

# WOOD DECAY FUNGI IN LANDSCAPE TREES

*Integrated Pest Management for Home Gardeners and Landscape Professionals*

Several fungal diseases, sometimes called heart or sap rots, cause the wood in the center of trunks and limbs to decay. Under conditions favoring growth of certain rot fungi, extensive portions of the wood of living trees can decay in a relatively short time (months to years). This significantly reduces wood strength and kills sapwood storage and conductive tissues. Almost all species of woody plants are subject to trunk and limb decay. Table 1 lists several wood decay fungi on California trees and some of their common hosts and symptoms.

## DAMAGE

Decay fungi destroy the plant's internal supportive or structural components (cellulose, hemicellulose, and sometimes lignin). Decay is not visible on the outside of the plant, except where the bark has been cut or injured, when a cavity is present, or when the rot fungi produce reproductive structures. Wood decay makes trees hazardous because trunks and limbs become unable to support their own weight and can fall, especially when stressed by wind, heavy rain, or other conditions.

## IDENTIFICATION AND BIOLOGY

Many wood rot fungi can be identified by the distinctive shape, color, and texture of the fruiting bodies that form on trees. These structures, called conks or brackets, are often located around wounds in bark, at branch scars, or around the root crown (Fig. 1). Some decay fungi (such as *Armillaria mellea*) produce typical fleshy mushroom-shaped fruiting bodies at the base of infected trees (Fig. 2) after a rain in fall

or winter. Some fruiting bodies, such as *Armillaria* mushrooms, are annual (for example appearing soon after the beginning of seasonal rains), but most are perennial and grow by adding a new layer each year.

Decay fungi often are divided into white rots, brown rots, and soft rots. *White rots* break down lignin and cellulose, and commonly cause rotted wood to feel moist, soft, spongy, or stringy and to appear white or yellow. *Brown rots* primarily decay the cellulose and hemicellulose (carbohydrates) in wood, leaving behind the brownish wood lignin. Wood affected by brown rot is usually dry and fragile, readily crumbles into cubes because of longitudinal and transverse cracks, and commonly forms a solid column of rot in wood. Brown rot is generally more serious than white rot. *Soft rots* are caused by both bacteria and fungi. They decay cellulose, hemicellulose, and lignin, but only in areas directly adjacent to their growth. Soft rots grow more slowly than brown and white rots and usually do not cause extensive structural damage to wood of living trees.

Fungi that decay limbs and trunks are spread by airborne spores that infect trees through injuries and wounds. Injuries include pruning wounds, vandalism, and damage from machinery or construction. Wounds may be caused by sunburn, fire, ice, lightning, snow, or insects that bore into the trunk or branches. Some decay fungi, such as *Armillaria mellea*, principally infect the roots and can spread to nearby plants from the roots of infected hosts.

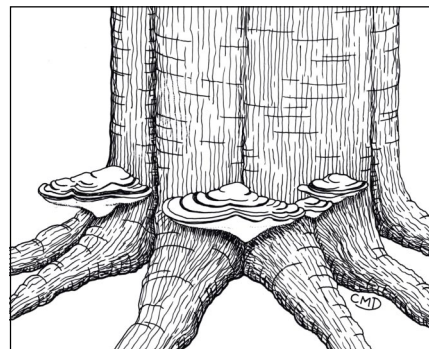


Figure 1. Conks on tree trunk.

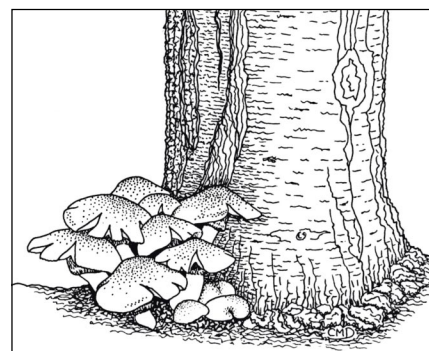


Figure 2. *Armillaria* mushrooms.

