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Pines in the Arboretum

Pines are probably the best known of the conifers native to the northern hemisphere. They occur naturally from the uplands in the tropics to the limits of tree growth near the Arctic Circle and are widely grown throughout the world for timber and as ornamentals. In Minnesota we are limited by our climate to the more cold hardy species. This review will be limited to these hardy species, their cultivars, and a few hybrids that are being evaluated at the Arboretum.

Pines are readily distinguished from other common conifers by their needle-like leaves borne in clusters of two to five, spirally arranged on the stem. Spruce *(Picea)* and fir *(Abies)*, for example, bear single leaves spirally arranged. Larch *(Larix)* and true cedar *(Cedrus)* bear their leaves in a dense cluster of indefinite number, whereas juniper *(Juniperus)* and arborvitae *(Thuja)* and their related genera usually bear scalelike or needlelike leaves that are opposite or borne in groups of three. Unlike other conifers that mature their seeds in one growing season, pine seeds require two seasons, and even a rare third, to reach maturity. The 31 or more species of pines that are hardy in Minnesota offer a wealth of horticultural diversity. They range in size from prostrate shrubs to trees of truly impressive height and diameter; specimens of eastern white pine over 200 feet tall and 6 feet in diameter at the base are on record.

Most pines are readily cultivated, adapting themselves to a wide variety of cultural conditions as long as climatic tolerances of the species are observed. Pines are drought tolerant and some species are known for their ability to grow well on poor soil that will not support other trees.

Unfortunately, pines are subject to a number of disease and insect problems. White pine blister rust is perhaps the most serious disease problem, especially in northeastern Minnesota where it is quite common. This fungus disease, which has currants and gooseberries as the alternate host, attacks most of the soft or five-needle pines. It can be controlled partially in ornamental plantings by pruning out and destroying infected branches.

Insect pests include the white pine weevil, various pine shoot moths, sawflies, and scale insects. The weevil and pine shoot moth can be controlled by pruning out and destroying wilted shoots that contain the larvae. For control of sawflies and scale insects, see *Controlling Insect Pests of Shade and Ornamental Trees,* Entomology Fact Sheet No. 28.

The yellowing of pine needles in the fall generates many calls to the Arboretum. This is not normally a disease symptom, but merely indicates that the tree is shedding its oldest needles. Pines vary in length of time needles are retained on the branches. Some lose their needles the fall of the third year, but others such as the foxtail pines retain their needles for 10 years or more.

The genus *Pinus* is divided into hard and soft pines based on the hardness of wood, fundamental leaf anatomy, and other characteristics. The soft or white pines usually have needles in clusters of five with one vascular bundle visible in cross sections. Most hard pines have needles in clusters of two or three with two vascular bundles visible in cross sections. For the discussion here, however, this natural division will be ignored and an alphabetical listing of species will be used. Where necessary for clarity, reference will be made to the proper groups of particular species.

Of the more than 90 species of pine, the following 31 are or have been grown at the Arboretum. It should be noted that many of the following comments and recommendations are based primarily on observations made at the University of Minnesota Landscape Arboretum, and plant performance could differ at other locations.

Pinus cembra (Swiss Stone Pine) is well suited for small yards because it grows slowly and will not grow out of scale with the house and other plantings.

Pinus albicaulis (Whitebark Pine). This pine grows only at elevations of more than 5,000 feet in the Rocky Mountains from Alberta and British Columbia south to Colorado and Nevada. The tree grows slowly and is only a shrub at the timberline. At the present we have no mature plants of this species (as ours were found to be *Pinus flexilis* or limber pine). Mature trees can be distinguished by the creamy white, scaly bark and the cones that, unlike the limber pine, do not open when mature. New plants of this species have been propagated and hopefully will prove hardy, since the whitebark pine is native to areas having similar climate to ours.

Pinus aristata (Bristlecone Pine). This plant is a shrub or small tree found at elevations of more than 7,500 feet in Colorado, Arizona, and New Mexico. Unlike most other pines the needles remain on the branches 10-12 years, producing an interesting foxtail effect. Another distinguishing feature is that the leaves exude small drops of white resin that dry on the leaves and look much like pine needle scale. The bristlecone pine is hardy here but does not grow as well as it does in its native habitat, probably because of our hot, humid summers. This pine should be planted only on dry sites with good drainage.

Pinus armandii (Armand Pine). Native to China, Taiwan, and Korea, this pine has not done well in the Arboretum. We have been unable to locate a seed source that produces hardy plants. The trees that have survived here usually winter burn badly and have poor color throughout the year. The Armand pine is not recommended for planting.

Pinus ayacahuite (Mexican White Pine). The Mexican white pine is similar to the eastern white pine when young. Older plants produce spectacularly large cones when the plant grows successfully. Two trees planted in the Arboretum in 1962 are now more than 15 feet tall; however, this pine is not completely hardy and usually has some winter injury.

Pinus balfouriana (Foxtail Pine). Native to the mountains of California, this pine has been acquired recently and needs to be evaluated further.

