

Why are root diseases a problem?

Root diseases are subtle, but persistent agents, causing damage and mortality on over 12 million acres of forest land in northern Idaho and western Montana. In the long-term, they cause more growth loss and mortality than any other disease or insect, even bark beetles! The fungi that cause root diseases have taken advantage of changing tree species caused by white pine blister rust, past selective logging, and fire suppression. These factors have greatly contributed to an increase in the amount of Douglas-fir, grand fir, and subalpine fir in northern Idaho and western Montana, the three most root disease-susceptible species.



Root diseases persist year to year. They remain on site in the roots of stumps and snags from one generation of trees to the next, surviving forest fires and tree harvesting.

For additional information, contact any USDA Forest Service or State Forestry Office in your area.



Forest Health Protection
Northern Region
www.fs.fed.us/r1-r4/spf/fhp/

Missoula Field Office
200 E. Broadway
Missoula, MT 59807

Coeur d'Alene Field Office
3815 Schreiber Way
Coeur d'Alene, ID 83815



Montana DNRC
Forestry Division
2705 Spurgin Road
Missoula, MT 59801
www.dnrc.mt.gov/forestry/assistance/Pests/



Idaho Dept. of Lands
Bureau of Forestry Assistance
3780 Industrial Avenue S.
Coeur d'Alene, ID 83815
www.idl.idaho.gov/bureau/ForestAssist/forest_health/foresthealth_index.html

Find more information on-line:

Root disease identification:

http://www.fs.fed.us/r1-r4/spf/fhp/field_guide/index.htm

Root disease management: http://www.fs.fed.us/r1-r4/spf/fhp/mgt_guide/index.htm

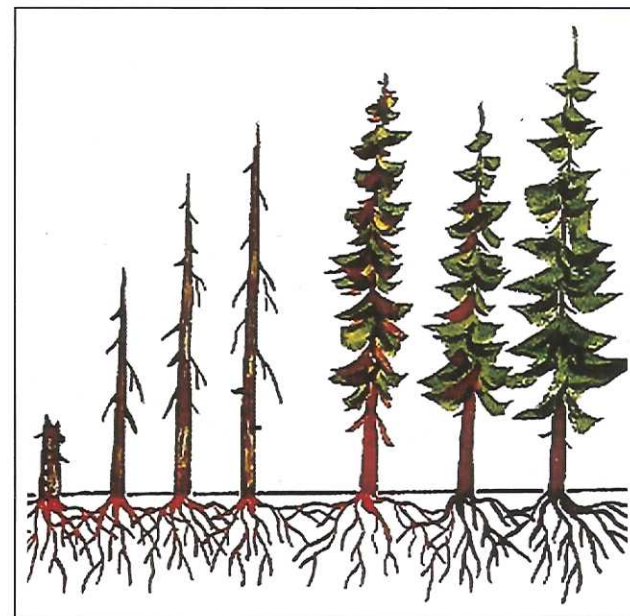
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Root Diseases in the Inland Northwest



The fungi that cause root diseases spread from infected trees to susceptible neighboring trees by root-to-root contact.

Introduction

Root diseases are the most damaging group of native tree diseases in the Inland Northwest. They are caused by fungi that break down and digest the cellulose and lignin in the roots of trees. Infected roots decay and lose their capacity to take up water and nutrients, causing the tree to decline and become more susceptible to windthrow, attack by other agents such as bark beetles, or experience outright mortality.



Tree that has fallen because of decayed roots.

What does root disease look like?

Damage on the Landscape

Root diseases spread from roots of diseased trees to healthy roots of susceptible trees (see front graphic). The result is usually several to hundreds of trees in various stages of death and decline. They may be in groups called root disease patches, or in scattered clusters of just a few trees.

Root disease patch with older and more recent mortality.

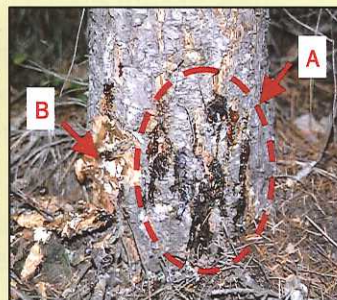


Damage on Individual Trees

Trees of all sizes and ages are killed by root disease, although susceptibility varies among tree species. See susceptibility chart below.



Foliage of infected trees becomes very sparse, usually thinning from the inside to the outside of the crown, and from the bottom up.



Infected trees may produce obvious resin near the root collar (A). White fungal tissue is sometimes present under the bark (B).



Infected trees usually have very short terminal growth, and may become chlorotic (yellow) a year or two before dying.

Species Susceptibility

All conifers have some susceptibility to root diseases, especially at a young age. The most root disease-susceptible species in the Inland Northwest is Douglas-fir, with grand fir and subalpine fir coming in a close second and third. The most tolerant species are ponderosa pine and western larch. Western redcedar and lodgepole pine are tolerant in some situations, and the remaining species fall somewhere between susceptible and tolerant.

What can be done about root diseases?

Root diseases are 'diseases of the site'- they are permanent. The fungi that cause these diseases remain on site- buried deep underground inside infected roots- from one generation of trees to the next.

Silvicultural control

The best tools available for managing sites infested with root diseases are to plant and (or) encourage tree species tolerant to root diseases, and minimize tree species most susceptible to root diseases. The species-susceptibility chart below is meant as a guide. Tolerance and susceptibility should be evaluated at each site by examining tree species being affected (mortality and declining trees).

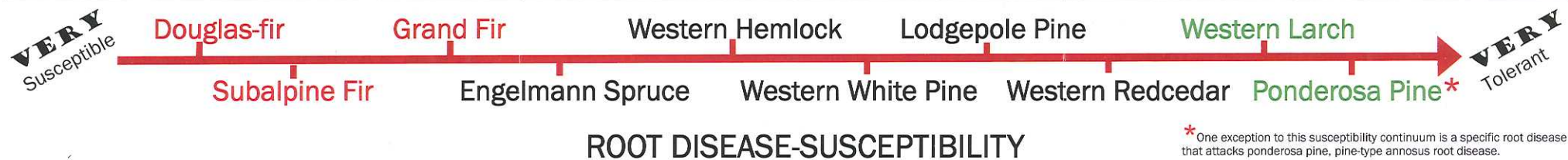


Western larch is considered root disease tolerant, but may need periodic thinning to stay vigorous.

CAUTION: Douglas-fir, grand fir and/or subalpine fir should be less than 30% of the residual stand after a harvest to minimize losses from root disease. Mixed species stands are nearly always more resilient than single-species stands. Disease intensification after harvesting occurs due to the rapid colonization of the stumps and roots after infected trees are harvested. Infected stumps then provide the food base for the root disease fungi to build up and then infect and kill neighboring trees that are susceptible.

Removal of the fungus

Reducing the amount of infected roots on a site by removal may be possible on a small scale, but is not feasible on a large scale. Stump and root system removal are costly and cause excessive soil disturbance.



* One exception to this susceptibility continuum is a specific root disease that attacks ponderosa pine, pine-type annosus root disease.