreaks.

Wildlife: Scots pine is of some importance as food and cover for many birds and small mammals. Although the plant is browsed by whitetail and mule deer, it is not a preferred forage.

Timber/Christmas tree plantations: Scots pine is suitable for ornamental and screen plantings. Its year long coloration adds variety to recreation plantings.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Scots pine is an evergreen, spreading tree 80 to 100 feet, pyramidal when young, becoming round topped and irregular in age. The tree is introduced from Eurasia, and has become naturalized in eastern North America. It is cultivated for windbreaks, timber, and Christmas tree plantations. It does best on rich, moist soils, but its winter hardiness and moderate drought tolerance enable it to do well on other soils. It is moderately slow growing, but is long lived.

Description

Fruits are tawny-yellow, oblong, symmetrical cones, 1 to 2 inches long. Clusters of flowers are yellow, minute, male and female. Needles occur in bunches of 2, are stout and usually twisted, 1 to 3 inches long, and bluish-green in color. Scots pine branches are spreading, and stems are often crooked in early years. The plant's bark is orange, thin and smooth on upper trunk, dark and fissured below. The tree's root system is widespread, moderately deep, and wind-firm.

Adaptation and Distribution

Scots pine is distributed throughout the Northeast and upper Midwest. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment

Plantings should be established during the spring of the year on weed free sites. Stand establishment can be enhanced by using 2 year old field-grown stock. Holes or furrows should be deep enough to contain roots without bending.

Management

Weed control is recommended in areas where the tree is grown for shade or Christmas tree plantings. It is also good to shape the tree for the form that you would like to have at time of harvest.

Pests and Potential Problems

There are several wood boring, root feeding, foliage feeding, and twig boring insects that attack this tree. The most common pest are cyclaneusma needle cast, western gall rust, Lophodermium needle cast, tip moth, sawflies, pine needle scales and giant conifer aphid.

Cultivars, Improved, and Selected Materials (and area of origin)

Scots pine has several intergrading cultivars, differing chiefly in leaf color and growth form. Most have ready use as Christmas trees, although leaves of some cultivars turn yellow-green in winter. Seedlings are available at most commercial conifer nurseries. Seed origin is extremely important in obtaining quality trees for a given sub-region.

Consult the state extension forester for information from provenance testing to determine the best seed source for your planting.

Prepared By & Species Coordinator:
USDA NRCS Plant Materials Program

Edited: 05Feb2002 JLK; 060809 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Scotch pine

Pinus sylvestris

Growth Form: pyramidal to ovoid
Crown Density: open
Size: 40-65 feet high
20-40 foot spread
Drought Resistance: very good
Cold Hardiness: very good
Growth Rate: rapid
Life Span: long
Elevational Range: to 7,000 feet
Soil Conditions: tolerates alkaline
Possible Insect Problems: tip moths, ips beetles
Possible Disease Problems: fairly resistant
Wildlife Value: high: food value for upland game and song birds
Seasonal Color: evergreen
Miscellany: makes an excellent Christmas tree

Taken from: Trees for Conservation, a buyer's guide, Colorado State Forest Service

Black Hills Spruce

Black Hills Spruce *(Picea glauca var. densata)*

General Description

A large tree, very dense and pyramidal when young. Not as drought tolerant as Colorado Spruce. Black Hills Spruce is a naturally occurring variety of white spruce native to South Dakota. Better adapted than White Spruce (*Picea glauca*) which is native in the eastern United States, as far west as Minnesota. The largest spruce tree in North Dakota is 95 feet tall with a canopy spread of 42 feet.

Leaves and Buds

Bud Arrangement - Whorls.

Bud Color - Chestnut brown scales, blunt tips, not resinous.

Bud Size - Buds are about 1/4 inch long.

Leaf Type and Shape - Needles attached individually on peglike projections called sterigmata.

Leaf Margins - Quadrangular in cross-section.

Leaf Surface - Slightly glaucous, 2 to 3 stomatal lines above, 3 to 4 on lower surface.

Leaf Length - 1/3 to 3/4 inch.

Leaf Width - 1/16 inch needles.

Leaf Color - Variably green and glaucous.

Flowers and Fruits

Flower Type - Moneocious, separate male and female strobili.

Flower Color - Female strobili are greenish to purplish; male are tan to pale red.

Fruit Type - Cone length 1½ to 2 inches long. Cone scales have a rounded, smooth margin; small winged seed.

Fruit Color - Brown cones, tannish seeds.

Form

Growth Habit - Long stout branches from ground up form a broad pyramidal to conical crown, compact ascending branches, denser growth form than species.

Texture - Medium, summer and winter.

Crown Height - 30 to 60 feet.

Crown Width - 15 to 25 feet.

Bark Color - Ash brown, scaly or flaky bark.

Root System - Shallow, fibrous, and wide spreading.

Environmental Requirements

Soils

Soil Texture - Grows best on moist loams.

Soil pH - 4.0 to 7.5.

Windbreak Suitability Group - 1, 3, 4, 5.

Cold Hardiness

USDA Zone 2.

Water

Fairly drought resistant. Needs additional moisture during droughts.

Light

Full sun.

Uses

Conservation/Windbreaks

Medium to tall evergreen for farmstead and field windbreaks.

Wildlife

Browsed by mammals. Nesting site for birds. Makes a good winter cover.

Agroforestry Products

Wood - Used for dimension lumber, pulpwood and Christmas trees.

Urban/Recreational

Good yard or ornamental tree. Used singly or in group plantings in recreation areas and public grounds.

Cultivated Varieties

Dwarf Alberta Spruce (*Picea glauca* 'Conica') - Dwarf, compact form, very subject to winterburn and spider mites.

Related Species

Norway Spruce (*P. abies*)

Colorado Spruce (*P. pungens*)

Pests

Common diseases include Lirula needle blight. White spruce is less affected than Colorado Spruce by Rhizosphaera needle cast and Cytospora canker. Common insect pests include spider mite, spruce needle miner, pine needle scale, yellow-headed spruce sawfly, and aphids.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

WHITE SPRUCE

Picea glauca (Moench) Voss

Plant Symbol = PIGL

Contributed by: USDA NRCS National Plant Data Center & the Biota of North America Program

Alternate Names

Canada spruce, skunk spruce, cat spruce, single spruce, western white spruce (var. *albertiana*, Canadian Rocky Mts.), Porsild spruce (var. *porsildii*, Alaska), Black Hills spruce (var. *densata*, South Dakota); synonyms: *Picea alba* (Aiton) Link; *Picea canadensis* (Miller) B.S.P.

