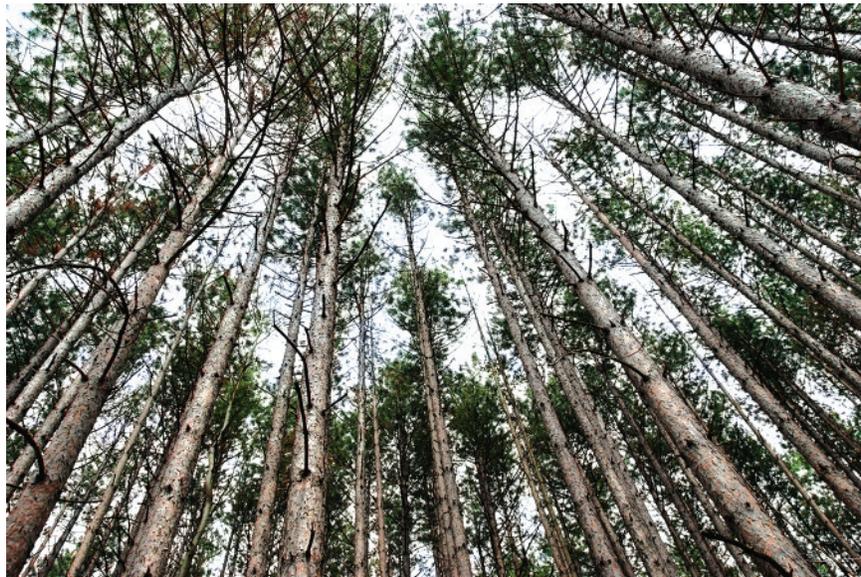


Forest Types of Michigan

Red Pine

MSU Forestry Extension Team

Red pine forests cover about 1.6 million acres across Michigan.¹ Red pine might be best known as a premier plantation species, but red pine is native to Michigan and there are many natural stands. Fire is a common precursor for natural regeneration. Plantation forestry in the Great Lakes states has been controversial because of perceptions of low biodiversity, artificial monocultures (forests of primarily a single species) and conversions of areas of hardwoods (broad-leaved trees) to red pine.



Female cone, male cones, and two-needled bundles

The Tree

Red pine (*Pinus resinosa*), also called Norway pine, might live to be more than 200 years old. It is fairly intolerant of shade, requiring full sunlight for optimum growth. There are two long needles (4 to 6 inches long) per bundle, joined at the base by a papery sheath. The mature cones are oval to round and about 1.5 inches across. The bark is scaly with a distinct reddish gray cast. Michigan's largest recorded red pine is 154 feet tall and 39 inches in diameter.²

Successful plantation establishment requires following a well-proven set of practices.

¹ Volumes of species are derived from the USDA Forest Service Forest Inventory and Analysis Data, available at www.fia.fs.fed.us/tools-data.

² Michigan Botanical Society. 1993. Michigan Big Tree Data.

Historically, red pine has been relatively free of major insect and disease pests.