## MANAGEMENT

Wood decay is usually a disease of old, large trees. It is very difficult to manage, but a number of factors can reduce the risk of serious damage. First, trees should receive proper cultural care to keep plants vigorous. Minimize wood decay by protecting plants from injuries. Properly prune young trees to promote good structure and avoid the need to remove large limbs from older trees, which creates large wounds. Cut

**Table 1. Wood Decay Fungi on California Landscape Trees.**

Fungus	Trees commonly associated with	Description and comments
<b><i>Armillaria mellea</i></b> oak root fungus	most coniferous and broadleaved woody species	One of the most widespread plant diseases in California. Causes a white rot. When bark is removed, white or cream-colored mycelia are present between bark and wood of roots and trunk below soil line. Mushrooms may form at the base of affected trees following rains in fall and winter. Fungi enter susceptible plants by means of dark, rootlike structures called rhizomorphs found on the surface of affected roots. Growth is most rapid under wet conditions; decay has been slowed or stopped in some instances by removing soil from around the base of the tree and allowing areas to dry.
<b><i>Ganoderma applanatum</i></b> artist's conk	wide variety of ornamental trees including acacia, alder, ash, birch, citrus, elm, eucalyptus, fir, magnolia, maple, mulberry, oak, pepper tree, pine, poplar, sweet gum, sycamore, tulip tree, and willow	Fungus invades tree through wounds, kills the sapwood of some species, and causes white rot of sapwood and heartwood in roots and trunks of a wide variety of forest and landscape trees. Forms semicircular conks that are 2–30 inches wide and 1–8 inches thick. Upper surface of conk is brown and the lower surface is white, but turns dark when scratched, hence the name artist's conk. Stalks are absent. Fungus can spread through natural root grafting. Conks are usually found near ground level, but columns of decaying wood can extend as far as 15 feet above and below the conk.
<b><i>Ganoderma lucidum</i></b> varnish fungus rot	acacia, apple, ash, birch, boxwood, cherry, citrus, elm, hackberry, sweet gum, black locust, honey locust, magnolia, maple, oak, olive, peach, pepper tree, pine, poplar, redbud, spruce, and willow	Fungus causes a white rot and is capable of attacking living trees, causing extensive decay of roots and trunk. Can kill the host over a period of 3–5 years. On some trees, oaks and maples, the rate of decay is rapid. The red-brown, annual conks are up to 14 inches wide and coated on top with a distinctive varnishlike crust; generally appear at base of trunk during summer. Environmental stress, such as drought and wounding, may predispose trees to damage from this fungus.
<b><i>Laetiporus sulphureus</i></b> sulfur fungus	acacia, ash, beech, birch, cherry, chestnut, elm, eucalyptus, fir, hackberry, black locust, honey locust, maple, oak, pepper tree, pine, poplar, spruce, tulip tree, walnut, and yew	The fungus causes a brown heart rot of living trees but will also decay dead trees. Can enter tree through bark wounds and dead branch stubs. Fungus is one of the most serious causes of decay in oaks and one of the few fungi that cause decay in yew. The soft, fleshy, moist conks range from 2–12 inches wide and are bright orange-yellow above and red-yellow below. Conks are produced annually and appear singly or in clusters, usually in fall; they become hard, brittle, and white with age. Conks do not appear until many years after the onset of decay and indicate extensive internal damage.
<b><i>Pleurotus ostreatus</i></b> oyster mushroom	acacia, alder, ash, beech, birch, chestnut, elm, eucalyptus, fir, hackberry, holly, horse chestnut, linden, magnolia, maple, oak, pecan, persimmon, poplar, spruce, tulip tree, walnut, and willow	Fungus decays heartwood and sapwood, causing a white, flaky rot. Infections occur through open wounds and decay is most extreme when wounds are large. A cluster of shelflike mushrooms, each 2–8 inches wide, is produced annually and can indicate localized decay or heart rot that extends 10 feet in either direction. The mushrooms are smooth on the upper surface with gills that characteristically extend down along the stalk on the lower surface.
<b><i>Schizophyllum commune</i></b> common split gill	Over 75 species of landscape trees including acacia, ash, birch, camphor, elm, eucalyptus, fir, juniper, laurel, locust, magnolia, oak, oleander, pepper tree, pine, plane tree, poplar, sequoia, spruce, sweet gum, tulip tree, walnut, and willow	This fungus causes a white rot of sapwood and produces annual fruiting bodies that are hairy and white to pale brown when young but darken with age. The stalkless conks are tough, leathery, about 1–4 inches wide and usually found in clusters. The fungus colonizes trees that are stressed by heat, sunburn, drought, or major wounds. It generally occurs on cut and fallen wood and dead parts of living trees.