Uses

The wood of white spruce is used primarily for pulpwood and lumber for various construction, prefab houses, mobile homes, furniture, boxes and crates, and pallets. It also is used for house logs, musical instruments, and paddles. Because of its wide geographic range and abundance, it is (de facto) highly significant for food and cover of many wildlife species, for soil stability, watershed value, and recreation. It was historically important for food, shelter, medicine, fuel, and other uses by American Indians. White spruce is the provincial tree of Manitoba and the state tree of South Dakota. White spruce is much used in some areas for Christmas trees and is a good ornamental and shade tree.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

Description

General: Pine Family (Pinaceae). Native trees grows to 25 (-50) meters tall, the crown broadly conic to spire-like, or the plants sometimes shrub-like near treeline; branches slightly drooping; twigs not pendent, slender, pinkish-brown, without hairs. Bark is gray-brown, thin scaly. Needles are evergreen, borne singly from all sides of the twig but often crowded on the upper side, (0.8-) 1.5-2 (-2.5) cm long, blue-green, 4-angled, often inwardly curved, stiff, sharp-pointed. Seed cones are light brown at maturity, 2.5-6 (-8) cm long, ellipsoid, pendent; cone scales fan-shaped, soft and flexible, the tip smooth-edged and extending 0.5-3 mm beyond seed-wing impression. The common name is derived from the white waxy layer on the foliage.

Variation within the species: White spruce is highly variable over its range and several varieties (apart from the typical) have sometimes been recognized.

P. glauca var. *albertiana* (S. Brown) Sargent – Canadian Rocky Mountains

P. glauca var. *densata* Bailey – Black Hills of South Dakota and adjacent Wyoming

P. glauca var. *porsildii* Raup – Alaska

The diagnostic characteristics of these variants are not well correlated and occur rather sporadically – some of the features may reflect interspecific hybridization and some may be phenotypic modifications. More study is needed, but recent taxonomic treatments do not formally recognize variants within white spruce. Most of the variation follows gradients of latitude and altitude.

Where they occur together, white spruce and Engelmann spruce regularly hybridize and intergrade completely, the hybrids occurring in intermediate elevation. Such trees are largely the basis for the description of *P. glauca* var. *albertiana*. White spruce also forms natural hybrids with Sitka spruce and black spruce.

Distribution

Widespread across northern North America, from Alaska, Yukon, and British Columbia continuously eastward to Nova Scotia, Newfoundland, New Brunswick, and Québec, in the northeastern United States and sporadically in the northern tier of states (Montana, Wyoming, South Dakota, Minnesota, Wisconsin, Michigan). For current distribution,

please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment
Adaptation: In muskegs, bogs, and river banks, to montane slopes; at 0-1000 (-2100) meters elevation. White spruce is a dominant tree of interior forests in Canada and Alaska and often an early colonizer in succession. White spruce co-occurs with black spruce (*Picea mariana*) over a wide range – the two species have evolved a complex competitive relationship (habitat partitioning) involving contrasts in water tolerance, vegetative reproduction, flowering times, and rate of early growth. *Picea glauca* grows best on well-drained mineral soils with deep or no permafrost, while *P. mariana* is more tolerant of sites with flooding, permafrost, and high soil acidity.

Planting: Cone crops have been reported for trees as young as 4 years, but seed production in quantity begins at age 30 or older for most natural stands. Good years of seed production may be 2-12 years apart.

Germination under established or mature stands commonly occurs on a variety of seedbeds – particularly on rotted logs and moss beds, but exposed mineral soil after windthrow and floods is the best seedbed. Large numbers of white spruce may become established immediately following disturbance. Seedling growth is greatest at full light intensity, but white spruce is capable of reproducing under mature stands of spruce and early succession tree species. Because seedling and juvenile growth of white spruce is slower than its early successional associates, it remains in the understory for 50 to 70 years.

Trees 100-250 years old are common on good sites; older trees (250 to 300 years) are frequently found in areas protected from fire and in relatively wet upland situations. As in other species, maximum age appears to occur on stress sites at latitudinal or elevational treeline. Trees 500-1000 years old are known from such sites.

Management
White spruce trees from very young to 200 or more years may show good growth after release resulting from natural causes or silvicultural treatment.

Mature forests with white spruce are easily destroyed because of their high susceptibility to fire. The probability of elimination of this species increases with latitude because good seed years become infrequent and seed quality poorer. At relatively short fire intervals (less than 40-50 years), the source of white spruce seed can be eliminated.

Delivery of seeds to seedbeds for germination may limit regeneration. Squirrels may harvest as much as 90 percent of the cone crop in Alaska. Seed predation by insects and small mammals such as deer mice, red-backed and meadow voles, chipmunks, and shrews also can result in significant seed loss.

Slow initial root growth makes young seedlings and transplants particularly susceptible to frost heaving. The severity of damage generally is greatest on fine-textured and wet soils where water is adequate for ice crystal formation in the surface soil. Defoliation by the spruce budworm and the western spruce budworm can cause mortality if defoliation continues for 2 or more years.

Cultivars, Improved and Selected Materials (and area of origin)
These plant materials are readily available from commercial sources. The cultivar 'Conica' (dwarf Alberta spruce, or dwarf white spruce) "is probably the best-known and most widely sold dwarf conifer in the United States (Dirr 1997)."

Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

References
Daubenmire, R. 1974. *Taxonomic and ecologic relationships between Picea glauca and Picea engelmannii*. Canad. J. Bot. 52:1545-1560.

Dirr, M.A. 1997. *Dirr's hardy trees and shrubs: An illustrated encyclopedia*. Timber Press, Portland, Oregon.

LaRoi, G.H. & J.R. Dugle 1968. *A systematic and genecological study of Picea glauca and P. engelmannii, using paper chromatography of needle extracts*. Canad. J. Bot. 46:649-687.

Little, E.L., Jr. & S.S. Pauley 1958. *A natural hybrid between black and white spruce in Minnesota*. Amer. Midl. Naturalist 60:202-211.

Naturhistoriska riksmuseet 1999. *Picea glauca*. IN: *Den viruella floren*. Stockholm, Sweden. <http://linnaeus.nrm.se/flora/barr/pina/picea/picegla.html>

Nienstaedt, H. & J.C. Zasada 1990. *Picea glauca*. Pp. 204-226, IN R.M. Burns and B.H. Honkala. *Silvics of North America*. *Volume 1*. *Conifers*. USDA Forest Service Agric. Handbook 654, Washington, D.C. <http://willow.ncfes.umn.edu/silvics_manual/Table_of_contents.htm>

Taylor, R.J. 1993. *Picea*. Pp. 369-373, IN: *Flora of North America, north of Mexico*. Vol. 2, *Pteridophytes and gymnosperms*. Oxford Univ. Press, New York. <http://hua.huh.harvard.edu/cgi-bin/Flora/flora.pl?FLORA_ID=12395>

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Edited 05dec00; 13feb03 ahv; 060802 jsp

Colorado (Blue) Spruce

Colorado (Blue) Spruce *(Picea pungens)*

General Description

A broad, dense, pyramidal tree with stiff branches horizontal to the ground. Native to intermountain states of the west. Choice specimen tree. The largest tree in North Dakota is 85 feet tall with a canopy spread of 30 feet.

Leaves and Buds

Bud Arrangement - Buds are in whorls.

Bud Color - Yellowish-brown, not resinous.

