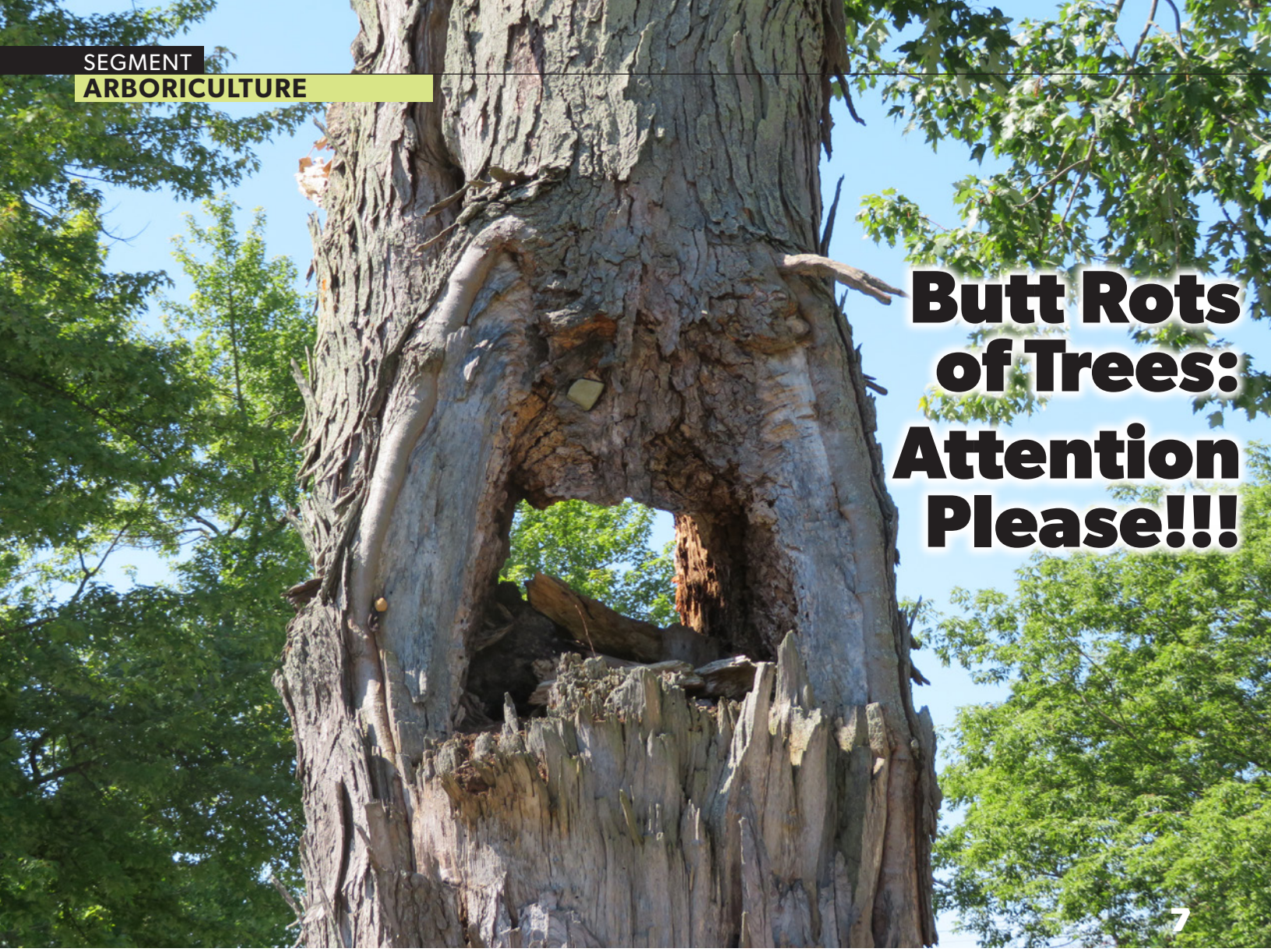
Butt Rots of Trees: Attention Please!!!



