

# Why is annosus root disease a problem in ponderosa pine?

Annosus root disease in ponderosa pine is a native disease caused by a fungus. Spores of this fungus readily colonize freshly cut stumps; this strategy has caused a significant increase of the disease in some areas of the Inland Northwest that have had repeated harvesting. The good news is, it is preventable. Treating freshly cut stumps with a borate-based product prevents the introduction of annosus root disease. However, stumps need to be treated in a timely manner, preferably within 24 hours of cutting.



Ponderosa pine seedlings dying around a stump infected with annosus root disease. Photo credit: USDA Forest Service Archive, USDA Forest Service, Bugwood.org

**Stump treatment does not eliminate any fungus already present in the wood. Once it gains entry into a stand, then it persists on the site in the stumps and roots and makes it very challenging to grow ponderosa pine.**

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



Forest Health Protection  
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[www.dnrc.mt.gov/forestry/assistance/Pests/](http://www.dnrc.mt.gov/forestry/assistance/Pests/)

Find more information on-line:

**Root disease identification:** [http://www.fs.fed.us/r1-r4/spf/fhp/field\\_guide/](http://www.fs.fed.us/r1-r4/spf/fhp/field_guide/)

**Root disease management:** [http://www.fs.fed.us/r1-r4/spf/fhp/mgt\\_guide/index.htm](http://www.fs.fed.us/r1-r4/spf/fhp/mgt_guide/index.htm)

All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.  
**CAUTION:** Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

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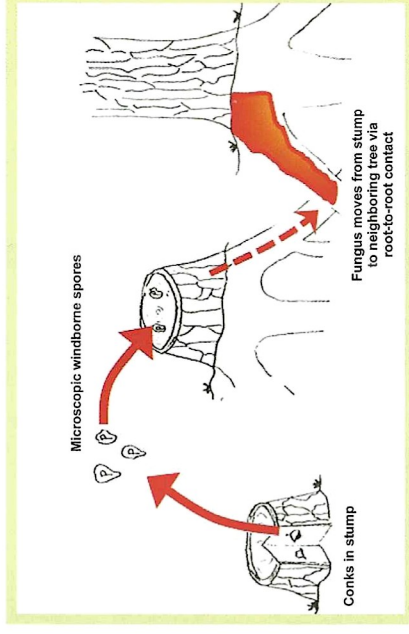
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R1-11-17

USDA Forest Service  
Northern Region  
Forest Health Protection



# Annosus Root Disease in Ponderosa Pine



The spores of the fungus that cause annosus root disease in ponderosa pine readily infect fresh basal wounds and freshly cut stump surfaces. Once it colonizes the stump or tree, it can then infect susceptible neighboring trees when their roots make contact.

# Introduction

Annosus root disease in pine is caused by the fungus *Heterobasidion irregulare* Garbelotto and Orosina (Syn. *H. annosum* P ISG). The fungus gradually decays the roots of trees resulting in reduced capacity to uptake water and nutrients, as well as loss of strength. Infected trees eventually die or become more susceptible to attack by other agents such as bark beetles. As roots become decayed, trees become more susceptible to wind throw.



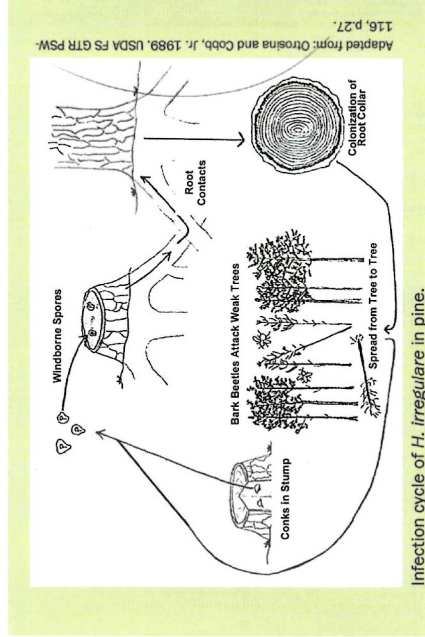
Advanced decay of *H. irregulare*.



Severely decayed root.

## Life History of Annosus Root Disease

Ponderosa pines of all sizes and ages can be killed by annosus root disease. The spores of the fungus readily infect freshly cut stump surfaces. After the fungus successfully infects a stump or tree, it grows down into the roots and can move from an infected pine root to a neighboring pine by root-to-root contact. Infected trees may decline for many years before dying of annosus root disease or being wind thrown due to weakened roots, or they may fall victim to bark beetles which seek out stressed trees.



Infection cycle of *H. irregulare* in pine.

Conks (fruiting bodies) are not readily visible as they are produced inside stumps, and occasionally at the root collar of infected trees just under the duff, or on the outside of roots. Spores are produced by these conks throughout the year, and can infect freshly cut stumps at any time.

# Recognizing annosus root disease in ponderosa pine

Ponderosa pine infected with annosus root disease will have sparse foliage with a "lion-tail" appearance to the branches. Foliage will become chlorotic (yellow), and the needles may be shortened. In older trees, the top of the crown may look worse than the lower crown. Crown decline of large, older trees may be quite gradual, with final mortality often occurring from bark beetles. Shelf conks and button conks can often be found inside older stumps near these declining trees. Shelf conks are hard fruiting bodies shaped like a shelf- dark brown with a white margin on the upper surface, and white on the lower surface. Button conks are corky mounds of sterile tissue, white to creamy in color, turning brown with age.



A large ponderosa pine showing crown symptoms of annosus root disease.



Button conks on the outside of infected root.

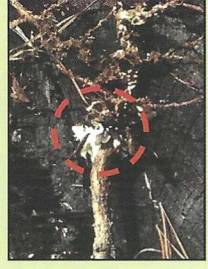


Shelf conk inside a heavily decayed stump.

Mortality of trees surrounding a stump indicates possible root disease. Infected seedlings and saplings often have button conks or even small shelf conks on their roots and root collars.



Seedling mortality near an infected stump.



Small shelf conks at the base of an infected seedling just under duff layer.

# What can be done about annosus root disease?

Annosus root disease is a "disease of the site"- it is permanent as long as host trees are present. The fungus remains on site- inside infected roots- from one generation of trees to the next. In the Inland Northwest, the highest incidence of annosus root disease is in ponderosa pine, and therefore of most concern, is found west-central Montana.

## Prevention

The best tool available for managing annosus root disease in ponderosa pine is to prevent the introduction of the disease onto a site. This can be done by treating the surfaces of larger stumps to prevent colonization by *H. annosum* spores. Stumps should be treated within 24 hours of cutting with an EPA registered product for control of annosus root disease: current recommendation is to treat all ponderosa pine stumps 12 inches and larger in diameter. Contact your local County Extension Office for a list of currently registered products for treating stumps. Even if you suspect you already have annosus root disease on your site, treating stumps is still recommended to prevent any new infections.



Stump after treatment with the recommended amount of Sporax®, a borate salt. This product can be applied with a simple shaker can.

Spores can also infect fresh basal wounds. Care should be taken to protect trees from wounding, such as careful layout of skid roads, directional felling of harvested trees, use of bumper trees, and leave-tree marking to make it obvious which trees are to be protected.

## Removal of the Fungus

Reducing the amount of infected roots on a site by removal may be possible on a small scale, such as a campground or an urban landscape situation, but not feasible on a large scale. Stump and root system removal are costly and cause excessive soil disturbance.