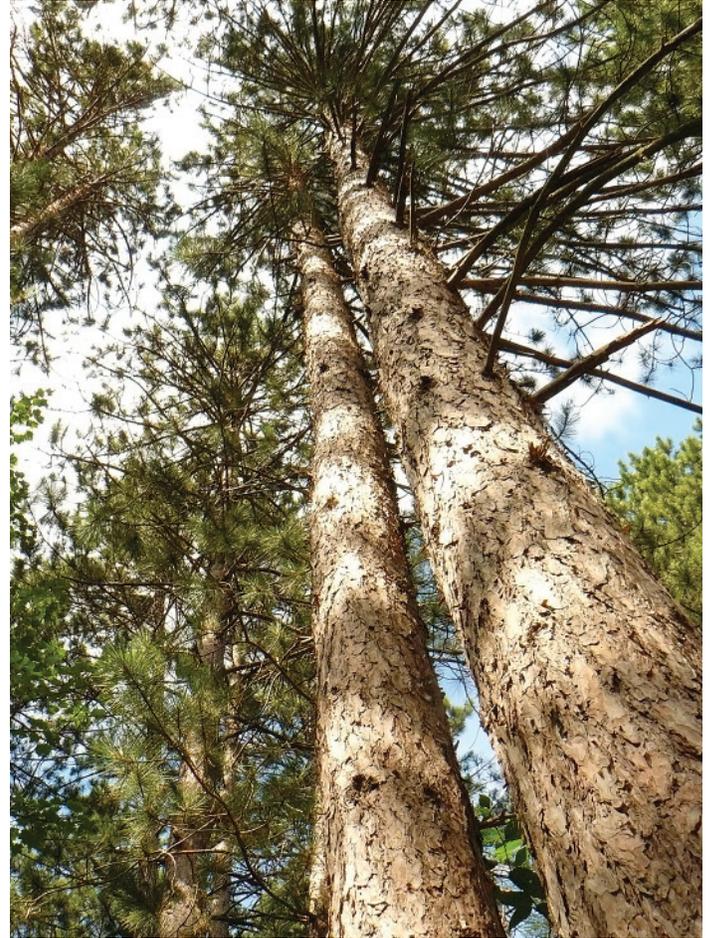
Distribution

The native range of red pine extends from the prairies of Manitoba across Canada to the Atlantic Ocean, and south to central Minnesota and east to parts of Pennsylvania. It is the fourth most common tree species in Michigan, on the basis of volume, and the sixth largest forest type. Because of extensive planting in the early to mid-1900s and natural recovery of burned-over lands, large volumes of red pine are reaching commercial sizes today. Most of Michigan's red pine lies in the northern Lower Peninsula. Red pine naturally occurs mostly on well-drained sandy soils, usually of glacial origin. It grows poorly on wet soils, but water tables should be within 4 feet of the soil surface.

Ecology

Red pine stands tend to run fairly pure to red pine, especially in plantations. About three-fourths of the forest type volume is red pine. The remainder is a mix of mostly white pine, jack pine, red oak, red maple and aspen. Most of Michigan's red pine volume occurs in red pine stands, with significant volumes also in jack pine and aspen stands. Though tree species diversity is sometimes low, the overall forest type is the fifth most diverse in Michigan. More importantly, red pine typically adds missing habitat components to landscapes and so contributes to ecosystem diversity.

Red pine is not a good seed producer, with a bumper crop every 10 to 12 years³ and usually less than half the cones producing viable seed. Historically, fire was the major factor in natural regeneration. Today, however, most red pines are planted. Foresters sometimes use controlled



Mature red pine

underburns to prepare planting sites, reduce brush levels, encourage natural regeneration, and help control certain insects and diseases.

Though it's fairly intolerant of shade, red pine will grow in as much as 50 percent shade. As a result, stands are typically even-aged. A tree produces only one whorl of branches each year, so age is reasonably easy to determine. Red pine is one of Michigan's fastest growing trees and has the ability to sustain rapid wood production given proper management. About one-third to one-half of the tree height should be occupied by live crown for best growth. As live crown length decreases, so does diameter growth (narrower annual rings). Too much live crown when trees reach sawtimber sizes, leaves knots and degrades monetary value. Red pines develop close relationships with naturally occurring root fungi called mycorrhizae, which greatly enhance water and nutrient uptake.

³ Burns, Russell M., and Barbara H. Honkala (technical coordinators). 1990. *Silvics of North America*: 1. Conifers; 2. Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture Forest Service, Washington, D.C. vol.2, 877 p www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm.

