



Watering your trees



Arborvitae (western redcedar or eastern whitecedar cultivars) prefers cool, shaded environments and is not drought tolerant. It does not like crowding but it is often planted in rows in dry, sun-exposed lawns and slowly dies unless irrigated. Drought weakens tree defenses, allowing beetles to move into these trees and finish them off.

Climate change has resulted in long droughts and heatwaves across the state. So our landscape trees could use a little help from irrigation. You can aid them by planting the right tree in the right site and removing grass and other plants nearby that compete for moisture (leave some understory plants to prevent soil drying from sun and wind).

Watering a drought-stressed tree will not bring back yellowing leaves but does prevent the loss of other leaves and death of roots and water transport tissues. Common symptoms of drought in trees are:

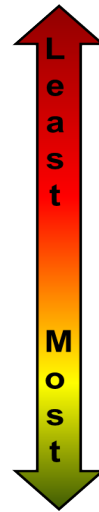
- thinning canopies (premature leaf drop)
- (asymmetrical) uneven crowns
- scorched leaves
- topkill (top of tree dies)
- reduced growth (trunk diameter, needle length)
- overabundant cones or seeds often paired with thin crowns to distinguish from a good seed year

How do trees respond to drought?

Water is collected by roots and moved throughout the tree along a network of tubes (vascular tissues) then released through holes in leaves (stomata) into the air. Hot, dry or windy conditions can increase water loss from leaves. Drought stress kills roots and collapses vascular tissues. It can take many years for trees to rebuild these tissues. During that time they have fewer of these tissues to actively collect and move water throughout the tree.

Trees combat drought by closing stomata to reduce water loss. However, this stops intake of carbon dioxide and thus photosynthesis, which starves the tree and is therefore only a short-term solution. Another strategy is to prematurely drop leaves to reduce the amount of tissues that both need and release moisture. This also reduces photosynthesis. Suppressing photosynthesis both reduces growth and resources for defenses, which makes trees less resilient to other stressors, such as insects, diseases, mechanical damage, etc. For example, pitch is a primary mechanical and chemical barrier against tree-killing bark beetles. However, drought-stressed trees do not have enough moisture for both growth and defense. Because growth always takes priority, defenses are limited. Further, drought-stressed trees release chemicals that indicate when defenses are down, which attracts opportunistic bark beetles.

Most trees have no solution for when water runs short; they simply are not drought tolerant over the long term. Prolonged or repeated droughts often result in death, sometimes years later.



Drought tolerance

- Western hemlock
- True fir (including grand fir)
- Western redcedar
- Birch
- Douglas-fir
- Madrone
- Incense cedar
- Willamette Valley ponderosa pine
- Eastern Oregon ponderosa pine
- Oregon white oak



Watering guidance

- Encourage healthy root development from the start by preventing drought or heat stress in seedlings. During planting keep trees cool and roots moist.
- Irrigation in the first 3-5 years is most important for young tree establishment. After that a network of roots is often established enough to absorb natural moisture. Most trees native to Oregon have the majority of their water-absorbing roots in the upper 12-18 inches of soil.
- Hand-watering, drip irrigation, soaker hoses, or passive irrigation (e.g., Tree-Gator-type watering bags, or 5-gallon buckets with small holes at the base set around the root zone) are preferred watering methods.
- Water around the root base or within the drip line (i.e., the area directly below the tree canopy).
- Trees need long, slow and deep watering to encourage deeper root growth. They get less benefit from a large dump of water or frequent, shallow watering.
- The larger the tree, the more water is needed, although larger trees may have more extensive root systems to access moisture deeper in the ground.
- A sprinkler set to water a lawn is typically not enough to support nearby mature trees.
- Water during the cooler parts of the day (preferably mornings) and keep irrigation systems low to the ground to avoid evaporation in the air and wet leaves, which can encourage diseases.
- Add 3-4 inches of mulch (wood chip instead of bark) around the base of a tree to retain moisture. Be careful not to pile mulch against the trunk, which can encourage rot.
- Avoid runoff by reducing water pressure or creating water catchment berms around the root base.
- Identify soil type (sand, loam, clay, etc.) to estimate ability for water to penetrate and be retained. Sandy soils drain too quickly and clay soils become waterlogged if overwatered. Allow the upper 3 inches of soil to get moderately dry between waterings to prevent fungal growth.
- Know how much water a tree needs before you choose what to plant. Pick a species density appropriate to the site. Sprawling invasives, such as ivy, blackberry and Scotch broom compete with trees for soil moisture. Shallow-rooted, drought-tolerant native ground covers can protect soil from drying out.
- Trees planted in containers require more frequent irrigation because roots are limited to moisture within the pot, which can dry out faster due to its smaller volume.

Volume, frequency and duration

Concentrate watering during the warmest, driest months - generally May through September in most of Oregon. The general guidance below is a place to start but should be adjusted depending on soil type and depth, microclimate, and tree species and size. Note that drought-sensitive species may need more and drought-tolerant species may need less. Adjust according to how your tree responds:

- 10-15 gallons a week for trees 3 years or younger
- 20-25 gallons a week for trees 4 - 10 years old. The International Society of Arboriculture suggests giving 10 gallons per inch of trunk diameter per week during the growing season in the absence of rain.
- Deep soakings that wet the soil a few inches down once or twice a month for trees over 10 years old

Avoid

- Fertilizing. Fertilization will not “green up” dying foliage. It increases growth and thus water needs.
- Sudden reduction of water amount or frequency. Gradually phase out providing supplemental water to avoid shocking trees.
- Overwatering. Too much water can waterlog soil, drowning roots and killing them. Symptoms can be confused with those of drought or nutrient deficiencies, such as yellowing leaves that drop early, poor growth, thinning canopies or topkill. Avoid overwatering drought-tolerant trees such as oaks and pines by allowing soil to dry between watering.