

Understanding Decay In Florida Trees

An explanation and pictorial guide to some of the more common decay fungi observed on Florida Trees

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Decay in laurel oak and waxmyrtle caused by *Inonotus rickii*

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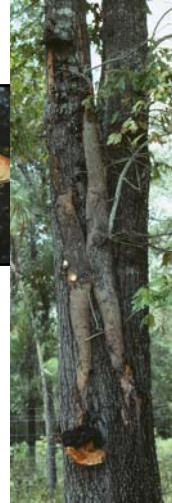
Decay in living trees is a biological process. It is caused primarily by fungi with the enzymatic capability of digesting the complex polymers of which wood is comprised (cellulose, hemi-cellulose and lignin). Most of these fungi are basidiomycetes; although some ascomycetes cause decay as well. Basidiomycetes are fungi that typically reproduce sexually by means of microscopic basidiospores produced in fructifications such as mushrooms or single- or multi-layered bracket- or hoof-shaped “conks” on or near their host trees. Decay-causing ascomycetes typically produce their sexual spores in darkened, carbonized crust-like structures called stromata (sing.; stroma). Technically, most decay fungi are saprophytes in that they usually colonize and decay only dead wood tissues (heartwood or sapwood). However, to the extent that decay fungi attack living wood tissues and/or occur on living trees, they can be considered parasites and pathogens as well. Decay occurs naturally as trees age and senesce, and opportunistically in younger trees where fungal entry is facilitated by stem, branch or root breakage or wounding. The decay process occurs over extensive periods of time as the microscopic filamentous vegetative strands (hyphae; sing., hypha) of decay fungi grow in and through wood tissues of their host trees. Wood decay is a natural process and provides ecological values such as habitat for numerous animals and birds and the recycling of nutrients and organic material, etc. On the other hand, decay eventually renders trees vulnerable to breakage or uprooting. Seriously decayed trees and/or branches are often considered safety hazards, depending on their location.

Wood decay has been studied extensively in certain tree species in some parts of the country. In Florida, extensive studies are essentially nil. There is much to be learned about fungus-tree relationships in Florida and, in particular, the types and aggressiveness of decay that result from their various associations.

Fungus: *Inonotus hispidus*

Hosts: Many hardwood/deciduous tree species; especially oaks in the southern U.S. and Florida.

Notes: This fungus causes both a heart rot and a “canker” (death of the tree’s cambium) where it grows out through the sapwood and into the cambium of its host tree. The damage is often referred to as “hispidus canker”. Cankered tissue may be substantially elongated up and down infected stems and is often surrounded by distinct ridges or folds of callus tissue. Conks are annual in nature. Young conks are yellow to yellow-brown. Old, inactive conks turn dark brown to black, and remnants of same may be found on or near cankers or on the ground beneath cankered stems.



Fungi: *Biscogniauxia* (formerly *Hypoxylon*) species

Hosts: Various hardwoods/deciduous tree species; very common on declining or dead oaks in Florida.

Notes: These ascomycete fungi are widespread and common. Certain species appear to live in their vegetative state in the bark tissues of perfectly healthy trees. As oaks are subjected to drought stress and excessive heat, *B. atropuc-tata* (and sometimes *B. mediterranea*) penetrates into the trees’ compromised



xylem (sapwood) tissues, “finishing off” ailing trees. The former fungus is recognized by its sheets of dusty tan, powdery asexual spores (conidia) or crusty, silver-gray sexual stromata (sing.; stroma) that appear as chunks of bark begin to slough off infected trees. The jet black crusts (sexual stromata) of *B. mediterranea* have resulted in infections caused by this species being called “coal canker”. Infections generally have been referred to as *Hypoxylon* cankers, but the fungi are also capable of sapwood decay as their host trees succumb to infection.

Fungi: *Ganoderma* species (often *G. lucidum*; *G. zonatum* on palms)

Hosts: Various hardwoods/deciduous tree species and palms. Occasionally affecting pines.

Notes: *G. lucidum* causes a root and butt rot on many hardwood species, often resulting in tree die-back or death. The fruiting structures of *G. lucidum* may occur as bracket-like conks on tree bases or as “toadstools” (which are ultimately attached to tree roots) near or some distance from infected trees. The fruiting structures of *G.*

lucidum are initially white, turning to yellowish and then appearing as red to red-brown and “varnished” on top. Undersides of the fruiting structures are white when fresh and minutely poroid. Stems of the toadstool forms of *G. lucidum* are often attached to one side as opposed to the center of the toadstool caps. *G. zonatum* causes a deadly root and butt rot of palms in Florida.



Fungus: *Kretzschmaria deusta* (syn. *Hypoxylon deustum*, *Ustilina deusta*)

Hosts: Various hardwoods/deciduous species. Common on *Ficus* spp. in south Florida.

Notes: This ascomycete fungus causes a basal canker and butt rot of its hardwood hosts. Its sporulating stromata (both asexual and sexual) are often undulating or lumpy and vary in color from grayish white to copper-brown to brown and then black, depending on stage of development.



