

Aspen Trunk Rot

Common conk on aspen

Pathogen—Aspen trunk rot (also called white trunk rot) is a stem decay (heart rot) of living aspen. It is caused by the fungus *Phellinus tremulae*.

Hosts—This pathogen occurs only on living aspen.

Signs and Symptoms—The fruiting body is a conk (shelf fungus). The top of the conk generally slopes down and the bottom slopes up, so it is roughly triangular in profile (fig. 1). It is hard and woody, black and cracked on top, and purplish brown with tiny pores on the bottom. Inside is a granular core at the point of attachment with a hard flesh layer above and a tube layer below. The conks are perennial and may live up to about 20 years. A new tube layer is produced each year at the bottom, but the layers are indistinct and difficult to count.

Decayed wood is firm to spongy, fibrous, yellowish tan, and often has a sweet, wintergreen odor. Decay columns rarely become hollow. Diffuse zone lines are scattered through the decayed wood (figs. 2-3), particularly in earlier stages near the edge of the decay column. The decay is a white rot. Because cellulose is only degraded as it is used by the fungus (unlike brown rot), decayed wood has some intact cellulose until very late stages and remains fibrous. Therefore, it can be used in limited proportions in products such as waferboard.

Disease Cycle—The pathogen infects branch stubs or small dead branches, eventually growing into the inner wood. It may infect wounds but does not require substantial wounds. It does not colonize dead trees and dies soon after the host dies. After decaying for perhaps 5 years or more, it begins to grow out to the surface along branch traces to produce conks. Microscopic spores produced in conks are airborne and travel long distances. Spores can cause infection if they land on a suitable point.

Impact—Aspen trunk rot is the most common stem decay of aspen in North America (but in a study in Colorado, incidence of *Peniophora polygonia* was slightly higher). More importantly, it decays the greatest volume of wood.



Figure 1. Fruiting body (conk) of *Phellinus tremulae*, the cause of white trunk rot of aspen. There are often multiple conks on one tree. Also, note the cavity excavated by a woodpecker. Such cavities are almost invariably excavated in aspens with white trunk rot, sometimes below the conk so that the cavity has an awning. Photo: Jim Worrall, USDA Forest Service.



Figure 2. Longitudinal section showing the extensive column of decay and zone lines. Photo: Jim Worrall, USDA Forest Service.

Aspen Trunk Rot - page 2

Infected trees lose an average of 70% of wood volume in cull. Stand age and site quality can be important. On good sites with deep soils and adequate moisture, incidence of decaying trees increased linearly with age from near 0% at 40 years to 91% at 160 years. Cull increased to roughly 50% at 160 years. On poor sites with dry, shallow soils, decay was higher, and less dependent on age. The pathogen may kill slow-growing trees directly by growing into and killing older sapwood. Tree breakage is another impact of particular concern in developed sites.

Phellinus tremulae provides important habitat for cavity-nesting birds (fig. 1), although in the long term it can also contribute to deterioration of aspen stands and loss of aspen cover type. Red-naped sapsucker, Williamson's sapsucker, downy woodpecker, and hairy woodpecker nest primarily in aspen in many areas. Nests are almost always excavated in trees with decay. Aspen may be important for nesting because it has stem decay much more frequently than other common tree species of the Rocky Mountains.



Figure 3. Cross section from a different tree that shows the bulge in the column where a conk was produced. Photo: Jim Worrall, USDA Forest Service.

Management—Compared to other decays, conks are reliably produced and are useful indicators for detecting and estimating decay: 75-85% of trees with cull due to aspen trunk rot have conks. Perhaps one additional tree may be infected, then, for every three or four trees with conks. Average cull for trees with conks is 82%, but only 40% for infected trees without conks. On a linear basis, decay generally extends 8-12 ft (2.4-3.7 m) in each direction from conks, and cull increases with number of conks.

Harvesting stands before decay becomes severe is probably the most effective management approach in stands managed for timber. Clonal variation in susceptibility to decay has been demonstrated. Clones differed not only in percent decay but also in position of rot columns and type of rot. Focusing management on clones with low levels of decay should result in future stands with the same resistance.

Partial cutting in aspen stands is strongly discouraged. Stands often deteriorate rapidly within 5 years after partial cutting. Wounding and subsequent canker infections, sunscald, and boring insects weaken and kill residual trees. Clearcutting is most likely to result in prolific sprouting of aspen. It interrupts succession to conifers and consequent loss of aspen cover type.

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Aspen Trunk Rot - page 3

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