Bud Size - Broadly conical, tips are blunt, about ¼ inch long.

Leaf Type and Shape - Sharply pointed needles are attached individually on peglike projections called sterigmata.

Leaf Margins - Needles are 4-sided.

Leaf Surface - Variably glaucous, 4 to 5 stomatal lines on both sides.

Leaf Length - Needles 3/4 to 1¼ inches.

Leaf Width - 1/16 inch needles.

Leaf Color - Variable from dull green, blue-green, to silvery-blue, glaucous.

Flowers and Fruits

Flower Type - Monoecious, separate male and female strobili.

Flower Color - Female strobili are green to purple; male are orange.

Fruit Type - Cones 2½ to 4 inches long, with papery cone scales that have a truncated edge; small, winged seeds, chestnut brown.

Fruit Color - Light yellow-brown or tannish cones, chestnut-brown seeds.

Form

Growth Habit - Branching is broad and dense, with branches extending to the ground.

Texture - Medium, summer and winter.

Crown Height - 30 to 65 feet.

Crown Width - 15 to 25 feet.

Bark Color - Bark is scaly or flaky and ash-brown.

Root System - Shallow and wide spreading.

Environmental Requirements

Soils

Soil Texture - Performs best on moist, well-drained loams.

Soil pH - 6.0 to 7.5.

Windbreak Suitability Group - 1, 3, 4 and 5.

Cold Hardiness

USDA Zone 2.

Water

Does not tolerate flooding. Prefers moist areas, but is the most drought tolerant of the spruces.

Light

Full sun. Does not tolerate shade.

Uses

Conservation/Windbreaks

Medium to tall evergreen for farmstead and field windbreaks.

Wildlife

Nesting sites for birds.

Agroforestry Products

Wood - Used for firewood but burns fast. Good for kindling. Used for Christmas trees.

Urban/Recreational

Popular specimen or ornamental landscape tree. Used singly or in group plantings.

Cultivated Varieties

Blue Globe Spruce (*Picea pungens* 'Glauca Globosa') - Excellent blue-needled dwarf bush.

Hoops Blue Spruce (*P. pungens* 'Hoopsii') - Striking steel-blue, beautiful.

Iseli Foxtail Spruce (*P. pungens* 'Iseli Foxtail') - Blue, bushy-needled form.

Mission Blue Spruce (*P. pungens* 'Mission Blue) - Blue needle color.

Moerheim Blue Spruce (*P. pungens* 'Moerheimii') - A dense, compact form with blue color.

Montgomery Spruce (*P. pungens* 'Montgomery') - Dwarf, blue-needled selection. Excellent, dense habit, but sometimes reverts to taller form.

Thompsen Blue Spruce (*P. pungens* 'Thompsenii') - Silvery-blue needles, similar color to 'Hoopsii'.

Related Species

Black Hills Spruce (*Picea glauca* var. *densata*)

Norway Spruce (*P. abies*)

Pests

Common diseases include Rhizosphaera needle cast, Cytospora canker, and Lirula needle blight. Common insect pests include spider mites, spruce needle miner, pine needle scale, yellow-headed spruce sawfly, and aphid.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

BLUE SPRUCE

Picea pungens Engelm.

Plant Symbol = PIPU

Contributed by: USDA NRCS National Plant Data Center & the Biota of North America Program

Alternate names

Colorado blue spruce, white spruce, silver spruce, Parry spruce, water spruce, *Picea parryana* Sargent

Uses

Blue spruce has been little used for lumber or wood products because it is rarely abundant in nature and the wood is brittle and often full of knots. It sometimes is cut with Engelmann spruce. Because of its cold hardiness, symmetrical pyramidal form, and waxy, blue-hued foliage, blue spruce is widely planted in ornamental and general landscape settings. Numerous horticultural cultivars have been developed, based on needle color and crown form. It is used considerably for Christmas trees and blue spruce plantations have been established in the northeastern US – these probably the source of

escapes reported for several states far from its native range (Maine, Massachusetts, New York, Pennsylvania, Maryland). Blue spruce is the state tree of Colorado and of Utah.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

Description

General: Pine Family (Pinaceae). Native trees growing to 50 meters tall, the crown long-conic; branches whorled, ascending to slightly to strongly drooping; twigs not pendent, stout, yellow-brown, usually without hair; many small twigs produced on the main trunk and between the main whorls of branches; bark relatively thick, gray-brown, breaking into furrows and rounded ridges, only slightly scaly. Needles are evergreen, borne singly and at right angles from all sides of the twig, 1.6-3 cm long, 4-angled, stiff and sharply spine-tipped, silvery to blue-green. Seed cones are green or violet, ripening pale buff, (5) 6-11 (12) cm long, ellipsoid, pendent, the scales elliptic to diamond-shaped, widest below middle, stiff at the base, the tip flexible, unevenly toothed, and extending 8-10 mm beyond seed-wing impression. The common name is based upon the blue foliage color of some races.

Variation within the species: trees with similar color tend to occur in small, local populations, suggesting that color traits are under genetic control. The color variation does not conform to a clinal pattern. Most other variable features in blue spruce (e.g., physiology, early survival, growth rate) similarly do not follow geographical parameters; date of bud set follows a local altitudinal pattern.

Besides features of habit, leaf color, and habitat, blue spruce is distinguished from Engelmann spruce by its cones and cone scales that average larger in size, but these characteristics are often partially or completely overlapping. Blue spruce also differs in its glabrous twigs.

Distribution
The native range of blue spruce is the central and southern Rocky Mountains of the USA – in Idaho, Wyoming, Utah, Colorado, New Mexico and Arizona. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation
Blue spruce commonly occurs on stream banks in moist canyon bottoms (hence one of its common names, water spruce) but may grow on gentle to steep mountain slopes in Douglas fir or spruce-fir woods up to timberline; at 1800-3000 meters elevation in mid-montane forests. It often grows with subalpine fir, white fir, and Engelmann spruce. It is cultivated on a wide variety of soils, except those that are very moist.

Establishment
Blue spruce begins to produce seed at about 20 years; maximum seed production occurs between 50-150 years. Good cone years occur at intervals of 2-3 years. Seed germination is mostly confined to exposed mineral soil with side shade and overhead light, but natural reproduction is scanty, probably because the light seeds are prevented from coming into contact with mineral soil by the dense herbage, grass, or other ground-cover vegetation that is usually abundant in the habitat of the species. Seedling establishment is probably benefited by moisture availability and shading, which prolong snow and soil moisture in late spring.

Blue spruce is a slow-growing tree and some individuals have been reported to live for more than 600 years. Reproduction by layering has not been reported for this species.

Management
Western spruce budworm larvae feed on old needles in late April, then mine developing buds and defoliate new tree growth. Heavy repeated attacks kill the tree.

Cultivars, Improved and Selected Materials (and area of origin)
These plant materials are readily available from commercial sources. Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under ”United States Government.” The Natural Resources Conservation Service will be listed under the subheading “Department of Agriculture.”

