

38. Phellinus Stem Decays of Hardwoods

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Species of *Phellinus* are associated with white rots of woody plants, and generally give a positive oxidase reaction on tannic and gallic acid media or with gum guaiac solution. In older taxonomic publications, the species now placed in *Phellinus* are found in the genera *Fomes*, *Poria*, and *Polyporus*.

Hosts and Distribution

Ten species of *Phellinus* occur on hardwood tree and shrub species in the Great Plains. *P. gilvus* is usually found on wood of dead trees, but it is occasionally found on live green ash, black locust, maple, and willow. *P. tremulae* (fig. 38-1) is restricted to aspen. Its range in North America, north of Mexico, is approximately the same as the range of aspen. *Phellinus igniarius* attacks live hardwood trees, especially birch, but it also has been found on ash, black walnut, poplars, buckthorn, and willow.

P. tuberosus (formerly *P. pomaceus*) (fig. 38-2) produces an extensive stem decay in live *Prunus* species,

especially American and chickasaw plums. *P. punctatus* (fig. 38-3) occurs on both live and dead hardwood trees and shrubs; it decays wood of live green ash, Siberian peashrub, American plum, lilac, willows (golden, diamond, Bebb), black locust, and common buckthorn.

P. robineae (fig. 38-4), a white-rot fungus, produces an extensive yellow-brown decay of living black locust (fig. 38-5) in the central and southern Great Plains. *P. weirianus* decays wood of black walnut. *P. everhartii* usually occurs on live trunks of oak, whereas *P. conchatus* occurs on dead wood of hardwood species. *P. ribis* has been found on live *Ribes* spp. in North Dakota. The ten *Phellinus* species and their known distribution in the Great Plains and surrounding states are described in table 38-1.

Symptoms and Signs

Sporocarps (fruiting bodies) develop on trunks and branches of trees and shrub species that have extensive wood decay. Characteristics of sporocarps and spores



Figure 38-1. Sporocarp of *Phellinus tremulae* on bole of an aspen tree.



Figure 38-2. Sporocarps of *P. tuberosus* on stem of American plum.



Figure 38-3. Sporocarps of *P. punctatus* and canker rot symptoms on bole of green ash.

Table 38-1. Geographical distribution and sporocarp and basidiospore characteristics of 10 *Phellinus* species that decay wood of hardwood tree and shrub species in the Great Plains.

Decay fungus	Geographical distribution	Sporocarp characteristics				Basidiospore characteristics			
		Size, cm ¹	Shape	Pores per mm hymenium	Context color	Pore surface color	Size, μm ²	Shape	Color
<i>Phellinus conchatus</i>	MAN,ND,MT,TX	<1x4x<1-7x12x1	Mostly resupinate; sometimes sessile	5-7	yellow-brown or darker	yellowish-brown to dark brown	4x3-5x4	subglobose	hyaline
<i>Phellinus everhartii</i>	MT,NE,KS,NM	2x4x2-15x36x15	Sessile, pileus convex	4-6	rusty brown	yellowish-to reddish-brown	4x3-6x4	subglobose to globose	chestnut-brown in KOH
<i>Phellinus gilvus</i>	MT,ND,NE,KS,OK,TX,NM	1x2x<1-7x12x15	Sessile or effused-reflexed; pileus solitary or imbricate	6-8	bright yellow brown	dark purplish brown	4x3-5x3	ellipsoid to ovoid	hyaline
<i>Phellinus ignitarius</i>	MT,ND,SD,NE,WY,CO,NM	3x5x2-15x20x12	Sessile or decurrent; pileus plane to convex	5-6	dark reddish brown	pale cinnamon brown to dark purplish brown	5x4-<1x5	broadly ovoid to subglobose	hyaline
<i>Phellinus tremulae</i>	CO,MT,NM,WY	up to 20x15	Sessile, developing at branch scars	6-7	dark reddish brown	purplish brown	4x4-5x4	subglobose	hyaline
<i>Phellinus tuberculosus</i>	MT,ND,NE,KS,OK,WY,CO,NM	<1x4x1-6x10x3	Sessile or effused-reflexed; pileus plane to convex	4-6	yellowish-brown to reddish-brown	dark yellowish to reddish-brown	4x3-5x4	ovoid to broadly ellipsoid	hyaline
<i>Phellinus punctatus</i>	ND,NE,OK,CO	—	Resupinate, becoming widely effused	6-8	—	yellowish to grayish-brown	6x5-8x7	broadly ovoid to subglobose	hyaline
<i>Phellinus ribis</i>	MAN,ND,MT,KS	1x1x<1-10x20x4	Sessile or effused-reflexed	7-8	brown	gray-brown to dark brown	3x2.5-4x3	ellipsoid to globose	pale rusty
<i>Phellinus robineae</i>	NE,KS,OK, TX,NM	3x5x1-20x30x15	Sessile; pileus appanate to unguulate	7-8	light reddish brown	yellowish to reddish-brown	5x4-6x5	ovoid to subglobose; flattened on one side	reddish-brown
<i>Phellinus weirianus</i>	NE,KS,OK, NM,TX	up to 3x8x8	Sessile, usually unguulate, sulcate	5-7	yellowish-brown	golden brown	4x3-5x3	subglobose to ovoid	pale yellow brown