Pinus banksiana (Jack Pine). The jack pine occurs from the tree line near the Arctic Circle south to Minnesota and east to New York. Its irregular form, short needles, and small twisted cones that point toward the branch tips help distinguish this tree from other two-needle pines. Its picturesque habit makes it suitable for use in Japanese gardens. Jack pine is native to areas with sandy soil, but it also grows well on heavier soils. In addition, seedlings of jack pine witches brooms have produced many dwarf types that are being evaluated at the Arboretum.

The **Uncle Fogey** jack pine **(Pinus banksiana** 'Uncle Fogey') is an interesting sprawling or weeping form of this species that has been propagated from a tree found in Richfield, Minnesota, by the late Albert G. Johnson, formerly on the staff of the Arboretum.

Pinus bungeana (Lacebark Pine). Plants of this Chinese pine survived for up to nine years in the Arboretum before dying of winter injury. Where the lacebark pine grows well it usually forms a small, multistemmed tree with attractive, white exfoliating bark.

Pinus cembra (Swiss Stone Pine). This choice five-needle pine is native to the mountains of central Europe at elevations of 4,000 feet - 8,000 feet. It has beautiful dark green color and a dense pyramidal form when young. The tree grows slowly and is well suited for small yards because it will not grow out of scale with the house and other landscape plantings.

Pinus cembra 'Sibirica' (Siberian Stone Pine) is a nicely shaped, pyramidal tree that is well adapted for planting in Minnesota as far north as the Twin Cities.

Pinus cembra 'Sibirica,' the Siberian stone pine, is a botanical variety of the species native to the Taiga regions of Siberia. Trees of this variety have formed nicely shaped, pyramidal trees in the Arboretum. Both plants are well adapted for planting at least as far north as the Twin Cities.

Pinus cembroides edulis (Colorado Pinyon Pine). This two or three-needle pine, native from southern Wyoming to Mexico, produces large edible seeds called pinyon nuts. Although the pinyon pine is native to areas having a harsh winter climate similar to ours, all of our plants have died due to winter injury. This may be due to the fact that our warm, humid weather in late summer and early fall interferes with hardening of the plant. We plan to try more plants of this species using seed from high elevations in the northern extremes of its natural range.

Pinus contorta latifolia (Lodgepole Pine). The lodgepole pine occurs from the Black Hills north nearly to the Arctic Circle and west to the Pacific Ocean. This species is usually a narrow, tall tree and although hardy here, it has no particular horticultural merit. We are also evaluating hybrid pines resulting from crossing the lodgepole pine with the jack pine.

Pinus densiflora (Japanese Red Pine). This interesting pine from Japan develops a characteristic flat topped form as it ages, which, when combined with the reddish brown, peeling bark, gives the tree a desirable ornamental effect. Our trees at the Arboretum were grown from seeds of trees growing at the Cloquet Forest Research Center in northern Minnesota; their original seed source was Korea. This strain of Japanese red pine is completely hardy. Our plants are doing well, some having reached heights of 12-15 feet. This pine is recommended for landscape plantings.

We are also growing **Pinus densiflora** 'Pendula,' a weeping form that is not as hardy as the species, and **Pinus densiflora** "Umbraculifera," a spreading dwarf form that usually winter burns badly every year.

Pinus flexilis (Limber Pine). This five-needle pine, native to the western United States, is distinctive in that its needles often are curved and twisted around the ends of the branches. Young plants of this species are usually narrow and pyramidal, but as the plant ages it becomes broader and somewhat flat-topped. This hardy pine deserves to be used more in landscape plantings because of its good color and form and the interesting effect of the twisted needles.

Pinus flexilis (Limber Pine) has distinctive needles that often are curved and twisted around the ends of the branches.

Pinus halepensis stankewiczii (Stankewis Jerusalem Pine). A single plant of this native of the Crimean peninsula was obtained from the U.S. National Arboretum in 1969. This tree is now seven feet tall and has a dense, flattened, oval shape and good color. It has been hardy so far, but additional plants and time are needed for further evaluation.

Pinus koraiensis (Korean Pine). This is an attractive tree that has been grown at the Arboretum since 1962. Some plants are now more than 12 feet high. The Korean pine has attractive, large cones that contain edible seeds. The plants have good green color and only slight susceptibility to winter burn. This pine is recommended for planting.

Pinus longeava. This pine is closely related to **Pinus aristata,** differing in that the branches are spreading and pendulous instead of spreading and ascending. It is native to high elevations in Utah, Nevada, and eastern California. Trees of this species growing in California are reported to be more than 4,000 years old. Our plants are only four years old and need to be evaluated further.

Pinus monticola (Western White Pine). This tree is the western equivalent of our native eastern white pine, differing in that the needles are stouter and stiffer and the cones much longer. We have been unable to obtain plants that weren't either killed by white pine blister rust or severely damaged by winter injury. We should try to obtain seeds from high elevations in the northern extremes of the species' natural range.

Pinus mugo (Swiss Mountain Pine). This small pine, found in mountains from Spain east to the Balkans, is either a short tree or a multistemmed shrub. If left to grow into its natural form, the plant will reach a mature height of 10-12 feet. The variety **P. mugo mugo** is a more compact form of the species and is widely sold in the nursery trade for landscape and foundation plantings. These pines are completely hardy and are recommended for planting.