Management and Silviculture

Because of difficulties in natural seeding and fire requirements, most red pines are planted. With good management, as few as 500 trees/acre are needed, though planting rates are usually closer to 800. The keys are proper site selection, good site preparation and careful control of competing vegetation for the first five years or so. Seedlings require an area of bare mineral soil. This is especially important when planting old farm fields. This can be achieved by applying herbicides, scarifying the site (exposing bare soil) or by creating furrows. When only a few acres are being planted, spot herbiciding can be used to create patches 4 to 5 feet in diameter on a 9- by 10-foot spacing for 500 trees per acre. Site preparation is best done the year before planting. Proper planting technique is important. Begin with good stock. Planting spruce around the edges will enhance wildlife habitat.

For the next five years or so, seedlings must be kept free of competing grasses, forbs and woody shrubs. This is most easily accomplished with herbicides. Glyphosate herbicide is readily available and works in most circumstances. Be certain to follow label instructions. Woody stems can be manually broken and left “hinged”. The most common mistake for first-time tree planters is skimping on site preparation and follow-up treatments. Planters usually make this mistake only once.

Once seedlings are established and heights exceed those of competing vegetation, red pine will grow rapidly on a proper site. Within about 20 to 25 years, the canopy will close, and lower branches will naturally prune themselves. When live crown lengths become less than 40 percent of tree height, schedule a thinning. Thinning every 10 to 15 years

will maintain proper crown lengths and optimize healthy growth. Red pine is quite sensitive to crowding and trees will essentially starve to death if they have to compete for light and nutrients.

Foresters use a measure called “basal area” to assess stand density. Basal area is the number of square feet that stems cut at a height of 4.5 feet would occupy per acre. Several tools are available to measure basal area in field practice.

Pole-sized stands (5- to 10-inch stem diameter at a height 4.5 feet from the ground) should be managed at a basal area of about 90 square feet per acre. Sawtimber-sized stands should be managed at about 120 square feet of basal area.⁴

Where markets are available, pulpwood thinnings work well. In later thinnings, some trees may be sold as small utility poles and fenceposts. Larger trees can be used for lumber, cabin logs and utility poles. Once average diameters reach 10 to 12 inches, stands can be opened up to encourage other species, possibly through underplanting, and create structure for wildlife. Such conditions, however, can foster insect and disease problems. Controlled fire can be used to

reduce understory vegetation, but only under certain weather conditions and with professional assistance.

More than 100 wildlife species utilize upland conifers. When establishing or managing red pine, consider landscape diversity and habitat values.



Mature red pine plantation with an oak understory

⁴ Benzie, J.W. 1976. Manager's Handbook for Red Pine in the North Central States. GTR-NC33. USDA Forest Service. St. Paul, MN.

Tree Health Issues

About 100 insects are known to feed on red pine, but few represent major health issues. Several sawflies, the Saratoga spittlebug (*Aphrophora saratogensis*), Zimmerman pine shoot moth (*Dioryctria zimmermani*), red pine shoot moth (*Dioryctria resinosella*) and mound ants (*Formica exsectoides*) can sometimes cause problems. High densities of white grubs (several genera) can damage seedling roots. Browsing by deer, rabbits, hares and porcupines can eliminate seedlings and deform young trees. Several diseases occasionally damage red pine, especially Scleroderris canker (*Gremmeniella abietina*), Diplodia tip blight (*Sphaeropsis sapinea*) and Sirococcus tip blight (*Sirococcus conigenus*). Young trees are more vulnerable than older trees to rust, root rot and a number of other fungi. Annosum root disease (*Heterobasidion irregulare*) is a serious threat after thinning.

Landowner Tips

- Develop a management plan.
- Use even-aged management with thinning and clearcutting.
- Most new stands should be planted at a 9- by 10-foot spacing — about 500 trees per acre minimum; greater densities are more common.
- Proper site preparation and good weed control are critical for maintaining high survival rates.
- Thinning is essential for good growth and tree health.
- Maintain crown lengths at one-third to one-half of tree height.
- Maintain 90 square feet of basal area in pole-sized stands and approximately 120 square feet in sawtimber stands.
- Hire a forester for advice and contracting.

See the Michigan Society of American Foresters' publication, *Forest Management Guidelines for Michigan*, on their website: <http://michigansaf.org>.