Fungus: *Phellinus* and related species

Hosts: Various hardwoods/deciduous species and conifers

Notes: Several species of *Phellinus* cause heart rots on various hardwood species.

Others, especially one commonly occurring on live oaks, may simply be bark saprophytes. Conks of *Phellinus* species are usually characterized by a hard, woody texture. Colors are varied from gray to brown to blackish, and old conks may be fissured or cracked. Conks of some species are perennial, producing annual layers of poroid spore producing tissues. *Phellinus pini* is a normal heart rot fungus on old age conifers, including pines. *Fomes fomentarius* (above left) is common on decaying redbays.



Fungus: *Hexagonia hydroides*

Hosts: Various hardwoods/deciduous species

Notes: This fungus is largely saprophytic, decaying dead wood tissues. Its conks are distinctively characterized by a dense mass of dark brown stiff hairlike structures on their upper surface. The underside is a smooth brown surface with minute pores throughout.



Fungus: *Schizophyllum commune*

Hosts: Many hardwood/deciduous species, and certain conifers.

Notes: This fungus is primarily a saprophytic fungus, but will be found on the bark of live trees in association with wounds, etc. The small, hairy annual fruiting structures are convex, whitish in color and typically occur in clusters. Fruiting structures may darken with age. The undersides of these fruiting structures are characterized by distinctive bifurcate gills.



Fungus: *Inonotus rickii*
(*Ptychogaster cubensis*)

Hosts: Various hardwoods, including waxmyrtle and oaks in Florida.

Notes: Quite common on waxmyrtles in Florida, especially mature to overmature waxmyrtles. Also known on oaks, silver maples and citrus in Florida.

“Bleeding” or exudation of sap at branch stubs or bark fissures is common, giving appearance of “coffee or tobacco juice staining”. Asexual fruiting structures are dark amber-brown in color and appear as dusty “goats’ beards” or goatees.



Fungi: *Laetiporus* species

Hosts: Wide variety, including both hardwoods and conifers.

Notes: This is a complex of species that formerly was “lumped” as *L. sulphureus*, in part because of the distinctive sulfur-yellow to bright orange color of fresh conks. Conks are annual in nature and occur in larger overlapping bracket-like clusters with whitish or sulfur-yellow poroid undersides. The fungi cause a brown cubicle rot in infected trees. Presence of this fungus usually indicates extensive internal decay and such trees should be inspected.

Fungi: *Armillaria* species

Hosts: Hardwoods, Conifers, and even Palms

Notes: *Armillaria* species are opportunistic colonizers of the roots and butts of injured or physiologically stressed trees. The honey-tan, clustered mushrooms with



gilled undersurfaces are characteristic. Mushrooms may occur on tree bases, stumps or nearby attached to infected roots. *Armillaria* (presumably *A. tabescens*) is a killer of oaks and other species in Florida.

Fungi: *Porothelium* species (syn. *Poria* spp., *Stromatoscypha* spp.)

Hosts: Various hardwoods and conifers including *Quercus* spp.

Notes: The taxonomy of these fungi is complicated and in a state of flux. The white to cream-colored and poroid sporophores are thin and appressed to host tissue surfaces – often confused for large lichens. Occasionally these are seen on the bark of live oaks in Florida. Although these fungi are capable of wood decay, it appears that specimens observed on live oaks in Florida are saprophytic on dead bark tissues (ref. *Phellins* spp.—above).



Fungus: *Trametes versicolor*

Hosts: Many species — mostly hardwoods

Notes: “Turkey tails” are common on dead hardwood stems and logs. The thin leathery sporophores have white to pale brown and poroid undersurfaces and characteristically display concentric rings of various colors on their upper surfaces. This fungus decays dead sapwood, although it may occasionally kill live cambium tissues of some species such as apple (*Malus* spp.) causing cankers.



Management

(Dealing with Decay)

Management or “control” of decay in trees is primarily a matter of prevention. Plant trees properly in habitats and spaces where they can flourish. Avoid disturbance of and injury to trees in place. Use proper pruning techniques when trimming or pruning ornamental trees to facilitate proper wound closure (“healing”). If trees are showing symptoms and signs of decay, assessment of decay severity and associated safety hazards are recommended. Remove branches and trees that are seriously decayed and represent threats to people and property.

Assessing decay in trees is not easy and is often a matter of “guesswork”. Professional assistance may be desirable to assure proper assessment, but even professional assessments can be inaccurate due to the lack of detailed information available on specific fungus-tree relationships. Certified arborists, foresters and knowledgeable extension agents may be of some assistance.

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Armillaria image by Dr. Albert (Bud) Mayfield, U.S.D.A., U.S. Forest Service

Smaller *Kretzschmaria deusta* images by JC Schou @ Biopix .com and www.wildaboutbritain.co.uk

Far left *Phellinus* image by Marc Hughes, University of Florida

Large *Schizophyllum commune* image at www.gen.wur.nl

Small *Trametes versicolor* image by Clive Shirley at www.fcps.edu

**Funded with support from the national Forest Health
Monitoring Program through the U.S. Forest Service,
Region 8, Forest Health Protection**