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ABOUT THE AUTHOR

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INTRODUCTION

Trees are susceptible to a variety of rot/decay diseases (Photo 1). Most are caused by fungi, the largest group of plant pathogens (disease agents). Root rot, butt rot, and heart rot are three general classes of diseases that can be amalgamated together under a general category of decay/rot. Root rots tend to occur on the root system of trees (Photos 2 & 3). Butt rots tend to occur in the butt or buttress area (Photo 4). Heart rot may occur anywhere throughout the tree, but is often found above the butt area of the tree (Photos 1 & 5). Root and butt rots may lead to heart rot and so forth. Tree decays are most commonly caused by fungi belonging to the class Basidiomycota. Among many possible fungi, some of the more common genera (first Latin binomial name) associated with decay are *Armillaria, Heterobasidion* (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. Tree rot/decay diseases should not be confused with vascular wilts, which are caused by other classes of fungi (example: Ascomycota) and predominantly infect the vascular system of plants.

A concern for all of these decay/rot diseases is that trees may undergo decline and eventually be killed. However, perhaps an even more important concern of rot and decay is the potential for catastrophic failure (toppling or limb breakage) of afflicted trees (Photos 3, 6 & 7).

In this article, I'll attempt to cover in very brief, general terms some of the symptoms, detection and management of these decay diseases, which for the sake of brevity I'll simply conjoin under the topic of Butt Rot.

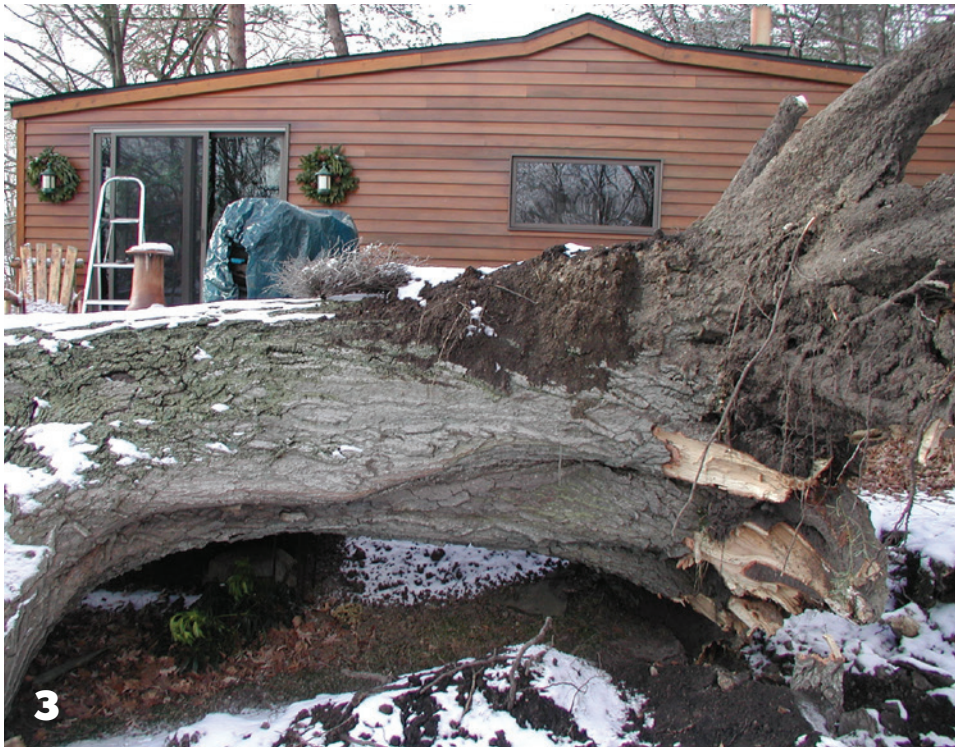
Symptoms and Disease Cycle

Symptoms: Trees with 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 (entire tree toppling or limb failure) 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 6).

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 7 & 8), at the root collar region or in the roots (Photos 2, 3, 4 & 6). 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 potential for trees to cause severe harm to humans or property, it

1 This champion ash tree, located in Northern Michigan, may be considered smart because it's exposing its brains. In reality, the tree is infected by an internal heart rot fungus as evidenced by the "brainy material" (reproductive structure) on the bark of the tree.

2 Root rots tend to occur on the roots of plants. Fructifications (mushrooms=reproductive structures) of *Armillaria* near the base of this red oak likely signify a root rot disease. This infection was probably precipitated by wounding of the roots during installation of a nearby septic drain field 15 years ago.



3 Several years after Photo 2 was taken, this red oak toppled during an ice storm, narrowly missing the cottage. *Armillaria* was probably a major contributor to the tree's structural failure.

