

Draft Key to Common Root Diseases and Dark-colored Decay Fungi found in Dry Forests of Okanogan County, Washington

© George Wooten, 2008

This dichotomous key is designed to aid in the identification of root decay fungi. At this time, only the root diseases and dark fungi are included. Light-colored decay fungi have not been incorporated yet. Suggestions are welcome.

- 1a..** Tree stands infected with root parasites spreading in a circular pattern over many years, sometimes radiating from a central stump; declining margins of the infection chlorotic, and slower growing; most with ectotrophic root decay; windthrow often present; affecting a wide range of hosts; these examples have light-colored mycelia and are ectotrophic on roots ... **ROOT DISEASES.**
- 2a..** Decay stringy or spongy; either not laminated, or if occasionally so (e.g., *Heterobasidium*), then with pits on only one side of the sheets ... **3.**
- 3a..** Live, infected trees exhibit copious basal resin flow or brown leachate; mycelial fans present as intact sheets under basal bark; decay is yellowish and stringy or spongy with black zone lines; advanced decay is surrounded by a yellowish to reddish stain with a water-soaked appearance; black, shoe-string-like rhizomorphs sometimes present under bark; sporophores in clusters of long-stemmed gilled mushrooms; decay on uprooted trees is fibrous on the outer roots, and sound within; many hosts in the tropics as well as temperate climates; secondary spp. include fir engraver, ambrosia beetles, Douglas fir bark beetle, pine engraver, western pine beetle, turpentine beetle, or mountain pine beetle; primary cause may be associated with *Phaeolus schweinitzii*, *Inonotus tomentosus* or *Verticicladiella* spp. ... ***Armillaria ostoyae*** complex (*A. ostoyae*, *A. mellea*, Shoestring rot, Fibrous outer root rot, Spongy root and butt rot, Honey mushroom) Decay resembles that of *Odontia bicolor*, which affects root centers.
- 3b..** Basal resin flow uncommon; decay occurs in small, white elongate pockets with black specks which merge over time to produce a spongy white mass; separated bark-wood surfaces are buff and flecked with white mycelia and streaked with darker lines; inner bark has white flecks; mycelial pads often present; thin, white mycelial mats occur in the bark; anise odor present; fruits are irregular whitish masses in crevices near the crown; white, fibrous, ectotrophic mycelia with black zone lines present on roots with a sound interior; conks are often present at the soil line, usually hidden under the duff; conks have white undersides with pores, a white interior, and a dark upper surface; stumps often present at center of infection; affecting most northwest conifers and some hardwoods; typically lethal to pines, but in other hosts less so, in those cases present more in the heartwood and inner sapwood (e.g., a heart rot) ... ***Heterobasidium annosum*** (*Fomes annosus*, *Fomitopsis annosa*, White spongy rot) Decay resembles *Phellinus pini*.
- 2b..** Advanced decay always laminated, with the separated sheets possessing round to oval pits on both sides of the separated sheets; setal hyphae reddish, whiskery; rot yellow to buff-brown; wood flaky; reddish stain ahead of advanced decay which later becomes chocolate brown at the edge of the heartwood; webs are found on the outside of the root bark; fruits are uncommon, exhibited as light-brown irregular masses; roots and lower boles infected with white to gray crusty, fine mottles of ectotrophic mycelia, often with black spots beneath the bark; windthrow in infection centers have "root balls" present with green tree crowns; secondary spp. include fir engraver, Douglas fir bark beetle, Douglas fir pole beetle, or hemlock engraver; susceptibility is grand fir > Douglas fir > hemlock; larch is resistant; pine and cedar are nearly immune ... ***Phellinus weirii*** complex (*Poria weirii*, Laminated root rot). Two forms exist, one primarily in western red-cedar, the other in Douglas fir, true firs and hemlock. Decay resembles *Phellinus ferrugineofusca* (*Poria ferrugineofusca*), which produces a uniform white rote with red-brown mycelium in holes or shrinkage cracks.
- 1b..** Decay manifest in the heartwood (HEART ROTS) and sometimes also in the roots (BUTT ROTS), or endotrophic root disease and heart rot with a dark color (*Phaeolus*).
- 4a..** Advanced decay light or dark brown and cubically cracked ... **5.**
- 5a..** Decay occurring within pockets of the wood, separated by intervening sound wood.
- 6a..** Decay present as dark, grayish-brown cubical cracks in heartwood columns and in 6-14" pockets in tops and boles of western redcedar; mycelium forms thin, whitish coverings on the cubes; sporophores rare, whitish crusts and patches ... ***Polyporus sericeomollis*** (*Poria asiatica*).
- 6b..** Decay brown and developing in the sapwood ... **7.**