Pinus nigra (Austrian Pine). This fast growing, two-needle pine has done very well at the Arboretum. Trees are hardy, develop a nice green color, and are available from many nurseries. The Austrian pine is also one of the most salt tolerant pines and does well in city plantings. The variety **P. nigra** 'Caramanica,' the Crimean pine, does not appear to be as hardy as the species and has suffered some winter injury.

Pinus parviflora (Japanese White Pine). This short growing pine is recognized by clusters of tufted needles toward the branch tips and the small cones borne even on young trees. Most of our plants have been hardy, but two trees suffered severe needle burn this past winter. The Japanese white pine has potential but should be further evaluated before being recommended.

Pinus peuce (Macedonian Pine). This pine is native to the Balkan countries and is similar in growth habit to the Himalayan pine. The oldest plants in the Arboretum, planted in 1964, are now more than 12 feet tall and have an attractive upright form and good green color. This pine is recommended for trial use in Minnesota.

Pinus ponderosa (Ponderosa Pine). This pine is found throughout the western United States and is an important timber species. The number of needles in each fascicle varies from two to five with most having two or three. The ponderosa pine has

long, thick, dark green needles and attractive, lighter colored, contrasting cones. The tree is hardy and recommended for planting.

Pinus pumila (Japanese Stone Pine). Plants of this dwarf spreading pine have done well in the Arboretum's dwarf conifer collection but should be evaluated further before being recommended.

Pinus pungens (Table Mountain Pine). This pine is native to mountainous areas of the eastern United States. Our trees have had winter injury most years and are very chlorotic. This species is not recommended for planting.

Pinus resinosa (Red Pine). This two-needle pine is the state tree of Minnesota. It grows throughout the lake states, southeast Canada, and New England and is noted for being an extremely uniform, straight, fairly fast growing tree. In addition, this pine is relatively free of serious disease or insect problems. The red pine is recommended for planting throughout Minnesota except on some heavy alkaline soils.

We are also growing dwarf red pines planted from seeds of witches brooms, two different upright selections, and a globe form of the red pine. These will be evaluated further in coming years.

Pinus rigida (Pitch Pine). This native of the eastern United States differs from other pines in that it sprouts from adventitious buds on stems and branches, and cut or burned stumps will sprout and form new plants. The trees in the Arboretum often are severely burned in the winter and have poor color throughout the year. The pitch pine is not recommended for planting.

Pinus strobus (Eastern White Pine). This beautiful native Minnesota species grows throughout the Great Lakes region and east to Newfoundland and Tennessee. The white pine was once the most valuable timber tree in North America and still is an important ornamental and forest species. This pine is recommended for planting, although it is sometimes injured by sulfur dioxide air pollutants and salt. Also, the white pine should not be planted in extreme northeastern Minnesota where white pine blister rust is a problem.

We are also growing the following cultivars of the eastern white pine:

P. strobus 'Brevifolia' – Dwarf Eastern White Pine.

P. strobus 'Broom' – Dwarf seedlings from witches brooms.

P. strobus 'Contorta' – Contorted Eastern White Pine. This plant has twisted branchlets and needles and is hardy here.

P. strobus 'Fastigiata' – Pyramidal Eastern White Pine.

P. strobus 'Pendula' – Weeping Eastern White Pine. Plants of this cultivar obtained from the Arnold Arboretum in Boston are growing very well at the Arboretum.

Pinus sylvestris (Scotch Pine). The Scotch pine is native not only to Scotland but throughout Europe. The thin, reddish brown, scaly bark on the upper part of the tree is characteristic. In addition, this pine often develops a multiple branched top creating a broad, spreading crown. Needle color varies from green to shades of bluish-green. The Scotch pine is completely hardy, and the interesting form and color of the plant makes it a good landscape specimen. Two cultivars are being grown:

P. sylvestris 'Fastigiata' – An extremely columnar form with blue color.

Pinus tabuliformis (Chinese Pine) lends itself well to landscape designs because of its irregular form and many attractive cones.

P. sylvestris 'Watereri' – A columnar form of the Scotch pine. Our plants are young and need to be evaluated further.

Pinus tabuliformis (Chinese Pine). Hardy trees of this species have been propagated from plants at Carleton College in Northfield, Minnesota, and from the Morton Arboretum in Lisle, Illinois. This pine, which has an irregular form that lends itself well to landscape designs, has good color and produces many attractive cones. This species is recommended for planting, although it can winter burn in severe winters.

Pinus virginiana (Virginia Pine). Plants of this species survived for 10 years but usually were injured each winter. All of the Arboretum's plants are now dead.

Pinus wallichiana (Himalayan Pine). Native to the Himalayan mountains, this five-needle pine is noted for its tall, graceful form; its long, thin, drooping needles; and its numerous cones that produce a pleasing ornamental effect. Himalayan pines planted in the Arboretum in 1962 are now more than 20 feet high. While needles burn in severe winters, the plants recover and continue to grow well.

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