References
Daubenmire, R. 1972. *On the relation between Picea pungens and Picea engelmannii in the Rocky Mountains*. Canad. J. Bot. 50:733-742.

Fechner, G.H. 1990. *Picea pungens*. Pp. 238-249, IN R.M. Burns and B.H. Honkala. *Silvics of North America*. *Volume 1. Conifers*. USDA Forest Service Agric. Handbook 654, Washington, D.C. <http://willow.ncfes.umn.edu/silvics_manual/Table_of_contents.htm>

Taylor, R.J. 1993. *Picea*. Pp. 369-373, IN *Flora of North America, north of Mexico*. Vol. 2, *Pteridophytes and gymnosperms*. Oxford Univ. Press, New York, New York. <http://hua.huh.harvard.edu/cgi-bin/Flora/flora.pl?FLORA_ID=12395>

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

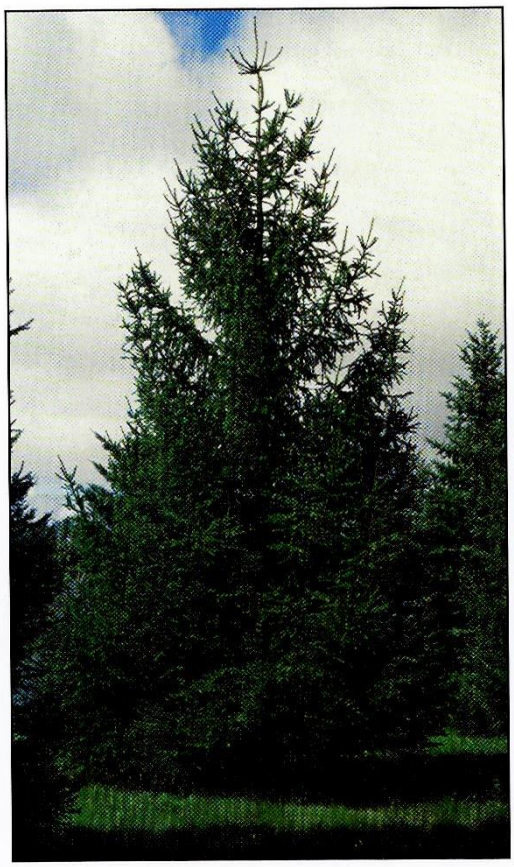
Colorado blue spruce

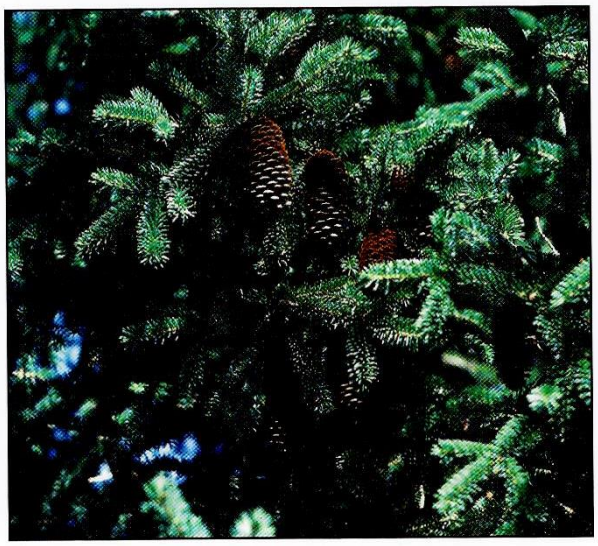
Picea pungens

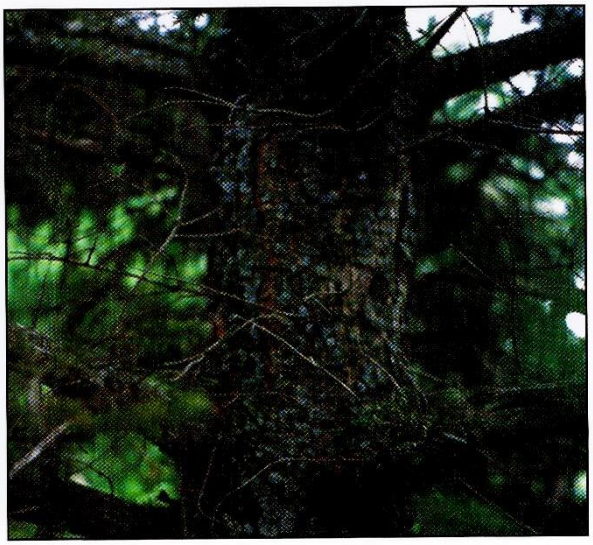
Growth Form: conical
Crown Density: dense
Size: 60-100 feet high
15-35 foot spread
Drought Resistance: fair
Cold Hardiness: excellent
Growth Rate: slow
Life Span: long
Elevational Range: to 9,500 feet
Soil Conditions: fair alkaline tolerance
Possible Insect Problems: pine needle scale, tussock moth, terminal weevil, gall aphids
Possible Disease Problems: Valsa canker, spruce witches' broom
Wildlife Value: high: song and ground birds and grouse; hoofed and small browsers
Seasonal Color: bluish evergreen
Miscellany: native; Colorado's state tree; high ornamental value

Taken from: Trees for Conservation, a buyer's guide, Colorado State Forest Service

Norway Spruce







Norway Spruce (Picea abies)

General Description

A large, wide, open pyramidal tree with potential for screening or use in larger landscapes. Native to northern and central Europe, has great diversity in growth forms from ground covers to shrubs to tree forms.

Leaves and Buds

Bud Arrangement - Whorled evenly around the stem.

Bud Color - Red to light brown, not resinous.

Bud Size - ¼ inch long, scales rosette-shaped.

Leaf Type and Shape - Needles, quadrangular shape in cross-section, straight or curved ending in a blunt point.

Leaf Margins - Entire.

Leaf Surface - Smooth.

Leaf Length - ½ to 1 inch.

Leaf Width - $^1/_8$ inch or less.

Leaf Color - 1 to 2 stomatal lines per side of the needle create a dark green and light green striping, often shiny.

Flowers and Fruits

Flower Type - Monoecious, male flowers are borne at leaf axils, female flowers are borne at the tip of the branch.

Flower Color - Male flowers are tan to pale red, female flowers are reddish-pink.

Fruit Type - Long cones 4 to 6 ½ inches, 1½ to 2 inches wide.

Fruit Color - Purple or green, maturing to light brown.

Form

Growth Habit - Pyramidal with pendulous branchlets. Very attractive tree, but loses density when old.

Texture - Medium, summer and winter.

Crown Height - 40 to 60 feet.

Crown Width - 25 to 30 feet.

Bark Color - Gray, flaky surface.

Root System - Fibrous, fairly shallow, spreading.

Environmental Requirements

Soils

Soil Texture - Prefers sandy to loam soils. Sensitive to soil compaction.

Soil pH - 4.0 to 7.2.

Cold Hardiness

USDA Zone 3.

