

Willamette Valley Ponderosa Pine- A Primer

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History of Ponderosa Pine in the Willamette Valley

The year was 1852, and white settlement of the Willamette Valley was well underway. The town of Monroe was just getting its start with a new water-powered sawmill. The mill's records indicate that it cut ponderosa pine exclusively for several years until the supply ran out.

Other reports and studies of ponderosa pine in the Willamette Valley paint a picture of ponderosa in scattered pure stands or mixed in groves with Douglas-fir, ash, and oak. Two studies (Hansen, Warona) using pollen counts in deep cores from Willamette Valley bogs track pines' presence for the last 7,000 to 10,000 years. The hypothesis is that lodgepole was the dominant pine until about 7,000 years ago when a major climate shift removed lodgepole and brought in ponderosa pine. Pollen counts covering these 7,000 years indicate that ponderosa pine, while widespread across the valley, has never been the dominant vegetation type.

Undoubtedly there is some connection between indigenous peoples' practice of burning and the distribution of pine in the valley at time of white settlement. Ponderosa pine is very common in other fire-impacted landscapes and is quite tolerant of ground fires, especially when the trees are mature. The frequent ground fires set by native peoples very likely resulted in the widely spaced groves of "yellow pines" (ponderosas), surrounded by grass prairie, which confronted early settlers.

Surveyors, botanists, and historians in the 1850s recorded yellow pines in oak woodlands, on areas subject to flooding, and on foothill slopes and ridges where they were widely spaced and mixed with oak and Douglas-fir. These open stands have been called savannahs.

Willamette Valley ponderosa's genetic difference from ponderosa east of the Cascades was the focus of a pine-race study begun in 1928 (Munger, Silen (unpublished)). The study featured ten seed sources from throughout the western United States, planted on six field sites. Included in the test were seven eastside [i.e., east of Cascades, east of Rockies, east of...?] sources and three westside sources. The westside sources included Peoria (south of Corvallis, along the Willamette River); El Dorado, California, in the Sierras south of Sacramento; and Steilacoom, Washington, near Olympia.

After 65 years, only the westside sources were still alive and actively growing at the Willamette Valley test site near Corvallis [i.e., the Peoria site?]. Trees from eastside sources all appeared poorly adapted for the weather and pest conditions in the Willamette

Valley. The bottom line is that one should not plant ponderosa pine trees from eastside seed sources in the Willamette Valley. While the trees may survive 15 to 20 years, they aren't likely to reach mature size and may become carriers for all sorts of pine pests.

Another lesson from the Willamette Valley test site is that even the trees from westside sources that were still living were not doing very well. This might be expected because the test site was not on a soil and exposure common for pine in the Willamette Valley.

Concern about the dwindling supply of native Willamette Valley ponderosa pines, and the realization that the local source could not be replaced with eastside sources, led to the formation of the Willamette Valley Ponderosa Pine Conservation Association, in 1996. A group of local foresters, landowners, and scientists had been studying the local pines for 15 years and had begun propagating local parent sources. The association seeks to further this work in restoring ponderosa pine to the Willamette Valley through research, education, and increased availability of seed from the local race of pines. To date, more than 400 native stands have been mapped, and about 150 parents have been grafted into a seed orchard near St. Paul, Oregon. The association's work will be complete when landowners can purchase native planting stock readily and when research has shown how best to plant and grow this tree.

Ponderosa pine growing sites in the Willamette Valley

Ponderosas grow on a wide variety of both rural and urban sites throughout the Willamette Valley. Native groves are in Beaverton, in parks and on the grounds of such prominent businesses as Nike. Scattered trees and small groves are found on neglected bottomland farm sites the whole length of the Valley. Along riverbanks, it often is associated with black cottonwood, ash, or bigleaf maple. In the foothills, ponderosas occupy the harshest of forest sites, where Douglas-fir and other species cannot dominate. On sites suitable for other conifers, ponderosa may grow for some time but eventually is shaded out by the taller, more dominant species. Commonly, ponderosas are found in association with Oregon white oak and many times in thick patches of poison-oak

Native ponderosas are commonly found on three general soil types:

1. Poorly drained, heavy clay soils on the valley bottom or in the low foothills
2. Shallow, rocky clay soils in the valley foothills
3. Well-drained, sandy soils in the flood plain of the Willamette River and its tributaries

These soil types represent the low end of growth potential for ponderosa pine. It grows better on soils with good drainage and depth.

