The Plant Doctor's LANDSCAPE TIPS

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ROOT & BUTT ROTS OF TREES: RISKY BUSINESS

Photo 1: This large champion ash tree, located in Northern Michigan, is not necessarily smart because it exhibits brains; it is infected by a heart rot fungus as evidenced by the "brainy material" on the outside of the tree.

Photo 2: Root and butt rots are generally located low on the tree. This example on an old oak tree is likely caused by Innotus drydeus.

Photo 3: Heart rot infections may occur low on the tree but are more likely to be present above the root and butt rot areas of disease. This infection of a large old pruning wound by the fungus Climacodon septentrionalis makes this old sugar maple a threatening situation.

INTRODUCTION

Trees are susceptible to a wide variety of pests, diseases and other maladies. One category not given much attention by many arborists and landscapers involve tree decay issues. Trees may contract various root rots, butt rots and heart rots (Photo 1). Root rots, collar rots and butt rots are generally located low on the tree (Photo 2), while heart rot may also be located low or higher on the trunks of affected trees (Photo 3). These rots (or decay) may cause tree death and/or tree decline and/or tree structural problems (Photos 4, 5A & 5B).

Tree decay is most commonly caused by fungi belonging to the class Basidiomycota. Among many possible fungi, some of the common genera (first Latin binomial name) associated with decay are Armillaria, Heterobasdium (Annosum Root Rot), Ganoderma, Phellinus, Laetiporus, Stereum, Xylaria, Grifola, Kretzschmaria and Inonotus. Another class of "fungi" that may cause root and butt rots are the "watermolds" (Oomycota); Phytophthora and Pythium are prominent examples. Root and butt rot diseases should not be confused with vascular wilts, which are caused by other classes of fungi (example: Ascomycota) and which predominantly infect the vascular system of plants.

In this article, I'll attempt to cover in very brief, general terms some of the symptoms, detection and management of these root and butt decay diseases.

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Photo 4: Root and butt rots sometimes result in catastrophic failure as evidenced by the toppling of this large old Bur oak during a thunderstorm. Despite the obvious root /butt rot note that the foliage (left) appears full, normal sized and healthy in appearance.

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Photo 5A: This large, old red oak, affected by Armillaria root rot, toppled during an ice storm, just missing the cottage.

Photo 5B: Fructifications of Armillaria near the base of the tree (Photo 5A) in previous years revealed an infection by Armillaria root rot . . . probably precipitated by wounding of the roots during installation of a nearby septic drain field 15 years previously.

Photo 6: Heartwood decay often results in hollow areas and/or limb failure in trees. This peep hole signifies trouble for the stability of this maple, which has already lost several large branches.

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SYMPTOMS AND DISEASE CYCLE

Trees with root and butt rot infections may exhibit a wide range of symptoms. In the initial phases of infection, a tree may appear perfectly normal and healthy. As the decay continues, the tree may show unthrifty growth and off-color, unhealthy, stunted foliage. Tree death and/or catastrophic structural failure (toppling) may represent the ultimate, final signs of root and butt rot issues. In some instances, trees may appear perfectly fine until they fail structurally (Photo 4).

Most often root and butt rots proceed slowly, over many years in their attack of trees and eventually lead to problems such as structural failure and death. In trees affected by urban stresses, the decay often occurs more quickly. Structural failure may occur in the main stem (trunk, Photos 6 & 7), at the root collar region or in the roots (Photos 4 & 8). It is important to be aware of potential risks posed by root and butt rots. Because the progress of these diseases can take years, their presence does not necessarily imply imminent danger. However, due to the potential for trees to cause severe harm to humans or property, it would be very prudent to take these tree infections seriously. When checking for decay, it is important to note that some of the decay fungi will create cavities or hollow areas within trees (Photos 6 & 7). Other decay fungi may cause rot that results in punky wood. And yet decay by other fungi may result in fairly sound, intact wood (Photo 9) from which it may be difficult to discern rot by traditional methods such as resistance drilling, pounding with a mallet or by tomography.

Photo 7: Improper pruning practices of large branches often leads to decay. Unscrupulous or unknowledgeable tree trimmers can do long-term harm to trees during a brief period of time their contract calls for them to be on the property. It is wise not to prune large branches unless absolutely necessary.

Photo 8: The root/butt rot of this tree caused it to fail at or slightly below the soil line.

Photo 9: Examining the wood tissue of this failed tree shows fairly dense, sound wood. Note the infusion of the wood tissue by white fungal mycelium (fungus body). Sounding this wood with a mallet or resistance drilling or tomography may lead to erroneous conclusions.

