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Management Guide for

Schweinitzii Root and Butt Rot

Phaeolus schweinitzii (Fr.) Pat.

Topics

Primary hosts—
- **Douglas-fir**
- **Engelmann spruce**
- **Ponderosa pine**

The most common heartwood decay organism of conifers in Montana and Idaho.

As a root disease, it results in little direct tree mortality except on the poorest sites.

Key Points
- Douglas-fir is the most commonly damaged species in western United States and Canada.
- Cull from butt rot and windthrow cause most losses.
- Direct mortality is rare.
- Trees may be predisposed to Douglas-fir beetle and Armillaria root disease.

Butt decay and windthrow are common effects

Butt rot from this fungus is common and can be seen in virtually all western conifers but is considered economically significant in only a few situations— mature and overmature Douglas-fir stands in Idaho and Montana; spruce stands infected with *tomentosus* root rot; and ponderosa pine but in Nevada around Lake Tahoe.

The fungus causes extensive decay of host root and butt heartwood. In addition, root ends are killed causing them to terminate in gall-like swellings, which greatly reduces structural support of roots. Consequently infected trees are more susceptible to uprooting and lower-stem breakage. Brown cubical decay in the structural roots often extends about 8 feet up the tree stem causing significant cull of the commercially important butt log.

As a root parasite on Douglas-fir, it predisposes trees to infection by *Armillaria ostoyae*, or attack by Douglas-fir beetle. Root disease caused solely by this fungus results in little direct tree mortality except on the poorest sites.

Although trees typically become infected at a very young age, they seldom show significant effect until they are 100 years-old or more. Generally, if one tree in a stand is infected, nearly all others are as well.

Management Overview

⇒ **Prevent over maturity**
⇒ **Avoid basal stem damage**
⇒ **Maintain growth and vigor**
⇒ **Favor less-susceptible species**
⇒ **Accept damage as a natural occurrence that can have positive effects**

Life History

Schweinitzii root and butt rot generally is considered a disease of old trees.

Infections can be detected in saplings but little damage is evident in young trees.

Infection occurs through small roots, in laboratory tests. Growth of the mycelium through duff and, perhaps direct infection by germinating spores probably accounts for most infections. Field evidence suggests that this may be the most important means of infection of Douglas-fir and grand fir.

Infections are also thought to occur directly though deep basal stem, or root wounds associated with a stand disturbance such as fire or logging. Even if the infection didn't originate with the wound, such scars almost certainly increase the extent of decay, presumably by aerating the infected heartwood, as seen in other heartrot diseases .

Basal wounding, including fire scars, can greatly increase severity of butt decay.

Incidence of Schweinitzii root and butt rot is very high in fire-scarred Douglas-fir stands. Old basal wounds, often mined by carpenter ants, are a fairly reliable indication that the tree also has brown cubical root and butt rot.

After infection, the fungus grows directly into the center of roots and is seldom found in the outer tissues. It decays the root heartwood and spreads from root to root through heartwood, also using grafted roots to move from tree to tree.

In the early stages the decay is punky and only slightly discolored. In the advanced stages, the decay is red-brown with cubical cracking.

Terminal ends of many of the larger roots eventually become stubbed; forming large gall-like swellings which can be diagnostic of this disease. These are particularly evident in trees uprooted because of their compromised root systems. Trees infected with *P. schweinitzii* display above-ground symptoms, such as thinning crowns with branch dieback and shortened terminal growth, only after the root system has been seriously degraded. Trees on very poor sites, such as at the margins of forest and grasslands, are most likely to display crown symptoms typical of other root diseases. Decades after root infection, decay may become evident in the lower stem.

Fruiting bodies produced by the fungus area annual, spongy to leathery conks. They develop during periods of moist weather in late summer. The upper surface of conks are reddish-brown and velvety with concentric rings; the lower surface is pored, green when fresh and becoming brown with age. Conks on the ground emanate from either decaying roots, or from the base of severely infected stems. Conks occasionally form on the cut end of logs with brown cubical heartrot.

Silvicultural Alternatives

Prevent overmaturity—

For existing Douglas-fir stands on affected sites, plan stand rotations of 100- to 120-years to both minimize Schweinitzii root disease severity and subsequent attacks by Douglas-fir beetle.

Prevent basal stem damage—

Avoid basal stem and root damage to residual trees to reduce the disease and decay hazards

Maintain growth and vigor—

Thin stands early, particularly on poor sites which can not support dense tree growth.

Favor less-susceptible species—Management should be planned to favor less-susceptible species, especially seral species like pines and western larch, whenever and wherever, possible.

Appreciate the positive ecological functions of the pathogen—

Realize that *P. schweinitzii* is a common, native pathogen that can not be removed from infested sites. The fungus plays an ecological role in recycling aging trees. It also produces habitat for cavity nesting birds and other animals, and for decay-inhabiting insects. Each of these roles and many others have evolved with the evolution of conifer forests and contribute to ecological diversity and stability.

-Web Resource-

Ecology and Management of Phaeolus Schweinitzii

Susan K. Hagle
1989

Other Reading

Allen, E.A., Morrison, D.J., and G.W. Wallis. 1996. Common tree diseases of British Columbia. Natural Resources Canada, Canadian Forest Service. 178p.

Dubreuil, S.H. 1981. Occurrence, symptoms, and interactions of *Phaeolus schweinitzii* and associated fungi causing decay and mortality of conifers. University of Idaho, PhD Thesis, 157p.

Scharpf, R.F. 1993. Diseases of Pacific coast conifers. USDA Forest Service, Agricultural Handbook 521. 199p.

Forest Health Protection and State Forestry Organizations

Assistance on State And Private Lands

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5211

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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
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