Natural stand development

It is difficult to define what normal stand development means for ponderosa pine in the Willamette Valley. Historical stands apparently were either scattered large trees in grassy bottoms or mixed-species stands in the foothills. In either case, the indigenous tribes'

broad-scale burning shaped those forests in ways not available today. Current stands have come about by colonizing neglected areas or soils with severe limitations for other tree species. The stands we see today are much denser than their counterparts in the past. What this means for future development and growth is uncertain, but because ponderosa pine is a shade intolerant species, preferring open spaces, it is likely that the high stocking will be reduced over time either through insect and disease outbreaks, or some weather-related event, or by selective thinning.

Expected growth of Willamette Valley ponderosa pine stands

A study on central Willamette Valley ponderosas (Anderson) reported in 1938 that young ponderosas grew rapidly, but growth rates peaked by about 30 years of age. The small sample of trees had a 20-year-old tree with a 15-inch diameter at breast height (DBH), while a 100-year-old tree was only 34 inches in diameter. A pine races study begun in 1928 (Munger, Silen, unpublished) showed a height growth spurt between 20 and 30 years of age, but the trees from the best seed source in the study have continued to grow well in height up to their last measurement at 65 years of age.

Growth of Willamette Valley Natural Stands

(Source: Max Bennett, unpublished)

Soil Type	Height	Age	Site Index (50)
Bashaw silty clay loam	98	59	92
Dayton silt loam	84	42	98
Dixonville/Hazelair/Philomath	96	98	63
Dupee silt loam	110	56	101
Hazelair silty clay* loam	93	52	92
McBee silty clay loam	104	59	92
Philomath cobbly, silty clay*	87	42	104
Ritner cobbly silty clay loam	101	54	95
Salem gravelly loam	111	63	93
Waldo silty clay loam	83	41	96
Witzel very cobbly loam	92	98	59

* An average of more than one site

Thinning

One genetic trait in the Valley pine population is a wide variance in tree forms. Progeny from various parent trees differ vastly in such characteristics as forking, branch angle, number of branches, and growth rate. By years 5 to 10, characteristics of individual trees in plantations are easily distinguishable, and the landowner can favor trees with characteristics suited to his or her objectives. If timber production is a primary goal, trees

with high wood-to-branch ratios and good growth can be favored in thinning programs. Likewise, in riparian plantings where lots of branching can be advantageous to birds and other wildlife, the heavily branched trees can be favored.

Individual tree spacing- As trees get larger, they need more room to grow. Foresters' rule of thumb for this size-space relationship is based on diameter of the tree at breast height (DBH). For example, a tree 12 inches in diameter might need 16 feet of space to be happy, while a 20-inch-diameter tree might need 24 feet. This often is referred to as a "D+ rule." Although there is no known D+ relationship for ponderosa pine, they likely need a bit more space than Douglas-fir because of their intolerance of shade. Ponderosa might be more comfortable at a minimum spacing of D+2 or D+3. For a 12-inch-diameter tree, this means the next closest 12-inch tree should be at least 14 or 15 feet away. You might want to space your 12-inch trees 18 to 20 feet apart, anticipating that they will continue to grow in diameter over time and eventually get back to the minimum D+2 spacing. Other ways to keep track of tree spacings are on a per-acre basis, either by total number of trees, or some other measure of density such as basal area (the cross sectional area of trees, measured at breast height), or relative density (the amount of basal area present on a given stand compared to the maximum that can possibly grow. For more information on measuring stand density refer to EC 1190, Volume Growth and Yield, Getting the Numbers, published by the OSU Extension Service. As more becomes known about the Valley ponderosas, better per-acre guidelines likely will be developed.

