Wood Decay

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One of the most common types of diseases in trees

Have you ever noticed a mushroom-like object growing on a tree near your home? If so, it is very likely that wood decay has occupied the tree and is now causing a hazard. Wood decay is one of the most common types of disease in trees. Decay is considered a disease because it causes a progressive deterioration in wood strength over time. Trees become structurally weakened and subject to wind breakage and windthrow. This translates to safety issues when compromised trees are situated near homes, streets and other infrastructure.

Nearly all wood decay in living trees is caused by fungi. The possibility for decay begins when fungal spores are carried by wind, insects, pruning equipment or other means to a wound. Any opening into the interior of the tree will provide a potential site for fungal infection when environmental conditions are suitable. Wounds caused by weather, fire, animal, insect or human activities are common points of entry. Natural openings such as branch stubs, open knots, and dead branches are additional entrance courts.

Fungal invasion is usually more successful and common in the older, dead tissue in the center of a tree (heartwood), although a few fungi attack and kill the living tissue (sapwood). Many fungi begin decaying the host as a heart rot and later move into the sapwood. Some fungi cause primarily root and butt rots; others cause trunk rot; and others produce decay throughout the bole and in larger branches.

Not all wounds lead to wood decay. Although trees cannot repair or replace damaged tissues, trees compartmentalize injuries by producing chemical and physical barriers to pathogens, surrounding damaged area with wound wood/callus tissue, and growing new wood. Where wounding is minimal and tree response quick, decay will be checked. Where wounds are extensive and tree response slow, the decay fungus spreads and the tree is weakened. Resinous species such as Douglas fir, pines, and spruces are considered more resistant to decay than non-resinous species including hemlocks, true firs and hardwoods.

Field identification as to decay cause can be challenging and requires an understanding of rot type, fruiting body characteristics, and location of the rot within the tree. In the early phases of decay rot color can be highly variable, but in final stages, it is either brown or white due to the selective digestion of two principal constituents of wood: cellulose and lignin. Fungi that digest the cellulose and leave the lignin behind are called brown rots.

Brown rots create columns, or pockets, of decayed wood that is dark brown, dry, and fragile and tends to crumble readily or break up into cubes of varying size. Brown rots compromise less than 10% of wood decay fungi and most commonly attack conifers.

LEFT: White rot makes the wood soft, spongy and whiter than normal. *Photo by Nancy Crowell.*

RIGHT: Brown rot creates columns or pockets of decayed wood that is dark brown, dry and fragile. Brown rot tends to crumble readily or break up into cubes of varying size. *Photo by Nancy Crowell / WSU Skagit County Extension Master Gardeners.*

Fungi that digest both cellulose and lignin are called white rots; they make the wood soft, spongy and whiter than normal. The majority of decay fungi on deciduous trees cause white rot. In white rot decay, wood strength declines gradually over time; with brown rot, large amounts of strength loss occur early in the decay process. Common names for rots come from descriptions of appearance and texture, e.g., stringy or spongy white rot, white pocket rot, brown crumbly rot, or laminated root rot.

The most obvious indicators of internal decay are the presence of fruiting bodies on the outside of infected trees. These include the occurrence of mushrooms in the soil at or near tree base and bracket or shelf-like fungal structures, called conks, on trunks or branches. Conks are hard, woody, and hoof-shaped, and vary greatly in size, color and texture. They may be annual or perennial, but usually are evident more than a single season. Presence of a conk generally means rot several feet below and above the fruit. More, or larger conks, indicate a greater amount of decay. Absence of fruiting bodies does not mean the tree is free of decay.

Fruiting bodies of some fungi are produced only after extensive decay has developed; others may go unnoticed, because they are small, short-lived or produced infrequently. If conks or mushrooms are evident, then further inspection is needed to determine the full extent of the infection and to assess any decline in structural integrity. Indicators of decay in structural roots are particularly important because roots are much less accessible and a limited number of decay fungi fruit directly from roots.

There is no cure for wood decay. The best management approach is to prevent injury to trunks, branches and roots. Keeping trees vigorous accelerates formation of wound wood/callus tissues. Proper pruning of young trees promotes good structure and avoids the need for removal of large limbs from aging trees. Dead and diseased limbs should be removed. Use of tree wound dressing is not recommended; it does not check the invasion of wood decay fungus and may actually retard trees' natural processes of wound closure.

RESOURCES:

- Managing Insects and Diseases of Oregon Conifers. 2009. Shaw, D.C., Oester, P.T., and G.M. Filip. Oregon State University Extension Service EM 8980. Corvallis, OR.
- Diseases of Pacific Coast Conifers. 1993. R.F. Scharpf. USDA Agriculture Handbook 521. Albany, CA.
- Field Guide to the Common Diseases and Insect Pests of Oregon and Washington Conifers. 2006. E.M. Goheen and E.A. Willhite. USDS Forest Service, Pacific Northwest Region. R6-NR-FID-PR-01-06. Portland, OR.
- Field Guide to Tree Diseases of Ontario. 2004. C. Davis and T.Meyer. Northern Ontario Development Agreement's Northern Forestry Program Report TR-46. Ontario, Canada.
- Pirone's Tree Maintenance. 2000. J.R. Hartman, T.P. Pirone and M.A. Sall. Oxford University Press, New York, NY.
- British Columbia Softwoods – their Decays and Natural Defects. 1932. H.W. Eades. Forest Service Bulletin 80. Department of the Interior. Ottawa, Canada.
- Mushrooms Demystified. 1986. David Arora. Ten Speed Press. Berkeley, California.
- Physiology of Woody Plants. 1979. P.J. Kramer and T.T. Kozlowski. Academic Press. New York, New York.