Water

Prefers moderately well-drained sites, only fair drought tolerance. Needs supplemental water if extended drought.

Light

Full sun to partial shade.

Uses

Conservation/Windbreaks

Conifer rows of multirow farmstead belts. There are trees in a farmstead belt in southwestern North Dakota growing well, but caution is advised if planting west of the James River Valley because of drier conditions, alkaline and saline soils. Fairly easy to transplant, mulching recommended.

Wildlife

Cover, nesting and food (seed, needles) for birds and mammals, including browsers.

Agroforestry Products

Wood: Commonly used as timber and pulpwood.

Medicinal: Extracts of turpentine have been used as antiseptics, on rheumatic swellings and bruises.

Urban/Recreational

Used in yard and park landscapes for year-round green color, pyramidal form provides good wind protection.

Cultivated Varieties

A host of cultivars. Many are dwarfed and compact. Some subject to winter injury. Only a few listed below.

Birdsnest Spruce *(Picea abies* 'Nidiformis') - Compact shrub.

Pumila Spruce *(Picea abies* 'Pumila') - Dwarf low spreader, one of best, very dense.

Sharpleaf Spruce *(Picea abies* 'Mucronata') - Tight, densely compact, pyramidal in form. Good performance in NDSU trials.

Related Species

Black Hills Spruce *(Picea glauca* var. *densata)* - See Black Hills Spruce.

Colorado Spruce *(Picea pungens)* - See Colorado Spruce.

Rocky Mountain Douglas-fir *(Pseudotsuga menziesii* var. *glauca)* - Plant hardy seed sources. See *Abies-Fir.*

Pests

Insects: Spruce spider mites, spruce gall aphids, spruce budworm and yellow-headed spruce sawfly. Cytospora canker also occurs.

Norway Spruce

Taken from: http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/e620/picea-abies.aspx

Common Name: Norway spruce
Type: Needled evergreen
Family: Pinaceae
Zone: 2 to 7
Native Range: Northern and central Europe
Height: 40 to 60 feet
Spread: 25 to 30 feet
Bloom Time: Non-flowering
Bloom Description: Non-flowering
Sun: Full sun
Water: Medium
Maintenance: Low
Leaves: Evergreen
Other: Winter Interest
Wildlife: Attracts Birds
Tolerates: Air Pollution, Deer

Culture

Easily grown in average, medium, well-drained soils in full sun. Best in cold climates, and will not grow well south of USDA Zone 7.

Noteworthy Characteristics

Norway spruce is a pyramidal evergreen tree which typically matures to 40-60' tall in cultivation in North America, but may reach 200' tall in the wild in its optimum native growing environments in Europe.

Norway Spruce

Taken from: http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/e620/picea-abies.aspx

Stiff dark green needles (to 3/4" long). Pendant seed cones (4-7" long) are reddish-brown. Pendulous branchlets distinguish this species from native American spruces.

Plant of Merit

Norway spruce is a large, pyramidal, evergreen conifer that matures to 40-60' tall. It is noted for performing particularly well in the St. Louis climate. It features slightly upturned primary branches with pendulous branchlets and twigs. Evergreen, spirally-arranged, four-sided needles are dark green. Cylindrical seed bearing cones with flexible scales are pendant. Common uses include landscape specimen or windbreak.

Problems

No serious insect or disease problems.

Garden Uses

Evergreen tree for large lawns, parks or woodland areas. Effective screen or windbreak in cold northern climates. Many dwarf cultivars of this species are available for foundation and rock garden plantings.

Welcome to NorwaySpruce.com

IDENTIFICATION | SOILS AND RAINFALL | HEIGHT AND GROWTH | USES | DISEASES AND PESTS

Norway Spruce

Click here for Norway Spruce in Windbreaks

The Norway Spruce is a native of Europe, and is commonly called the mountain spruce there. Due to its hardiness and adaptability it has been introduced around the world and thrives in the plant hardiness zones of 2 to 8 where there is adequate rainfall of at least 20” per year. In areas of less rainfall additional water will be necessary especially when young.

IDENTIFICATION

First stand back--if this evergreen is a tree that is 20 foot tall or larger it should have a dark
green color with pendulous (arching upward) branches.

The foliage on these branches commonly "hangs" down from the main branches on larger trees. If the tree is over 20 feet tall look under the tree for the large cones, they are usually 4-8 inches long or they can be seen hanging down from the ends of the branches.

Identification

Remove one needle, it should be about 1 inch long and rotate easily between the thumb and forefinger. If it does not rotate and has 2 flat sides it is a fir tree.

Smaller trees are sometime hard to identify, look mainly for the dark green color, and needle rotation, and if all else fails ask a local tree expert, or a nursery, or some government forester, or me.

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SOILS AND RAINFALL

In the Black Forest of Germany, the Norway Spruce

is the dominate evergreen.

As with most plants it grows best on moist deep loam soils with 35" of annual rainfall per year. Due to their adaptability they can also grow on clay soils and sandy soils where there is adequate moisture to meet their needs. They seem to prefer a soil Ph of from 5 to 7.5 but have seen them on soils up to a PH of 9 with a reduced growth rate and density.

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HEIGHT AND GROWTH RATES

The Norway Spruce can grow 2-3+ feet per year their first 25 years under good conditions, in heavy or poor soils they may average 1 foot per year. Soil, moisture, and adequate sunshine is everything to a plant and its growth rate. On a perfect weather year, and no competition from grass or weeds, we have seen over 6 ft of growth in one year! This spruce if given sufficient room to grow will easily grow to over 100 feet tall and be 40 feet wide with spreading branches at the base and will live over 100 years.

This is not a tree for a small yard! Although they do best in full sunshine they can tolerate some shading up to 50% and still survive but the growth rate and density will be reduced. The Norway spruce has a fiberous deep spreading root system that makes this tree very wind firm able to withstand winds up to 100MPH.

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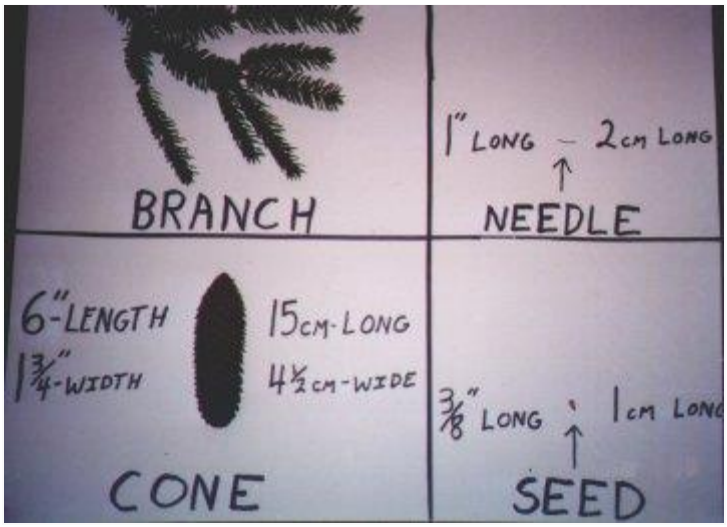
CHRISTMAS TREE

Every year at Christmas time, a tree is placed in the Rockefeller center in New York City. They look for the largest, most beautiful tree they can find. Year after year there favorite is the Norway Spruce. Its strong branches are able to hold up the thousands of lights and ornaments, and being outside the needles stay on the tree for a long time. The tallest tree ever used was a 100-foot Norway Spruce from Killingworth, Conn. in 1948. After X-mas the tree is cut into lumber and used to build a house.