- 7a..** Decay limited to sapwood, usually around cracks; occurring above 5,000 ft. elevation on coniferous logs and slash; sporophore a dark brown, hairy lumpy conk, without pores below ... *Stereum rugisporum* (Subalpine slash rot).
- 7b..** Decay extending into the outer heartwood; pockets elongate, avg. 6" or longer and 3" across, filled with brown, friable wood broken into small cubes; sporophores common ... **8.**
- 8a..** Sporophores with light- to dark-brown daedaloid gills ... *Lenzites saepiaria* (slash conk).
- 8b..** Sporophores poroid ... *Trametes americana* (Brown pocket saprot of conifers).
- 5b..** Decay not in pockets of the bole or otherwise different from above ... **9.**
- 9a..** Decay dark brown or reddish-brown ... **10.**
- 10a..** Decay confined to the heartwood column and originating in the root interiors (a root disease and heart rot); reddish-brown; forming 1" cubical cracks which crumble to fine dust when crushed; sporophore a flattened, brownish felt-covered shelf, several feet from the base of the tree ... *Phaeolus schweinitzii* (Felt-top fungus, cow-pie fungus).
- 10b..** Decay not limited to heartwood, or if so, then with decay cracks of different sizes and shapes ... **11.**
- 11a..** Decay in zones of the sapwood or outer heartwood ... **12.**
- 12a..** Brown cubical decay of coniferous or rarely hardwood sapwood only; sporophores common as irregular, sinuous masses raised slightly above the wood, poroid, sometimes daedaloid, with thick walls ... *Trametes heteromorpha* (Brown saprot).
- 12b..** Decay variable in color, with violet shades; eventually reaching the heartwood; found above 5,000 feet elevation; sporophores in rows, spongy above, poroid below; the upper surface eventually covering the lower ... *Polyporus leucospongia* (Subalpine brown saprot).
- 11b..** Decay not in zones limited primarily to the sapwood or outer heartwood ... **13.**
- 13a..** Decay cubically cracked in a fine, brick-like pattern on in-service wood ... **14.**
- 14a..** Mycelial mats are common in the shrinkage cracks; rhizomorphs are dirty-grey to brown, up to 30 ft long ... **15.**
- 15a..** Sporophores are white to purplish-black, shallow and poroid ... *Poria incrassata* (Building poria).
- 15b..** Sporophores are white to pale yellow, flat, chalky, and cracked ... *Poria xantha* (Brown cubical rot of timbers).
- 13b..** Mycelial mats are lacking in the shrinkage cracks; sporophores are leathery, flat to shelving, whitish with small deep pores and thin walls ... *Trametes serialis* (Dry rot).
- 13b..** Decay not in a fine brick-like pattern or not on in-service wood ... **16.**
- 16a..** Decay beginning in the sapwood and working down into the heartwood ... **17.**
- 17a..** Decay forming sharply delimited longitudinal spires of dark brown wood, extending into the outer heartwood; sporophore a thin brownish, poroid shelf, 1-3" across; on conifers ... *Polyporus fibrillosus* (Brown spire rot).
- 17b..** Decay of logs and downed trees only; at elevations above 5,000 ft; sporophore an orangish, irregular shelf, with elongate tooth-like pores ... *Polyporus alboluteus* (Subalpine brown rot).
- 16b..** Decay in the heartwood ... **18.**
- 18a..** Decay cube surfaces are nearly black, with thin white mycelial mats in the shrinkage cracks, which often follow the rings in a circular pattern; white flecking is apparent; rotten wood has an anise or turpentine odor; sporophore is a tough gilled fungus, with a thick, off-center cap, brown scaly surface and gills ... *Lentinus lepideus* (Brown cubical rot of conifers, scaly cap).
- 18b..** Decay surfaces not black ... **19.**
- 19a..** Thick, white mycelial felts obvious in the shrinkage cracks; mycelium and conks bitter; strictly a heart rot, more common in wet areas; sporophore a large, whitish elongate conk ... *Fomes laricis* (*Fomes officinalis*, Quinine conk).
- 19b..** Mycelium thin on cube faces; cracks both longitudinal as well as horizontal, color brown to purplish; common in slash and living subalpine conifers or up to 20 feet up the bole; cracks trees above the base rather than windthrow; sporophores an annual, crust-like olive paint ... *Coniophora puteana* (*Coniophora cerebella*, brown cubical rot of timber or trees, crack rot).
- 9b..** Decay light brown (*Lenzites saepiaria* and *Trametes americana* will be found in the alternate lead) ... **20.**
- 20a..** Found only on dead birch in heartwood and sapwood; cubical cracks not conspicuous; crushes to a fine powder; white mycelial mats in radial cracks; sporophore a soft, corky shelf ... *Polyporus betulinus* (brown rot of birch).

20b.. On conifers ... **21.**

21a.. Yellow-brown or slightly reddish-brown decay which crumbles with frequent cubical cracks; on sapwood and heartwood of dead trees and exposed parts of live trees; white mycelium within shrinkage cracks; yellow-brown discoloration appears ahead of advanced decay; the most common rot of slash and down timber; sporophores common; wide, thick shelves, white and poroid below, and reddish above, with a white, rounded margin... *Fomes pinicola* (red belt fungus).

21b.. Irregularly cracked cubes with a slight pinkish tinge; shrinkage cracks display white to rose-colored mycelial mats; typically found on dead trees, slash and timber in use; sporophores common on dead wood as small brackets with gray to black upper surfaces and finely pored, pinkish under surfaces ... *Fomes roseus* (*Fomes subroseus*, rose-colored conk).

4b.. Advanced decay light-colored, white, yellow, grey or a shade of these colors, but not brown ... (key not finished)