¹length x width x height
²length x width



Figure 38-4. Sporocarps of *P. robineae* on bole of black locust.

that are useful in the identification of *Phellinus* species appear in table 38-1. Sporocarps are perennial, resupinate, effused-reflexed, or sessile. The context of the sporocarps is yellowish-brown to reddish-brown or purplish-brown, and darkens permanently to black in KOH solution. The hyphae may have simple septa but lack clamp connections. Setal hyphae and hymenial setae are present or absent; and basidiospores are cylindrical to globose, and hyaline to pigmented. The pore surface is yellowish-brown to purplish-brown, and the pores are circular to daedaloid.

All *Phellinus* species cause a white-rot decay. Wood of aspen decayed by *P. tremulae* is initially light pink to straw-brown, then chocolate-brown, and finally is reduced to a soft, spongy, whitened mass. The decayed wood is surrounded by conspicuous dark zones or black lines. Wood invaded by *P. tuberculosus* initially becomes brownish with flecks and streaks, and finally becomes soft and stringy. *P. robineae* reduces wood of black locust to a soft spongy yellow or brown mass (fig. 38-5). The decay extends outward from the center of the heartwood in a series of radial lines along the rays. Red-brown mycelial felts characterize the decay. Decay by *P. gilvus* is confined mostly to the sapwood, which is tan or cream-colored when completely decayed.

Disease Cycle

The process of decay in trees is complex, and involves invasion of wounds by a succession of microorganisms, including bacteria, yeasts, other nonhymenomycetous fungi, and wood decay fungi. The development of decay in trees is discussed in article 37. Most of the species of *Phellinus* that decay wood of living trees are confined to the non-living heartwood of their hosts.

Damage

Many windbreaks established throughout the Great Plains in 1935-1942 during the Prairie States Forestry Project have reached an age of declining vigor, and damage from stem diseases has become increasingly

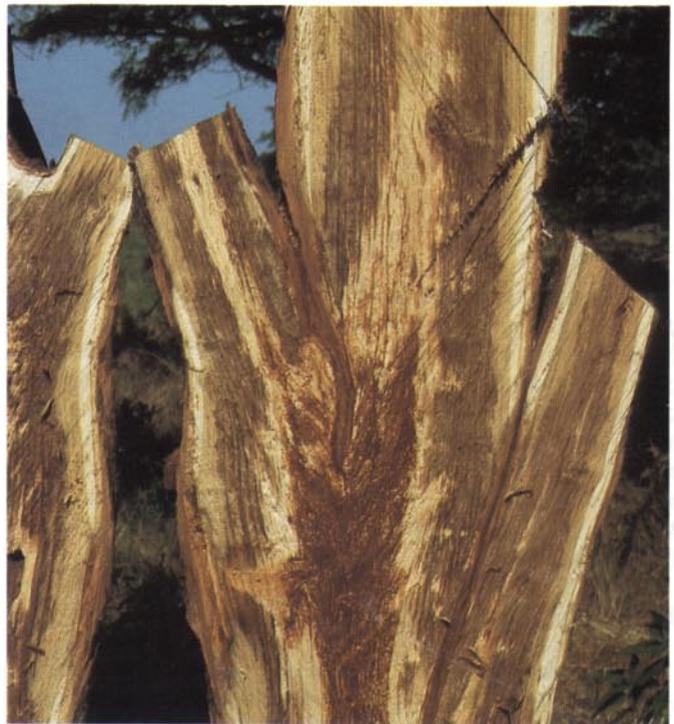


Figure 38-5. Longitudinal section of black locust with wood decayed by *P. robineae*.

serious. *P. robineae* occurs on black locust throughout the windbreak planting area in Oklahoma, and is the predominant stem decay fungus on this species. Incidence increases with tree age. About 25 percent of the black locusts in 40-year-old windbreaks in Oklahoma were infected with *P. robineae*.

P. punctatus is widespread in North Dakota, has a relatively wide host range, and occurs on about one-third of the sites that have hosts more than 20 years old. It has been found associated with canker rot on eight tree and shrub species in plantings and natural stands in the northern Great Plains. Based on sporocarp incidence, *P. punctatus* is the most important stem decay fungus on green ash in North Dakota Prairie States Forestry Project windbreaks.

Control

No direct control for stem decay fungi is known. Losses from these fungi can be minimized by use of certain preventative measures (see article 37 for such information).

Selected References

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