USES



The Norway Spruce is the most widespread, fastest growing, largest and most disease resistant spruce in the northern hemisphere. It is used extensively for windbreaks through out Canada and the United States. It can tolerate much winds and still grow well.

Norway Spruce makes an excellent timber tree and is used extensively for reforestation in many areas.

In the past Norway Spruce was used extensively for the Christmas tree industry. They grew fast, and with a little shearing and the dark green color they looked like the perfect Christmas tree. Unfortunately they have lost

favor as they do not hold their needles well after being cut. They can all fall off after only 2 weeks of being in the house!

The Norway Spruce also makes an excellent Specimen tree if given sufficient room. Although not as formal as many of the other spruces in it's natural growth habit, if a person trims the tree lightly every few years and with its dark green color it has no rivals for beauty. Due to their long life the old trees carry a certain character that has a beauty that is all there own.

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DISEASES AND PESTS

The Norway Spruce is the most disease resistant spruce and is effected by few insects, none that are serious. In Europe there is the Spruce Beetle that effects the Norway Spruce, click here for information on our recent fact finding trip to Germany in search of this insect. It is not the preferred species for browse by most animals. Deer may take a bite but usually spit out the branch as it does not taste well. Buck deer will rub there horns on trees during the rut and can extensively damage a tree. The damaged tree can usually be saved by tying up a good branch that will then become a new leader. This is usually better than replacing a tree.

Damage done by Rabbits

But in a severe winter or when excess numbers of animals exist, severe browsing of the green foliage can take place. Repellants can help but not if the animals are really hungry. Removal of animals or relocating them to other areas may be the only choice. Rabbits are easily caught in live animal traps. After the trees are bigger, animals can be welcomed back into the area.

In the picture to the right this a Norway Spruce that has had its bottom branches severely eaten by rabbits during the long winter we had here in Iowa in 2001. The Norway spruce will grow back quite well with only light browsing, (tips only) but the bottom branches shown here will not grow back. Do not let this happen to your trees, Take action.

Taken from: www.NorwaySpruce.com

Fact Sheet ST-448
October 1994

Picea abies
Norway Spruce[1]

Edward F. Gilman and Dennis G. Watson[2]

INTRODUCTION

Norway Spruce can grow 80 to 100 feet tall and spread 25 to 40 feet, though some listed cultivars are shrublike (Fig. 1). Small-diameter branches sweep horizontally from the straight trunk which can grow to four feet thick. Branchlets droop from the branches toward the ground in a graceful, weeping fashion forming a delicate pyramid. On very old specimens the lower branches increase to 12" or more in diameter and the top becomes open. Many small-diameter roots originate from the base of the trunk and they are often found fairly close to the surface of the soil. The root system is shallow and often dense, particularly close to the trunk which makes growing grass difficult.

GENERAL INFORMATION

Scientific name: *Picea abies*
Pronunciation: PIE-see-uh AY-beez
Common name(s): Norway Spruce
Family: *Pinaceae*
USDA hardiness zones: 2B through 7A (Fig. 2)
Origin: not native to North America
Uses: screen; specimen; no proven urban tolerance
Availability: generally available in many areas within its hardiness range

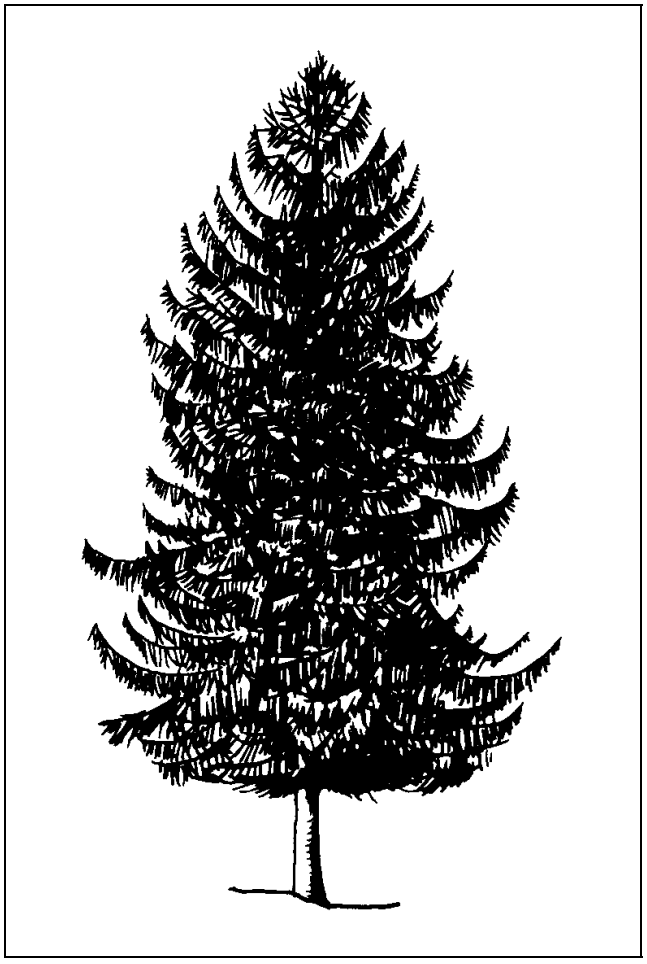

Figure 1. Mature Norway Spruce.

DESCRIPTION

Height: 80 to 100 feet
Spread: 25 to 40 feet
Crown uniformity: symmetrical canopy with a regular (or smooth) outline, and individuals have more or less identical crown forms
Crown shape: pyramidal
Crown density: moderate
Growth rate: slow
Texture: fine

1. This document is adapted from Fact Sheet ST-448, a series of the Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: October 1994.

