

# GROWING KNOWLEDGE

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## Knowing your cedar pests

### Part 2: *Thuja*, *Juniperus* and *Cupressus*

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IT'S IMPORTANT TO be aware of issues in the landscape and forest, as these can become problems in the nursery or for your customers. On the flip side, problems not detected in the nursery can become big issues when planted out at the customer's end. Cedar trees have a number of issues to be aware of, from abiotic disorders to insects and diseases.

The word cedar is used loosely on many different trees. We covered problems on *Cedrus* spp. (true cedars), *Chamaecyparis nootkatensis*, *Calodendrus decurrens* (Incense cedar), and *Chamaecyparis lawsoniana* (Port Orford cedar) in the January 2021 issue of *Digger*\*. In this article, we will cover *Thuja* spp. (Arborvitae and Western Red Cedars), junipers and cypress.

Recently, drought and heat/scorch have become a big issue. The heat dome that influenced the PNW during late June 2021 had major impacts on western red cedar in some parts of western Oregon, especially in a band just a few miles inland from the coast. It appears that western red cedar is very susceptible to these high-temperature events, and young trees can be killed.

The influence of drought on plant health, however, can be very confusing. Many pathogens and insects respond to plant stress associated with drought, and it can be very difficult to discern which is truly responsible for the problem. Getting a proper identification of the pathogen or insect found on the plant allows the grower to determine if the pest is a drought opportunist or a primary host attacker.

#### Complex drought, heat and vapor pressure deficit related mortality

Drought injury has become a major issue over the last several years, especially in the landscape and the forest. Although this problem can be observed in nature, it can also occur in potted nursery trees.

In some potted plants, the root-shoot ratio is so lopsided that trees have a difficult time maintaining water balance. Many conifers, including cedar, are susceptible to drought stress, especially when planted on lower elevation, south-facing or marginal sites. However, juniper and cypress tend to be much more resistant than



Figure 1. Scorch on western red cedar in Siletz, Oregon, from late June heat wave, 2021. Note the regular pattern of necrotic tissue. PHOTO COURTESY OF OREGON STATE UNIVERSITY

## Knowing your cedar pests

western red cedar and arborvitae.

Newly planted trees are most at risk to drought damage. Drought-stressed trees are highly susceptible to secondary attack from insects such as cedar bark beetles (*Phloeosinus* spp.) (*Coleoptera: Curculionidae*) and canker-causing fungi. Drought damage can accumulate over several years of subnormal precipitation and persist after normal conditions return.

During extremely warm, dry weather, trees may not regenerate rootlets fast enough to replace those lost to moisture stress. The degenerating root system results in crown decline, which in turn reduces food supply to roots. This process is known as carbon starvation. Branch flagging may also indicate drought damage.

Throughout western Oregon (and Washington state, both west side and east side), western red cedars of all size classes have died of unknown causes over the past few years, but most likely this is associated with drought combined with high vapor pressure deficit (VPD). VPD is the difference between how much water is in the air versus the amount of water the air can hold.

High VPD can put extreme stress on a tree as it contributes to the pull of water from the plant. Warmer air can hold more water, so high temperatures can exacerbate the effects of drought. The late June 2021 heatwave was particularly hard on western red cedar, causing tip reddening and browning, whole branch reddening and browning of the foliage and killing the branch (Figure 1). In some cases, especially younger trees in highly exposed settings, the entire tree is killed.

### Insects of western red cedar, arborvitae, cypress and juniper

Insects are generally pretty rare on these hosts, especially foliage eaters. A bark beetle, several wood borers and spider mites may be the most important for nursery growers. Table 1 lists the common insects known to occur on these tree species. Perhaps the most common insect is the cedar bark beetle, which has been routinely found on drought-stressed trees that are dead or dying. Meanwhile, the flatheaded cedar borer is becoming more of an issue for arborvitae.

### Diseases of western red cedar, arborvitae, cypress and juniper

#### *Thuja plicata* - Western red cedar

Leaf blight (Keithia blight) – The fungus *Didymascella thujina* is a problem on trees and shrubs of all age classes whether in nurseries, landscapes or forests. However, seedlings are most severely affected.

Leaves turn brown or ash gray and may be cast in fall. Fungal fruiting structures (apothecia) are imbedded in leaf tissues; the entire structure drops out, leaving deep pits. The cultivars ‘Atrovirens’ and ‘Excelsa’ are susceptible. Conditions that keep foliage wet will also aid disease development and spread.

