

## Laminated Root Disease

### Background

Laminated root disease is one of the most serious forest diseases in northern Idaho. Laminated root disease is caused by a fungus that decays and kills the roots of infected trees. Affected trees suffer reduced growth, butt decay, windthrow, and are frequently attacked by bark beetles. The disease is difficult to manage because it is capable of persisting in the roots and stumps of dead trees for 50 years or longer.

### Hosts

Douglas-fir and grand fir are the most commonly infected and severely damaged trees in northern Idaho (Table 1). Western hemlock, subalpine fir and Engelmann spruce are moderately susceptible to the disease. They are usually only seriously affected when they are growing in stands with Douglas-fir and/or grand fir. Ponderosa pine, western white pine, lodgepole pine, western larch, and western redcedar are the least damaged trees. All hardwoods such as alder, birch, and maple are immune to the disease.

### Disease Recognition

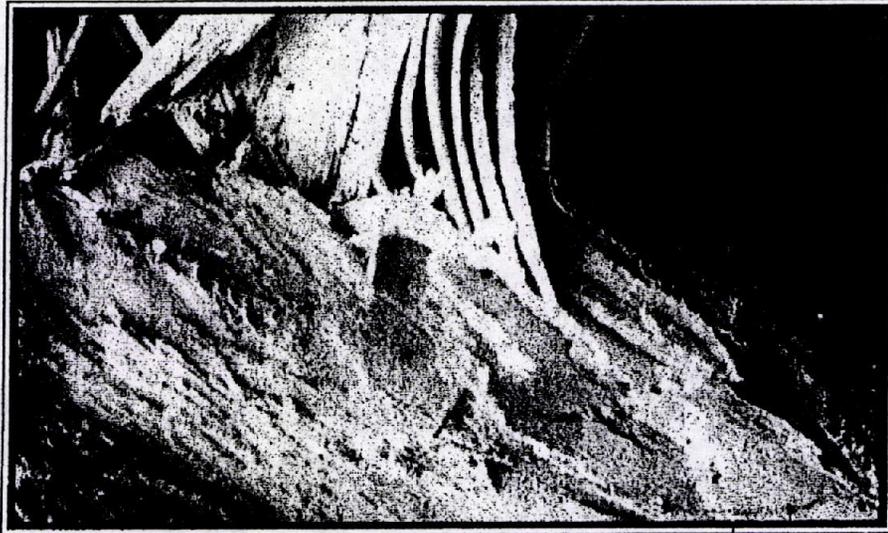
Recognizing laminated root disease is important for management. In northern Idaho the disease can be identified using several characteristic symptoms and signs that occur on infected trees.

Crown symptoms on severely infected trees usually include retarded leader growth and/or sparse and yellowing foliage.

Laminated root disease can most easily be identified by the characteristic decay it causes in the roots and butts of infected trees. Wood of severely decayed roots and butts separates easily between the annual rings and the wood is heavily pitted on both sides (Figure 1). The pits are about 1/2 millimeter wide and one millimeter long. This laminated decay is most evident on windthrown trees with broken roots. When heavily infected trees fall, the decayed roots usually break off near the root collar, and form what are termed "root balls" (Figure 2).

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**Figure 1** - Advanced decay caused by laminated root disease. Note the separations of the wood between annual rings.

Root disease centers frequently have scattered dead standing trees of various sizes, stubs, dead and recently live windthrown trees with "root balls", and some apparently unaffected standing live trees within their boundaries. Often live trees within the disease center or near its margins will display the crown symptoms described above. Many of the most susceptible trees within 50 feet of the root disease center's margin are infected, even though they may not have any crown symptoms evident.

Laminated root disease spreads from infected trees to healthy ones by root contacts. The fungus can survive in the roots of dead trees for several decades. When the roots of young trees contact the infected old roots, the young trees become infected.

When examining a forest for the presence of laminated root disease, look for openings with windthrown trees. Next, examine the broken roots and base of the windthrown trees and look for the characteristic laminated decay described above (Figure 1). If you find this type of decay you probably have laminated root disease in that area.



**Figure 2** - Windthrown Douglas-firs with "root balls". Note how decayed roots break off near the root collar.

### **Management**

Management of laminated root disease is difficult, but not impossible. There are several other valuable trees than grow well in northern Idaho and they are less susceptible to damage by this disease. You can retain or plant these trees wherever possible in areas with laminated root disease. The best way to attack laminated root disease is to identify the disease and its location. Then harvest all Douglas-fir and grand fir in each root disease area and those within 50 feet. Finally, retain or replant less susceptible trees like western larch, ponderosa pine, or western white pine whenever possible.

In stands where several root disease centers have coalesced to form relatively large infestations, and few if any of the less susceptible trees are available for retention, clearcut the stand and plant with less susceptible trees.

Partial cutting in laminated root disease centers is not recommended because many of the residual trees will already be infected. These trees will usually die and/or be windthrown in five to ten years after partial cutting.

**Table 1 - Relative Susceptibility of Native Conifers to Laminated Root Disease in Northern Idaho.**

<p><b>MOST SUSCEPTIBLE</b> - Readily killed by laminated root disease: Douglas-fir Grand fir</p> <p><b>MODERATELY SUSCEPTIBLE</b> - Some trees killed when growing in association with Douglas-fir or grand fir: Western hemlock Subalpine fir Engelmann spruce (These trees may suffer some butt rot also.)</p> <p><b>LEAST SUSCEPTIBLE</b> - May be infected when growing in association with Douglas-fir or grand fir, but no severe damage occurs: Ponderosa pine Western white pine Lodgepole pine Western larch Western redcedar (Western redcedar may suffer considerable butt rot when infected with laminated root disease in northern Idaho.)</p> <p><b>IMMUNE</b> - Never damaged by laminated root disease: All hardwoods</p>
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Although other management alternatives such as stump and root removal or pesticide treatments have been shown to be effective in reducing losses from laminated root disease, they are not economically practical in northern Idaho at this time.

The important points to remember when managing laminated root disease infested areas are:

1. Locate the laminated root disease centers.
2. Salvage all the Douglas Fir and Grand Fir in and within 50 feet of each disease center.
3. Retain or plant less susceptible trees in and near each center.

***For more information contact your nearest Idaho Department of Lands office,  
or call (208) 664-2171.***

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