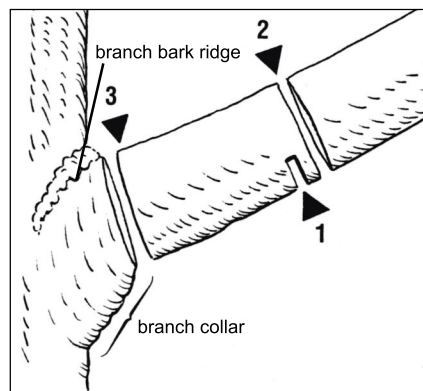
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Table 1. Wood Decay Fungi on California Landscape Trees, continued

Fungus	Trees commonly associated with	Description and comment
<b>Stereum sp.</b> parchment fungus	acacia, alder, birch, catalpa, cherry, chestnut, elm, eucalyptus, fir, juniper, magnolia, maple, oak, sequoia, spruce, sweet gum, tulip tree, and willow	This fungus is commonly found on dead trees, branches, and stumps but is rarely a cause of serious decay in living trees. One species, <i>S. gausapatum</i> , enters branch stubs and wounds and causes a white rot. The annual fruiting bodies are thin, leathery, bracketlike, lacking stalks, and 1 inch or more across. The upper surface is gray brown, and the lower side is brown. Some species exude a red fluid when injured.
<b>Trametes hirsuta</b> hairy turkey tail	alder, ash, birch, catalpa, cherry, chestnut, citrus, elm, eucalyptus, fir, ginkgo, holly, juniper, locust, magnolia, maple, oak, pine, poplar, redbud, spruce, sweet gum, sycamore, tulip tree, walnut, and willow	This fungus can enter a tree through dead wood exposed by fire scarring; decay begins as a sap rot and may continue as a heart rot on some woody species. Often produces fruiting bodies on the dead portions of live hardwoods; fruiting bodies are tough, leathery, usually stalkless, shelflike, and 1–10 inches wide. The outer surface is dry, velvety, and with concentric zones.
<b>Trametes versicolor</b> turkey tail	alder, apple, ash, beech, birch, catalpa, chestnut, cherry, crape myrtle, elm, eucalyptus, fir, ginkgo, hackberry, holly, juniper, laurel, lilac, linden, locust, London plane tree, maple, nectarine, oak, pepper tree, pine, poplar, redbud, sequoia, spruce, sweet gum, tulip tree, walnut, and willow	Fungus is commonly found on cut and fallen wood and on wounded areas of living trees; it is also capable of colonizing sapwood of trees and shrubs stressed by water shortage, sunburn, freeze damage, or wounding. The fungus, which causes a white, spongy rot of wood, can actively invade and rapidly kill the cambium, causing cankers with papery bark and dieback. The annual conks are thin, leathery, stalkless, bracketlike, 1–4 inches across, and often found in groups. The upper surface is velvety with concentric zones of various colors, and the lower surface is cream colored.

out dead or diseased limbs. Make pruning cuts properly (Fig. 3); prune just outside the branch bark ridge, leaving a collar of cambial tissue around cuts on the trunk to facilitate wound closure, but avoid leaving stubs. Make cuts so that rainwater will drain. Wound dressings are not recommended as they have not been found to hasten wound closure or prevent decay.

Trees that may cause personal injury or property damage if they fall should be regularly inspected by a qualified expert for signs of wood decay and other structural weakness. Hazardous trees may need to be trimmed, cabled, braced, or removed.



**Figure 3.** Remove a branch by making the pruning cut just outside the branch bark ridge and branch collar, as indicated by number 3. When removing a limb larger than about 2 inches in diameter, make three cuts in the order indicated. Make the first cut from below, about one-fourth of the way through the limb and 1 or 2 feet from the trunk. Make the second cut about 2 inches beyond the first cut, cutting from above until the limb drops. Make the final cut at number 3.

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