Spore discharge from wetted apothecia begins in late spring, with a second ascospore release in the fall if conditions are wet and above 50 F. Symptoms develop the season after spore dispersal. Be sure to propagate from disease-free stock plants or use seed from British Columbia coastal, low-elevation populations. Space nursery plants and time irrigation to promote rapid drying of foliage.

Stem decays are primarily a forest

**Table 1.** Insects and mites associated with cedars. Most insects that occur on cedars can be found on multiple species, and also on cypress and juniper.

Insect or mite species/group	Common symptoms/signs	Importance
Cedar bark beetles <i>Phloeosinus</i> spp. ( <i>Coleoptera: Curculionidae</i> )	Cedar bark beetles can occur on any of the cedars, cypress, or juniper. They are usually associated with stressed, dying or recently dead trees. They are not considered primary mortality agents, but recent observations indicate they have become increasingly common on drought-stressed trees.	Typically associated with stressed and dying trees, especially associated with drought.
Western cedar borer, <i>Trachykele blondeli</i> ( <i>Coleoptera: Buprestidae</i> )	Mostly a forest/lumber problem of western red cedar, but can occur on other species, including juniper and cypress. Adult beetles feed intermittently on cedar foliage for several days before mating, after which the female lays eggs under bark scales on branches of living trees. The larvae tunnel into the heartwood via the branches. Living trees are attacked without visibly injuring or killing the tree. Infested trees are readily found once they have been felled and limbed as the larval tunnels are exposed in the knot faces.	Not important in young trees.
Flatheaded cedar borer, <i>Chrysobothris nixa</i> ( <i>Coleoptera: Buprestidae</i> )	A native beetle that tunnels into several members of the <i>Cupressaceae</i> . They have become common on nursery-grown arborvitae ( <i>Thuja</i> spp.). This insect can also occur on <i>Calocedrus decurrens</i> , <i>Thuja plicata</i> , <i>Cupressus</i> spp, and <i>Juniperus occidentalis</i> .	Has become important in some nursery settings especially on arborvitae.
Spruce spider mite, <i>Oligomychus ununguis</i> (not an insect, belongs to the Class <i>Araachnida</i> with spiders. <i>Trombidiformes: Tetranychidae</i> )	Can occur on a wide host range, including many cedars, cypress and juniper. Look for dark green mite stipples and bronzes needles, beginning at the base. These mites overwinter as red-orange eggs.	Can be important in nursery settings, especially where broad spectrum insecticides that kill natural enemies are used.

problem with pencil rot (sometimes called brown pocket rot), caused by the fungus *Postia sericiomollis*, as the most common. Yellow root rot caused by *Perreniporia subacida* is another forest problem usually found on suppressed or weakened trees. It is rarely seen in vigorous trees.

Armillaria root rot is yet another problem but mostly in the forest. It is not expected to be a nursery problem, but it could exist in the landscape if trees are planted in new home sites recently cleared of native vegetation. Avoid wounding roots and overwatering in landscape settings.

#### **Thuja occidentalis - Arborvitae cedars**

Black flagging, or young foliage on branch tips, show a very dark-brown to black discoloration. The color is not the brown associated with normal or disease-induced leaf senescence. This can occur on only one side, be evenly distributed over the entire plant, or occur only on some branches.

Plants with black flagging are not permanently disfigured or injured and the condition does not always recur on an individual plant. Repeated isolations by multiple diagnosticians across the country have consistently failed to produce any disease-causing microorganisms. The injury is not caused by insects mining in the foliage, nor is it due to girdling twig cankers. This suggests that the problem is due to stress of some sort, but the exact source of stress that results in black flagging is unknown.

Root rot is in many samples sent to the OSU Plant Clinic. The condition thrives in poorly drained and wet sites where oxygen depletion to the roots has occurred. Occasionally, pathogens such as *Phytophthora lateralis* or *Armillaria ostoyae* are associated with rotted roots. The cultivar *T. occidentalis* 'Pyramidalis' has intermediate resistance to *Phytophthora* root rot while *T. occidentalis* 'Smaragd' is most susceptible.

Root rots can be avoided by not reusing pots from a previous crop for propagation. If pots must be reused, then wash off all debris and soak in a sanitizing solution or treat with aerated steam for 30 minutes. Also, plant only in deep, >>

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## Knowing your cedar pests

**Figure 2.** Leaf blight (Keithia blight) on western red cedar. In contrast to heat related scorch, note the random pattern of necrotic tissue.