2. Edward F. Gilman, associate professor, Environmental Horticulture Department; Dennis G. Watson, associate professor, Agricultural Engineering Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

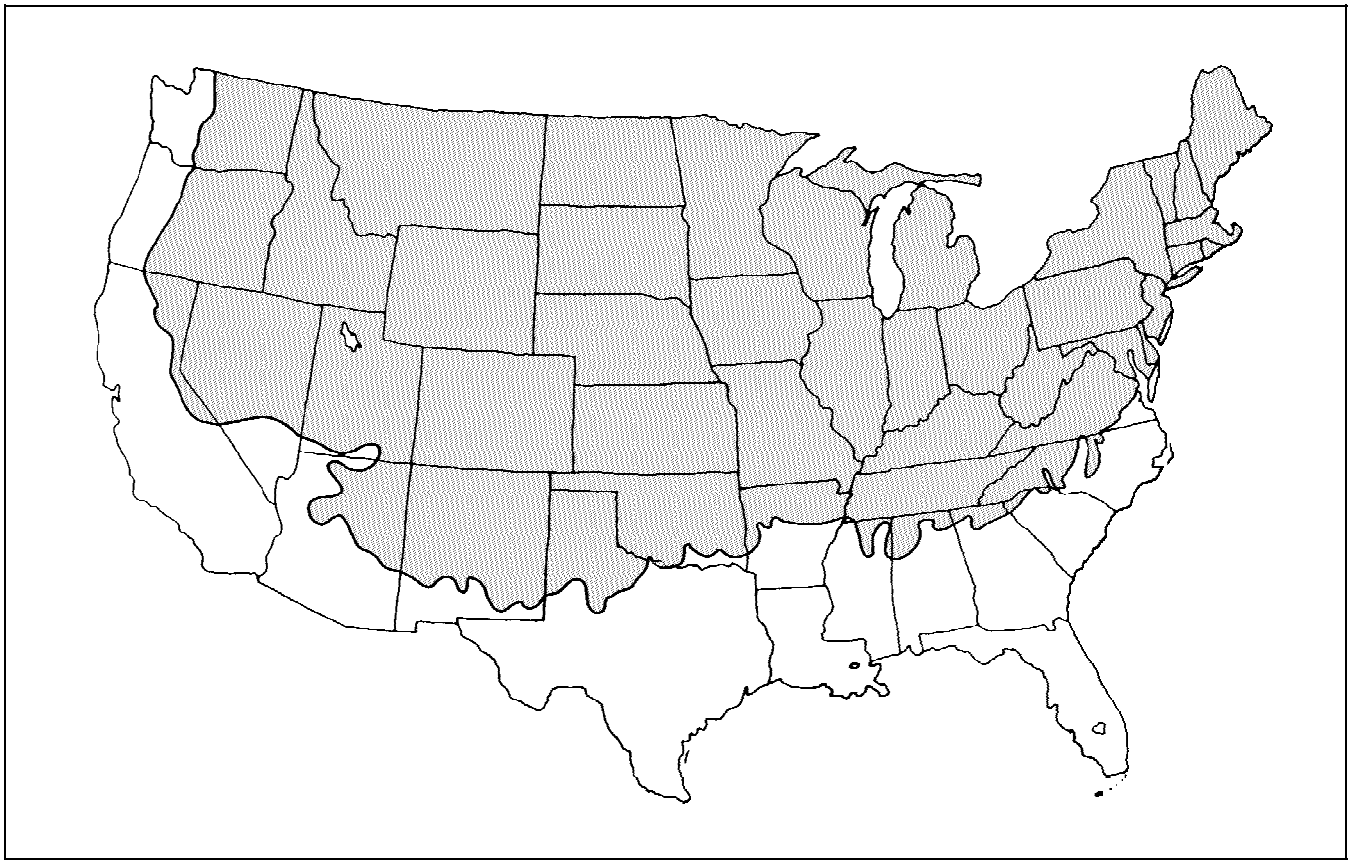

Figure 2. Shaded area represents potential planting range.

Foliage

Leaf arrangement: alternate; spiral (Fig. 3)
Leaf type: simple
Leaf margin: entire
Leaf shape: needle-like (filiform)
Leaf venation: parallel
Leaf type and persistence: evergreen; needle leaf evergreen
Leaf blade length: less than 2 inches
Leaf color: green
Fall color: no fall color change
Fall characteristic: not showy

Flower

Flower color: pink
Flower characteristics: inconspicuous and not showy

Fruit

Fruit shape: elongated; oval
Fruit length: 3 to 6 inches
Fruit covering: dry or hard
Fruit color: brown
Fruit characteristics: does not attract wildlife; no significant litter problem; persistent on the tree; showy

Trunk and Branches

Trunk/bark/branches: droop as the tree grows, and will require pruning for vehicular or pedestrian clearance beneath the canopy; not particularly showy; should be grown with a single leader; no thorns
Pruning requirement: needs little pruning to develop a strong structure
Breakage: resistant
Current year twig color: brown
Current year twig thickness: medium

Culture

Light requirement: tree grows in full sun
Soil tolerances: clay; loam; sand; slightly alkaline; acidic; occasionally wet; well-drained
Drought tolerance: moderate
Aerosol salt tolerance: moderate
Soil salt tolerance: poor

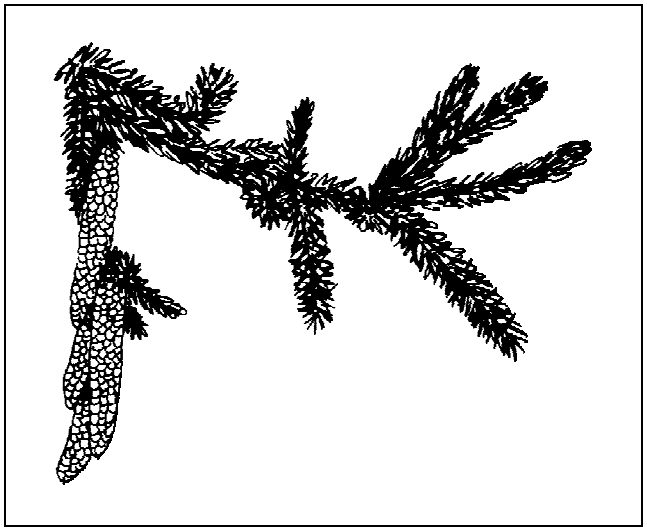

Figure 3. Foliage of Norway Spruce.

Other

Roots: surface roots are usually not a problem
Winter interest: no special winter interest
Outstanding tree: not particularly outstanding
Invasive potential: little, if any, potential at this time
Ozone sensitivity: tolerant
Verticillium wilt susceptibility: not known to be susceptible
Pest resistance: very sensitive to one or more pests or diseases which can affect tree health or aesthetics

USE AND MANAGEMENT

Norway Spruce is best used as a specimen in a lawn area or as a wind break or screen, planted on 20-foot-centers. Rockefeller Center in New York City erects a Norway Spruce each Christmas next to the skating rink and decorates it for the holiday season.

Norway Spruce tolerates most soils if moist and transplants easily if balled and burlapped or potted. Trees subjected to drought are much happier if they receive periodic irrigation although they tolerate drought well.

