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Management Guide for

Cedar Laminated Root and Butt Rot

Phellinus weirii (Murr.) Gilbertson

Host:	Also known as Yellow Ring Rot. The majority of heartwood decay in western redcedar in inland forests is caused by this fungus.
• **Western redcedar**	

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Key Points

- Decays the heartwood of both roots and stems, especially the butt log
- Develops and increases with age
- Wounds increase decay rate in infected stems
- Cavity nest sites used by many wildlife species.

Introduction

Although western redcedar heartwood is considered to be highly resistant to decay, standing trees often have a high rate of decay defect. *Phellinus weirii* is the most common cause of heartrot in western redcedar in inland (non-coastal) forests. Alaska yellow cedar is a significant host in high elevation stands.

The butt log is usually most damaged and decay extends into root heartwood, commonly rendering them hollow as well. Extensive decay can develop in living trees without external signs of defect. The butt log and roots are most damaged, although decay can extend to considerable heights in a tree.

Decay can be extensive in old trees. Cedar trees are rarely killed by this disease, and this fungus is not known to cause disease in other tree species.

MANAGEMENT OVERVIEW

1. **Appreciate its value as wildlife habitat.** Cavity nest sites are often in short supply. If heartrot is uncommon in your forest, consider leaving a few infected trees for their ecological value.
2. **Prevent wounding.** Fires, logging and other activities in the forest can result in basal wounds. Even if wounds are not the source of an infection, they can increase decay rates by aerating the heartwood.
3. **Pathological rotation.** Harvest trees before they a old enough for the fungus to have done much damage.

Life History

Cedar laminated root and butt rot

Quick Facts:

- Yellowish laminated rot
- Western redcedar is the only significant host in inland stands
- Common nest site for cavity-nesting birds.
- Basal cankers (catfaces) commonly are associated with severe infections
- Wounding may increase damage.

Identifying *Phellinus weirii* in culture and in wood

New methods have been developed for the differentiation of *P. weirii* (cedar pathogen) and *P. sulphurascens* (Douglas-fir pathogen) using molecular analysis (Lim and others 2005). This method is able to detect *P. weirii* genetic material (DNA) in cultures and even in cedar decay samples.

Though not currently commercially available, it has the potential to be a cheap and rapid method of detecting and differentiating *P. weirii* in western redcedar stands.

Infection

Little is know about how this pathogen infects and spreads. Sporophores produce abundant spores on the outer bark of the lower stem and roots. Trees with no evidence of prior wounding commonly have extensive columns of decay. The presence of extensive root decay suggests that roots may be a site of infection from which the decay extends into the stem heartwood.

Although wounds are apparently not necessary for establishment of infections, they may contribute to expansion of decay by aerating the heart wood. Carpenter ants also are commonly found building nests in this type of decay but they are unlikely to have caused the infections.

Development of decay

Phellinus weirii produces a white-rot type of decay in which both lignin and cellulose are degraded. Even in the early stages, the integrity of the wood is significantly reduced.

At first, the decayed wood is light tan or yellowish. In advanced stages of decay the wood becomes red-brown in color. It delaminates, separating easily into sheets as the springwood is decayed in preference to the denser summer-wood. Shallow pits develop on the springwood side of delaminated sheets. These pits often are filled with fuzzy cinnamon-colored mycelium.

In old infections, the stem and main roots may become hollow, with delaminating decay at the edges of the cavities. Although mostly confined to the butt-log, decay columns occasionally extend up the stem 30 feet or more.

Fruiting structures

This fungus is often seen fruiting at the base of infected trees, generally between buttress roots. They will occasionally occur up to six feet high on the outer bark of trees.

The conks (Figure 1) are thin (usually less than 1/4 inch), resupinate (crust-like), and highly variable in size, from less than 1 inch to several inches across. These perennial conks have irregular, somewhat elongate pores that are typically about 1/100th inch in diameter.

Figure 1. *Phellinus weirii* conk close-up. The new pore layer (light brown) can be seen developing over the dark brown pore layer from the previous season. The presence of new and old pore layers produces the characteristic mottled appearance of this species. This conk is perennial, having survived more than one season.
[Photo by S. Hagle]

The older pore layers of a conk are dark brown with lighter brown, newer growth in irregular patches on top.

These conks are common in cedar stands that have a high rate of infection. It appears that most conks survive two, or perhaps three years.

Management

Phellinus weirii is the most common cause of laminated decay in cedar trees in inland forests. It is especially common in mature trees, at least 100 years of age. In coastal forests Buckland (1946) found *Poria albipellucida* to be the most common cause of cedar decay in forests of coastal British Columbia, Canada. It produces a similar decay (yellow, laminate) to that produced by *P. weirii* and is also most common in mature age classes of cedar. Although this fungus occurs in inland stands, it is far less common here.

Cedar brown pocket rot is also a common heartrot of cedar and can occur in the same stands and even the same tress as cedar laminated rot. The management for these two diseases is similar.

The publication included in this guide entitled 'Stem decays; General ecology and management' by Gregg Denitto provides a more complete discussion of management recommendations for stem and butt decays. For cedar butt rots, avoiding wounding and harvesting before the trees are old are recommended.

Avoid wounding

Cedars are thin-barked trees and easily wounded by falling trees, fire and machinery. Wounds that remove bark, exposing wood, may provide entry courts for *P. weirii* spores. They may also aerate the wood beneath the wound and increase growth of heart rots already present in the wood.

Harvest before trees are old

The most effective means of managing cedar butt rot is to harvest trees before stem decay becomes significant. The age may vary by location but in general, once a stand has reached maturity, it can be expected to begin decaying at an increasingly greater rate with each passing decade. Stands with a great deal of wounding can be expected to accumulate decay at an even faster rate, necessitating earlier harvest to avoid excessive loss.

For a full discussion of management considerations and methods for conifer stem and butt decays, go to "Stem Decays; General Ecology and Management" by Gregg Denitto

Forest Health Protection and State Forestry Organizations

Assistance on State And Private Lands

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5530

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Assistance on Federal Lands

US Forest Service Region One
Missoula: (406) 329-3605
Coeur d'Alene:(208) 765-7342

US Forest Service Region Four
Ogden: (801) 476-9720
Boise: (208) 373-4227

Other Reading

Buckland, d. c. 1946. Investigations of decay in western red cedar in British Columbia. Canadian Journal of Research. 24: 158-181.

Hagle, S. K., K. E. Gibson, S. Tunnock. 2003. Field guide to diseases and insect pests of northern and central Rocky Mountain conifers. U.S.D.A. Forest Service, Northern and Intermountain Regions, Rept. No. R1-03-08. 197 pp.

Lim, Y. W., Y. C. A. Yeung, R. Sturrock, I. Leal and C. Breuil. 2005. Differentiating the two closely related species, *Phellinus weirii* and *P. sulphurascens*. Forest pathology 35: 305-314.