Pruning Valley Ponderosa Pine

The fact that ponderosa is a naturally limby species, combined with the fact that clear pine wood has high value, makes pruning important in young Valley pine stands. For more information on this subject, read the section on harvesting and marketing at the end of this publication.

If done correctly, pruning scars will heal quickly, and the tree will produce a rind of clear, valuable wood outside of the pruning scars. You may also improve the form of young trees because the taper point of the tree is at the base of the live crown, and when you remove live limbs, you are pushing the bottom of the live crown up the tree.

Pruning ideally should begin once the trees reach 10 to 15 feet tall. All lower limbs should be clipped carefully as near the stem as possible without damaging the branch collar. Removing too many limbs in one pruning may impair tree growth, so leave at least 50 percent live crown at all times. For example, if your trees are 16 feet tall, you could prune up at least 8 feet without concern about impairing growth. If you delay limb pruning too long, the limbs will be larger and harder to remove. This will also increase the size of the knotty core of wood in the center of the tree, and reduce recovery of clear wood.

Pruning should be done between the months of September and March to avoid attacks on pruning wounds by pitch moths. You should also plan to pile and burn larger limbs and stems to avoid infestation by bark beetles. For information on potential insect problems make sure that you read the section of this publication dealing with insects that attack

Valley ponderosa pine. For a more complete description of proper tree pruning, refer to “Pruning to Enhance Tree and Stand Value,” EC1457, published by OSU Extension Service.

Pest Management

Valley ponderosas are generally hardy trees, well suited to local conditions and able to tolerate attacks from insect pests. From time to time insect populations increase to the point of killing individual trees or small stands. Maintaining trees in healthy growing condition and avoiding insect buildups through salvaging or other methods is generally the best prescription for avoiding loss due to insect attacks. Native stands of Valley ponderosas seem to be able to tolerate the current array of insects present. Currently, ponderosa pine is widely scattered in the Willamette Valley and usually grows in small groves or as a component of mixed-species stands. Few even-age plantations exist. But this is changing, and with change comes unknown risk, risk that currently benign or minor diseases will be catapulted to significance as our management practices interact with environmental factors. Careful monitoring and prompt action are the best hedges against an insect epidemic. Insects and Diseases of primary importance include:

Red Turpentine Beetle

Dendroctonus valens LeConte

Red turpentine beetle, the largest bark beetle in Oregon, commonly infests ponderosa pine and many ornamental pines grown in the Willamette Valley. Infested trees vary from saplings only a few inches in diameter to old-growth ponderosa pine. Most often, beetles attack trees under stress from drought, flooding, or some other type of site disturbance. Pines can survive the occasional attack, but repeated attacks over several years or attacks in conjunction with other bark beetles often are fatal.

California Fivespined Ips

Ips paraconfusus Lanier

The California fivespined ips (*Ips*) is potentially a threat to managed stands of Willamette Valley ponderosa pine. At present, documented *Ips* infestations in the Valley are confined to scattered attacks on saplings and larger pine. In California and southwest Oregon, populations of this beetle build up in slash and emerge to attack live trees. This species of *Ips* is very aggressive during drought years and often kills the tops of mature trees or clumps of overstocked pole-size pine. As more acreage in the Willamette Valley is planted to ponderosa pine, this beetle is likely to become a significant pest.

Sequoia Pitch Moth

Synanthedon sequoiae (Hy. Edwards)

Sequoia pitch moth causes little serious damage to large trees since larval feeding rarely girdles the trunk or branches. Wounds may cause lumber defects and increase the susceptibility of small-diameter trees to wind breakage. The unsightliness of pitch masses and resin flow on the lower bole are sometimes a concern, as is their possible ignition by ground fires. Repeated attacks over a period of years result in the greatest damage.

Red Band Needle Blight (Dothistroma Needle Blight)

Caused by the fungus *Mycosphaerella pini*; synonyms are *Scirrhia pini*, *Dothistroma septospora*, and *Dothistroma pini*.