4 Butt rots are generally located low on the tree. This example of an infection on an old oak tree is caused by *Innotus drydeus*. Such advanced infections may lead to catastrophic failure.

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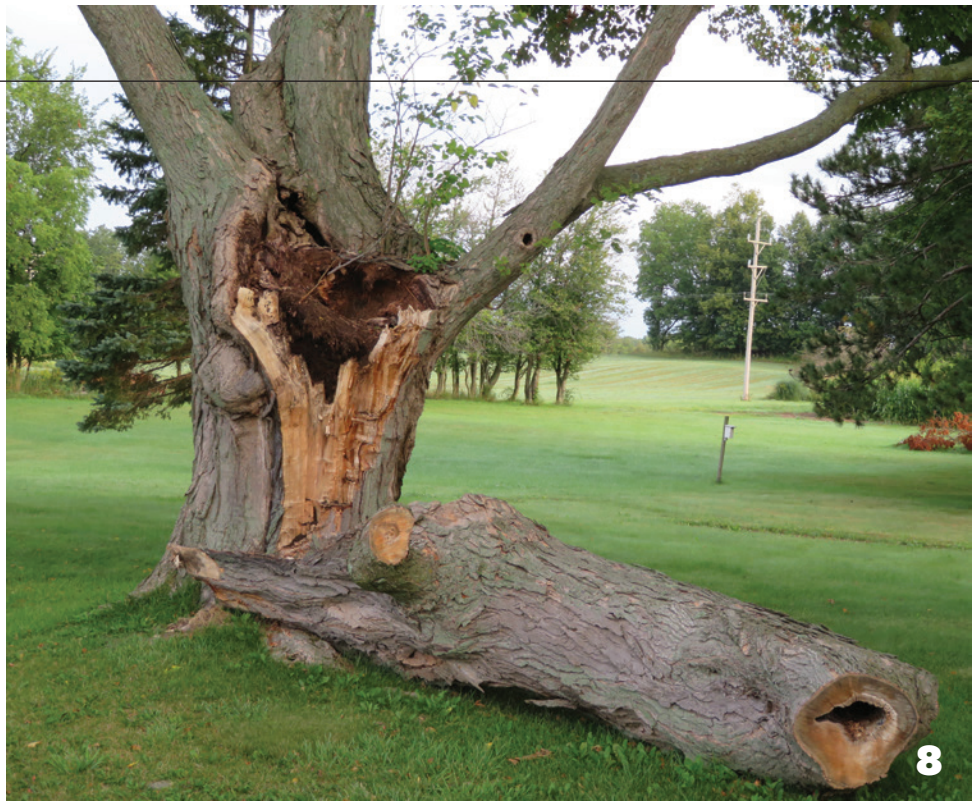
would be very prudent to take these tree infections seriously. When checking for decay, it is important to note that some of the decay fungi will create cavities or hollow areas within trees (Photos 5, 7 & 8). Other decay fungi may cause rot that results in punky wood. And yet decay by other fungi may 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.

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 often described by the generic term, "conk". Conks may not be produced every year (example, *Armillaria*, Photo 2). 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 or near a tree (Photos 1, 2, 4, 5, and 10) or emanating from a tree's roots (Photo 11) may help us determine that 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

5 Heart rot infections may occur low or high on the tree; they are more likely to be present above the root and butt rot areas. Here, *Climacodon septentrionalis* infected a large pruning wound and makes this old sugar maple a liability, especially in a heavily trafficked area.

6 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.

7 (Full photo on first page of article) Heartwood decay often results in hollow areas and/or limb failure in trees. This peephole signifies trouble for the stability of this maple, which has already lost several large branches.



causal fungus may be practically inconspicuous or difficult to detect (Photo 12). People often try to avenge the dastardly fungus by beating 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. Nevertheless, destroying the conk may be satisfying for some individuals who need to relieve tension about the tree infection or other personal matters.

Disease Cycle: Most of these fungal pathogens 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). Such fungal growth generally 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, except the fungus is not "systemic". In some situations, such underground dissemination may result in "epicenters", the infection and dying of trees in a radial pattern from an original point source. Some of these epicenters may expand for decades or even centuries. One such epicenter of *Armillaria* has resulted in a fungal mat area the size of 2,200 acres or about over 1,665 football fields in Oregon… and has been declared the world's largest organism.