In addition to symptoms (or lack of symptoms), the outward signs of infection of trees by these fungi are often disclosed by the production of reproductive structures (fructifications & mushrooms), which are given the generic term, "conk". Conks may or may not be produced every year (example, Armillaria, Photo 5B). Some grow annually much like trees do and exhibit rings of growth (example, Ganoderma) as they increase in size every year (Photo 10). The presence of a conk on the tree (Photos 1, 2, 3, 5B, and 10) or emanating from a tree's roots (Photo 11) may help us determine if a tree has a disease and may help us identify what fungus is involved in the butt rot, root rot or heart rot. In some cases, decay and the causal fungus may be practically inconspicuous or difficult to detect (Photo 12). People often feel vengeful if not relieved when they beat conks off of trees, thinking they have eliminated the culprit tree killer. While the removal of a conk from a tree may help to minimize airborne spore dispersal if caught early enough in the conk's development, it is important to note that the removal of the conk from the trunk or root collar area will not eliminate the fungal infection from that tree; the body of the fungal infection still resides within the tree and will continue to advance.

Disease Cycle/Fungal Dispersal/Dissemination: Most of these fungi can disperse themselves by two means: soilborne or airborne. Soilborne dispersal usually involves the growth of the fungus along roots from one tree to another (underground). Fungal growth often occurs in and along the cortex of the roots; hence, the fungus is transferred from tree to tree in an analogous sort of manner similar to Oak Wilt or Dutch Elm Disease. In some situations, such underground dissemination may result in "epicenters"– the infection and dying of trees in a radial pattern from a point source. Such epicenter progression of root and butt rots are usually revealed by failed trees in the center, unthrifty trees away from the center, and healthy trees beyond these zones. Airborne dispersal can occur over great distances by release of spores from conks. Infections from airborne spores usually occur to injured roots and stems (trunks) or by infection of stumps left when trees are removed. Stumps may serve as a food source for root and butt rotters, which build up their energy reserves from colonization of the stumps. In colonizing a stump, the fungus may enter into a soilborne phase by growing underground along roots to nearby trees…hence, starting an epicenter.

MANAGEMENT OF ROOT & BUTT ROTS

Fungi that cause root and butt rots are opportunistic pathogens: they usually require wounding, favorable environmental conditions or a food source to enact their destructive careers. Because trees that already have infections of the decay fungi cannot be cured, much of the efforts for managing these diseases need to be focused on avoidance, and prevention.

Stump Removal: Because stumps left by felled trees (dead or alive) may serve as food sources for decay fungi, it is wise to remove stumps and exposed roots in landscapes (or forests if practical). Stump grinding or removal with a backhoe can help

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Photo 10: While the mushrooms of many decay fungi (example: Armillaria, Photo 5B) grow and disappear every year, other decay fungi, such as Ganoderma, produce new annual growth rings each season, much like the growth rings of a tree.

Photo 11: The presence of these Xylaria "conks", aptly named dead man's fingers, discloses a root rot on the tree roots below the mulch.

Photo 12: Sometimes, decay and the causal organism are difficult to detect; the fungal fructifications may be inconspicuous or below grade. In this case Kretzschmaria, also known as "Burnt-Crust Root", is causing a butt rot. It may also cause root rot and cankers.

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prevent stump infections and subsequent infection centers from developing. Also, where trees have been infected or killed by a butt rot fungus, it may be advisable to remove the stumps and as many of the large support roots as possible.

Stump Treatments: Stumps can be treated with biological agents that hasten rotting and compete with the fungi that induce root and butt rots. For example, Trichoderma is a fungus that is sold as a natural biological control agent.

Monitor: For those situations where infections are already present but determined to be nonhazardous, it would be strongly advisable to monitor said trees for potential risks and continuing decay. Some decay organisms are practically inconspicuous (Photo 12), such as Kretzchmaria "Burnt Crust Root".

Avoid Wounding: Lawn mowers and weed trimmers that injure the lower trunks, roots and root collar areas predispose trees to infections. Hence, trees should not be injured in these regions if we are to avoid these lethal and risky diseases. Large limb wounds that are slow to heal are attractive to decay fungi (Photos 6 & 7).

Other Detrimental Cultural Practices: Excess mulch and frequent wetting of the lower trunk and root collar area by irrigation may predispose trees to infection by root and butt rotters.

Fungicides: Applications of fungicides have generally not proven to be effective in inhibiting the advance of decay fungi. This may be due to several reasons including that the culprit fungi are insensitive to the fungicides and that the fungi are protected inside the wood tissue.

Trenching/Root (Graft) Separation: Because decay fungi may spread underground along roots to the roots of neighboring trees, in some rare, high value situations, trenching may be employed to minimize root to root spread (where they may touch). Barriers can be placed in the trenches for long-term inhibition of spread.

Assess Risk/Consider Tree Removal: Even though root and butt rots tend to progress in a slow manner, trees affected by these diseases may eventually become risks to people and property. Trees that exhibit conks and/or associated decline or decay issues should be assessed for potential tree failure. Suspect cases should be considered for removal. Sometimes, sounding with a mallet, probing, resistance drilling and tomography may assist with determination of the extent of decay. Use of a supersonic air tool may also be helpful. Trees with large conks indicate long-term infections; such cases should strongly be considered for removal. Do not be deceived by healthy appearing tree crowns. L

The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.