PHOTO COURTESY OF OREGON STATE UNIVERSITY

well-drained soils or media.

Tip blight, caused by the fungus *Pestalotiopsis funerea*, is a common problem. The fungus can colonize tissue damaged from other pathogens, insects, freeze injury or sunscald. Other stresses include being pot-bound, too much or too little water or fertilizer. Spores are disseminated from diseased tissue by splashing rain. The fungus has a wide host range of many different conifers and has been associated with leaf and stem blights, cankers, diebacks, and even root rots of these hosts.

### **Berckmann's arborvitae — *Platycladus orientalis***

Berckmann's blight (*Seimatosporium berckmansii*) — *P. orientalis* var. *conspicua* 'Berckmannsii' is particularly susceptible to infection by this fungus. Most cultivars, including the golden arborvitae and several green forms of globular or pyramidal habits, are susceptible to the disease as well. American and European species seem to be immune.

The fungus produces spores in late September, which are washed and splashed by rains to infect new foliage within the plant. These small spores are also easily carried by insects or by air currents to other shrubs. This is a foliage disease confined to the imbricated or bract-like leaves and small twigs where the fungus overwinters. Large woody stems are not attacked, but infected plants eventually die because of continued defoliation.

### ***Juniperus* spp. Juniper**

Twig blight is mostly a nursery problem and not present in the landscape as much. Two fungi (*Diaporthe juniperivora* and *Kabatina juniperi*) cause a foliar blight and tip dieback, which are difficult to separate. In areas west of the Cascades, *D. juniperivora* (formerly *Phomopsis juniperovora*) is found most often. *Kabatina* tip blight is more common in eastern areas of the Pacific Northwest and throughout nursery markets east of the Rocky Mountains.

Cultivars differ in susceptibility to both fungi: *J. chinensis* 'Pfitzeriana Aurea' is considered resistant to both. *Diaporthe* infection

occurs whenever foliage is young and moisture and humidity are high, generally in spring. Older, mature foliage is resistant to infection. Excessive pruning or shearing in summer will stimulate new, succulent growth that is highly susceptible. *Kabatina* infection is thought to occur in fall and often is associated with wounds, insect feeding or mechanical damage.

Several fungi in the genus *Gymnosporangium* cause rust on juniper and members of the rose family, such as serviceberry and pear. Seven different species are reported from Oregon, nine from Washington and six from Idaho.

Spore stages produced on junipers infect only members of the rose family in early spring over a 2- to 3-year period. The spore stages produced on serviceberry, pear or others in the rose family only infect junipers during the course of one summer. These fungi may produce large witches' brooms or reddish-brown, gelatinous masses on leaves, or woody, round, elongated galls on branches and small stems. Cedar apple rust is common east of the Rockies on *J. virginiana* but in the West, it is rare on *J. virginiana* and *J. scopulorum*. Galls on juniper in the Pacific Northwest are more likely due to other species of rust.

There have been several species of the fungal-like microorganism *Phytophthora* reported on juniper to cause root rot. The disease is favored by wet or waterlogged conditions during warm weather. The pathogen can produce swimming spores that are attracted to roots and can move from one infected tree to another in saturated soil or between flooded pots in a nursery.

Inoculum also may be found in containers previously used to grow other crops. Many cultivars are susceptible; however, some may show similar symptoms simply from waterlogging and not necessarily from infection. Armillaria root rot is another problem in the landscape if trees are planted in new home sites recently cleared of native vegetation.

### ***Cupressus* spp. — Cypress**

The fungus *Seiridium cardinale* can infect many genera of the *Cupressaceae*.



To produce cankers. Monterey cypress (*Cupressus macrocarpa*) has the worst damage, but other *Cupressus* spp. also are affected.

A typical lens-shape, sunken canker can be found on the branch below affected foliage. Top death and dieback are common. *Cupressus glabra*, *C. lusitanica*, and *C. torulosa* are more resistant although not immune. Other trees including *Chamaecyparis*, *Juniperus* and *Thuja*, as well as hybrids such as Leyland cypress are also hosts.

Spores are rain splashed but the fungus also can be moved on pruning tools and infected nursery stock. It enters trees through natural occurring wounds or insect damaged tissue. Favored by prolonged periods of mist and light rain with moderate temperatures. Cankers enlarge faster on drought-stressed trees. ☺

For more information on the diagnosis and management of these problems, please refer to the PNW Handbooks for Insects and Plant Diseases. These can be found at <https://pnwhandbooks.org/>.

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