There are a number of cultivars of Norway Spruce. Some are dwarf and shrublike, while others are trees. Not all will be available in nurseries. Cultivars include: 'Clanbrasiliana' - dwarf, about four feet tall and twice as wide; 'Columnaris' - narrow, columnar; 'Echiniformis' (Hedgehog Spruce) - a rounded dwarf, broad; 'Gregoryana' - rounded, broad, about three feet tall but much wider, slow-growing; 'Humulis' - about two feet tall; 'Inversa' - 40 to 50 feet tall, drooping habit; 'Maxwelli' - four feet tall and 10 feet wide, slow-growing, dense; 'Nidiformis' - dwarf, very dense mound; 'Nigra' - densely branched, dark green; 'Pendula' - weeping; 'Procumbens' - flat, dense, can be three feet tall; 'Pumila' - spreading, about four feet tall; 'Pygmea' - conical, slow-growing; 'Pyramidata' - narrow, slender pyramid; 'Reflexa' - branchlets pendulous, one foot high but 10 feet wide; 'Repens' - flat and prostrate, less than three feet tall but quite wide; 'Stricta' - slender, spirelike, 40 to 50 feet tall, eight feet wide.

Pests

Mites are the worst problem, and in hot weather they can build to populations which require control. They can be a major problem in summer after hot dry weather, especially near concrete, buildings, and other urban surfaces which reflect heat. The small insects can't be readily seen with the naked eye. The first noticeable symptoms are yellowing at the base of the oldest needles on infested branches. Close inspection with a magnifying glass will confirm the presence of the mites.

Two gall-forming insects commonly attack Spruce. Eastern Spruce gall adelgid forms pineapple like galls at the base of twigs. Galls caused by Cooley's Spruce gall adelgid look like miniature cones at the branch tips. The gall adelgids do not kill trees unless the infestation is heavy. A few galls on a large tree are not serious.

Bagworms make a sack by webbing needles and debris together. Small numbers may be picked off by hand or use *Bacillus thuringiensis*.

In northern climates, Spruce budworm larvae feed on developing buds and young needles. The yellowish brown caterpillars are difficult to see.

The Spruce needle miner makes a small hole in the base of a needle then mines out the center. Dead needles are webbed together and can be found on infested twigs. Hand pick these from the tree to reduce future damage.

Pine needle scale is a white, elongated scale found feeding on the needles only. Populations would have to be quite high to cause major damage.

Sawfly larvae may feed on the needles. One infestation will usually not kill the tree, but there may be two or more generations per year.

Borers can infest trees which are weakened by other problems.

Diseases

Cytospora canker infects a branch then eventually kills it. The lower branches are attacked first then progressively higher branches. The needles turn brown to reddish brown and eventually drop off. White resin patches are seen on infected branches. Prune off infected branches. Water Spruces during dry weather.

Spruce may be attacked by needle casts. One causes needles to turn yellow or brown and drop off. Another affects the lowest needles first then moves up the tree. Infected needles are a mottled yellow.

Several rust diseases attack Spruce but these are rarely seen. Infected needles turn yellow and drop off.

References

MSU Animalrangeextension.montana.edu. 2013. *Siberian and Manchurian Crabapple - wildlife habitat*. [online] Available at: http://animalrangeextension.montana.edu/articles/forage/Plants/Crabapple.htm [Accessed: 2 Nov 2013].

MNDOT Dotapp7.dot.state.mn.us. 2013. *Plant Selector*. [online] Available at: http://dotapp7.dot.state.mn.us/plant/ [Accessed: 2 Nov 2013].

DUTCH Dutch Growers Plant Finder. 2013. *Carmine Jewel Cherry (Prunus*. [online] Available at: http://plants.dutchgrowers.ca/11040002/Plant/1830/Carmine_Jewel_Cherry [Accessed: 2 Nov 2013].

DUTCH Dutch Growers Plant Finder. 2013. *Mayday (Prunus padus) at Dutch Growers Garden Centre*. [online] Available at: http://plants.dutchgrowers.ca/11040002/Plant/345/Mayday [Accessed: 2 Nov 2013].

FG Finegardening.com. 2013. *Trees - Plant Guide - Fine Gardening*. [online] Available at: http://www.finegardening.com/PlantGuide/PlantFinder.aspx?274=16384 [Accessed: 2 Nov 2013].

ND Herman, D. 2013. *N.D. Tree Handbook*. [online] Available at: http://www.ag.ndsu.edu/trees/handbook/ndhand-1.htm [Accessed: 2 Nov 2013].

UConn Hort.uconn.edu. 2013. *Corylus americana*. [online] Available at: http://www.hort.uconn.edu/plants/c/corame/corame1.html [Accessed: 2 Nov 2013].

PDW http://climbers.lsa.umich.edu. 2013. Untitled. [online] Available at: http://climbers.lsa.umich.edu/wp-content/uploads/2013/07/VitiripaVITAFINAL.pdf [Accessed: 2 Nov 2013].

USFS Lootens, J. 2013. *Treesearch - Forest Service Research & Development*. [online] Available at: http://www.treesearch.fs.fed.us/ [Accessed: 2 Nov 2013].

MW Minnesotawildflowers.info. 2013. *Rosa arkansana (Prairie Rose): Minnesota Wildflowers*. [online] Available at: http://www.minnesotawildflowers.info/tree-shrub/prairie-rose [Accessed: 2 Nov 2013].

MBG Missouribotanicalgarden.org. 2013. *Plant Finder*. [online] Available at: http://www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx [Accessed: 2 Nov 2013].

NS.Com Norwayspruce.com. 2013. *NorwaySpruce.com - World Wide resource for Norway Spruce*. [online] Available at: http://norwayspruce.com/ [Accessed: 2 Nov 2013].

NRCS PMP Nrcs.usda.gov. 2013. *USDA NRCS - Natural Resources Conservation Service*. [online] Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/conservation/ [Accessed: 2 Nov 2013].

OHDNR Ohiodnr.com. 2013. *Ohio Trees - Black Cherry*. [online] Available at: http://ohiodnr.com/forestry/trees/cherry_bk/tabid/5351/Default.aspx [Accessed: 2 Nov 2013].

PFAF Pfaf.org. 2013. *Database Search*. [online] Available at: http://www.pfaf.org/user/plantsearch.aspx [Accessed: 2 Nov 2013].

NRCS PFS/PG Plants.usda.gov. 2013. *Fact Sheets & Plant Guides |USDA PLANTS*. [online] Available at: http://plants.usda.gov/java/factSheet [Accessed: 2 Nov 2013].

LIND Search.linders.com. 2013. *NetPS Error Handler Message*. [online] Available at: http://search.linders.com/12070003/Plant/4029/Woodbine [Accessed: 2 Nov 2013].

TFC *Trees for Conservation a buyer's guide*. 2008. 2nd ed. Fort Collins, CO: Colorado State Forest Service, Colorado State University.

SCHMIDT Jfschmidt.com. 2013. [online] Available at: http://www.jfschmidt.com/pdfs/JFS_CRAB_CHART.pdf [Accessed: 2 Nov 2013].

UWis Fyi.uwex.edu. 2013. [online] Available at: http://fyi.uwex.edu/sewmg/files/2011/02/PPtsHawthorn.pdf [Accessed: 2 Nov 2013].

PADD Dpi.nsw.gov.au. 2013. Untitled. [online] Available at: http://www.dpi.nsw.gov.au/agriculture/resources/private-forestry/paddock-plants/Salix-babylonica-Weeping-Willow.pdf [Accessed: 2 Nov 2013].