Forest Types of Michigan

MICHIGAN STATE UNIVERSITY | Extension

RED PINE FOREST TYPE

Number 9, May 2013

Red pine forests cover about 1.6 million acres across Michigan (2009).[1] Red pine might be best known as a premier plantation species, but red is native to Michigan and there are many natural stands. Fire is a common precursor for natural regeneration. Plantation forestry in the Lake States has been controversial due to perceptions of low biodiversity, artificial monocultures (forests of primarily a single species), and conversions of hardwood (broad-leafed trees) to red pine. Successful plantation establishment requires following a well-proven set of practices.

The Tree

Red pine (*Pinus resinosa*), also called Norway pine, might live to be 200+ years old. It is fairly intolerant of shade, requiring full sunlight for optimum growth. There are two long needles (4-6 inches) per bundle, joined at the base by a papery sheath. The mature cones are oval to round, 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] Historically, red pine has been relatively free of major insect and disease pests.

Female cone, male cones, and two-needled bundles

Distribution

The native range of red pine extends from the prairies of Manitoba, across Canada to the Atlantic Ocean, and south to central Minnesota to parts of Pennsylvania. It is the fourth most common tree species in Michigan, based on volume, and the sixth largest forest type (2009). From 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 four feet of the soil surface.

Ecology

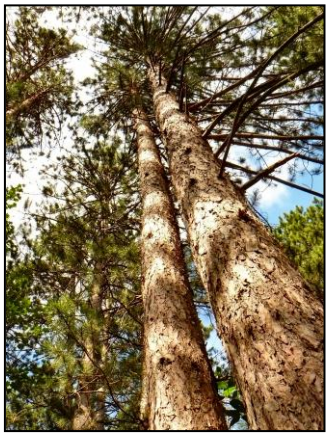
Red pine stands tend to run fairly pure to red pine, especially in plantations. About 3/4 of the forest type volume is red pine. The remainder is a mix of mostly white pine, jack pine, red oak, red maple, and aspen. Most of Michigan's red pine volume occurs in red pine stands, with significant volumes also in jack pine and aspen stands. While 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, contributing to ecosystem diversity.

Red pine is not a good seed producer, with a bumper crop every 10-12 years,[3] and usually less than half the cones producing viable seed. Fire was the major factor in natural regeneration. However, today most red pine are planted. Foresters sometimes use controlled underburns to prepare planting sites, reduce brush levels, encourage natural regeneration, and help control certain insects and diseases.

While fairly intolerant of shade, red pine will grow in as much as 50% shade. As a result, stands typically grow in even-aged conditions. 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 with the ability to sustain rapid wood production given proper management. About 1/3 to 1/2 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, at sawtimber sizes, leaves knots and degrades monetary value. Red pine develop close relationships with naturally occurring root fungi called *mycorrhizae*, which greatly enhance water and nutrient uptake.

Management & Silviculture

Due to difficulties in natural seeding and fire requirements, most red pine are planted. With good management, as few as 500 trees/acre are needed, usually closer to 800. The key is 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, especially important when planting old fields. This can be done by applying herbicides, scarifying the site (expose bare soil), or by creating furrows. With only a few acres, spot herbiciding can be used to create 4-5 foot diameter patches on a 9 by 10 foot spacing for 500 trees per acre. Site preparation is best done the year before planting. Proper

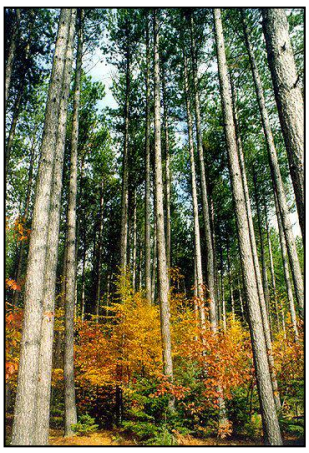


Mature red pine

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. Usually, this mistake is made only once.

Once seedlings are established and heights exceed competing vegetation, red pine will grow rapidly on the proper site. Within about 20-25 years, the canopy will close and lower branches will naturally prune themselves. When live crown lengths become less than 40% 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 will essentially "starve" themselves to death competing for light and nutrients if left unthinned.



Mature red pine plantation with an oak understory

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 (5-10 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 acres. Sawtimber-sized stands should be managed at about 120 square feet of basal area.[4]

Where markets permit, pulpwood thinnings work well. In later thinnings, some trees may be sold as small utility poles and fence posts. Larger trees can be used for lumber, cabin logs, and utility poles. Once average diameters reach 10-12 inches, stands can be opened up to encourage other species, possibly through underplanting, and create structure for wildlife. However, such conditions can foster insect and disease problems. To reduce understory vegetation, controlled fire can be used, but only with exact weather conditions and professional expertise.

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

Tree Health Issues

While about 100 insects are known to feed on red pine, 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 also more vulnerable 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 x 10 spacing, about 500/acre (minimum), greater densities are more common
- Proper site prep & good weed control are critical for maintaining high survival rates
- Thinning is essential for good growth and tree health
- Maintain crown lengths 1/3-1/2 of tree height
- Maintain 90 ft^2 BA in pole-sized stands, ~120 ft^2 in sawtimber
- Hire a forester for advice and contracting

See http://michigansaf.org about Forest Management Guidelines from the Michigan Society of American Foresters.

[1] Volumes of species are derived from the USDA Forest Service, Forest Inventory and Analysis Data [*http://www.fia.fs.fed.us/tools-data*].

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

[3] Burns, Russell M., and Barbara H. Honkala, tech. coords. 1990. Silvics of North America: 1. Conifers; 2. Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol.2, 877 p *http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm*

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