Red band needle blight affects many species of pine throughout the world. Damage tends to be most severe in areas with cool, moist weather. Off-site plantings of native or exotic pines often are damaged severely by this disease.

The term “red band” refers to one of the disease symptoms, which is a red-brown band on needles at the point of infection. The disease causes needles to turn brown and eventually drop from the tree. Foliage loss results in growth loss and occasionally can kill young trees. In the Pacific Northwest, damage to ponderosa pine has been spotty and apparently relates to local climatic conditions and suitability of the particular seed source to the site.

Western gall rust (Pine gall rust)

Peridermium harknessii synonym *Endocronartium harknessii*)

Western gall rust is a widespread disease of hard pines caused by a fungus that induces the tree to form woody spherical swellings (galls) on stems and branches. Galls on the main stem seriously degrade lumber value and may provide a point of breakage during windstorms or snow and ice accumulations. Some consider galls on branches to be unsightly in ornamental plantings, and they may harm tree growth. Infections on the main stem of a seedling or sapling can kill the tree.

In the Willamette Valley, Western gall rust has not caused much damage in young plantations, possibly because we have so few young plantations. Observations in mature trees have revealed very heavy branch infection in the upper crowns of many trees but few infections on the main stems. In some areas, the disease has severely damaged KMX pine.

Rodent damage

Good vegetation management before planting trees is the best way to prevent mice and vole damage. When these destructive creatures are allowed the cover of vegetation, they will girdle young seedlings by chewing the bark and cambium. Hoeing, mulching, or spraying around the seedlings after planting can prevent damage. Using Vexar tubes also helps if the tube is tight to the ground. For more information on rodent damage, refer to EC1255 “Controlling Pocket Gopher Damage to Conifer Seedlings,” and EC1256 “Controlling Vole Damage to Conifer Seedlings,” which are both available from the Oregon State University Extension Service.

Porcupine damage

Porcupine damage is becoming more prevalent in the Willamette Valley because of a building population over the last few years. Prevention is difficult because of these creatures' stealth. It's usually too late for a few trees by the time you discover the damage, but you must find the culprit immediately to prevent more damage. Currently there are no repellents that have proven effective on porcupines in the Willamette Valley. Poison baits are available, but they should be used very carefully in order to avoid poisoning non-target species. Hunting or trapping seem to be the best methods of control.

Harvesting and Marketing

This is a good time to restate a few very important basic rules in felling, bucking, and merchandising logs. Do not cut any tree until you have investigated the market and secured a buyer. Once a tree is on the ground, there is no turning back! The marketing process has begun and must be seen through to completion. Once a tree has been bucked, you may have eliminated some markets, and your negotiating position with any remaining buyers has been compromised. Ponderosa pine markets in the area currently are very limited, so it's even more imperative for Valley growers to secure markets before cutting.

It's also important to understand that future markets for trees planted today are uncertain. Who knows what the world will be like in 40-50 years? One hedge against this uncertainty is to plant enough trees of a certain species so that there will be an economically viable volume ready for future harvests. Over the past decade, Willamette Valley ponderosa pine growers have planted about 600,000 trees per year, with the number increasing yearly. Soon, the annual planting in the Valley will be about 1 million trees per year. This number of trees is certainly capable of sustaining future local milling facilities.

For more information on harvesting and marketing considerations refer to EC 1127 "Measuring Timber Products Harvested from Your Woodlands," EC 1384 Selling Timber and Logs: Seven Steps to Success," EC 1487 "How to Manage Your Own Timber Sale: Guidelines for Success," and EC 1190 Stand Volume and Growth: Getting the Numbers.

For More Information:

Contact the Willamette Valley Ponderosa Pine Conservation Association via phone, 503-769-2520 or internet: <http://www.westernforestry.org/wvppca/>. The Association will also sell you a copy of the Valley Ponderosa Pine Management Guide, a full color publication describing the history, and current management of Willamette Valley Ponderosa Pine.