Airborne dispersal can occur 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 these opportunistic decay fungi, 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 a new epicenter (Photo 13).

Management of Root & Butt Rots

Fungi that cause Butt Rots are opportunistic pathogens: they usually require wounding, favorable environmental conditions and/or a food source to enact their destructive livelihoods. Because trees that already have

8 Improper pruning practices of large branches often lead to decay due to slow healing and slow wound closure. 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 not wise to prune large branches unless absolutely necessary.

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.

10 While the mushrooms of many decay fungi (example: *Armillaria*, Photo 2) may 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.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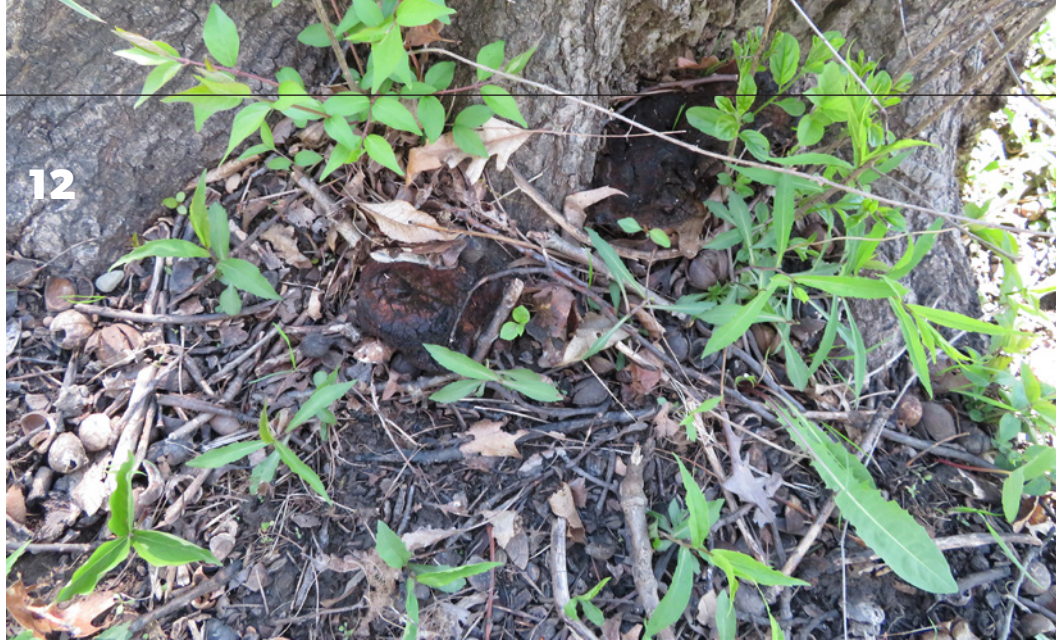
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infections of decay fungi cannot be cured, much of the efforts for managing these diseases need to be focused on avoidance and prevention.

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 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 under the trade name Trianum. Such products may also provide some protection for live trees.

Monitor: For those situations where infections are already present, it would be strongly advisable to monitor said trees for potential risks and continuing decay. Also, some decay organisms are practically inconspicuous (Photo 12, *Kretzschmaria*, "Burnt Crust Root").

Avoid Wounding: Lawn mowers and weed trimmers that injure the lower trunks, roots and root collar areas predispose trees to infections (Photo 4). Hence, trees should not be injured in these regions if we are to avoid these lethal and risky diseases. Large

pruning or storm-incited wounds that exhibit slow healing are prime targets of decay fungi (Photos 5, 7 & 8).

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 lack of control 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 underground transmission.

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 usually indicate long term infections; such cases should strongly be considered for removal. Do not be deceived by healthy appearing tree crowns. Arborists and landscapers who service trees need to heed issues posed by decay/rot fungi because the public often considers these plant health care service providers as experts.

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

12 Sometimes, decay and the causal organism are difficult to detect because 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.

13 This entire disease cycle of a fungal decay/rot, in this case *Armillaria*, is displayed in this photo. The stump on the left was likely colonized by airborne spores. Gaining energy from the stump substrate, the fungus moved underground killing the adjacent young spruce tree. Subsequently, the fungus grew along roots where it is sporulating (mushrooms) near its next victim. Airborne spores from these mushrooms may initiate new epicenters.