How To

IDENTIFY AND CONTROL HYPOXYLON CANKERS OF OAKS AND OTHER HARDWOODS

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Southern Region

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Hypoxylon cankers are common throughout the South on oaks and other hardwoods where they normally occur on stressed hosts (figure 1).

Figure 1.--Trees stressed by construction damage.

This disease should not be confused with *Hypoxylon* canker of aspen, which is caused by a different fungus. The canker is caused by one or more species of fungi in the genus *Hypoxylon*. Found in the outer-bark areas of living and healthy trees, the fungus is normally of little consequence. However, it can severely injure or kill trees weakened by factors such as drought, root disease, mechanical injury, logging, or construction activities. These agents of stress enable the fungus to move into the xylem and produce cankers on the branches and trunk. Apparently, the fungus is activated by reduced moisture in the xylem and bark. Once this low-moisture threshold is reached, the fungus quickly spreads. Especially in droughty areas, *Hypoxylon* fungi are often closely associated with tree death. Other fungi found in weakened trees may also play a role.

In recent years, more oaks have been dying across the South. In many cases, the affected trees are victims of oak decline, a complex of

environmental stress, site factors, and living agents, of which *Hypoxylon* canker is a major contributor.

Identification

Trees infected with *Hypoxylon* often develop severe injuries on the branches or trunk. They may also exhibit crown dieback (figure 2).

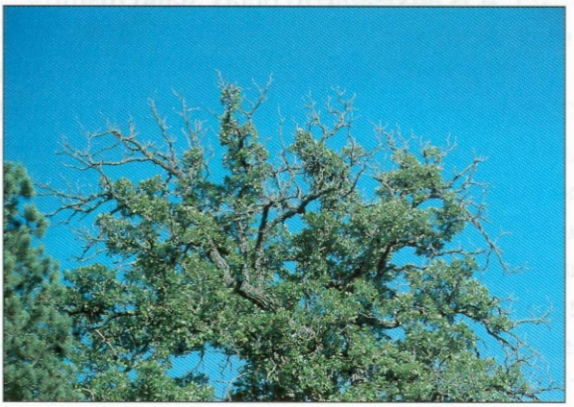


Figure 2.-- Crown dieback associated with Hypoxylon canker.

Large patches of bark of infected trees often slough off along the trunk and major branches (figure 3), revealing the fungus fruiting bodies.

Figure 3.--Hypoxylon canker on the main branches.

As infection progresses, the sapwood turns dull yellow, often with black zone lines (figure 4).

Figure 4.--Dull, yellow sapwood decay with black zone lines

In spring or early summer, powdery greenish to brown or gray masses of the spores (conidia) are produced on the surface of crusty, fungal tissue patches (stromata). These stromata are the most obvious signs of *Hypoxylon* canker. They vary from less than 1/4 inch to 3 feet long or more, running along the stem and main branches. In the summer or early fall, these stromata thicken, harden, and turn silver or bluish-gray (figure 5), to brown or to black (figure 6) depending on the *Hypoxylon* species.

Figure 5.--Silver-gray fruiting body on trunk.

Figure 6.--Black fruiting body on chestnut oak.

Small, slightly raised dots may be found on the surface of these masses (figure 7). These are the tops of small chambers where a second type of spore (ascospore) is produced.

Figure 7.--Small, slightly raised dots on stroma where ascospores are produced.

How do trees become infected?

The most abundant species of *Hypoxylon, H. atropunctatum*, infects trees when they are seedlings. This fungus develops within the inner, living bark. As the tree grows, the fungus continues to grow but does not enter the sapwood. Insect defoliation or drought, or other weather extremes exert stress on trees that may activate the fungus. Once fruiting bodies develop, the disease spreads from tree to tree via airborne spores.

Hazard rating stands and trees

Many species of oak (and to a lesser extent, hickory) throughout the South are hosts to *Hypoxylon* canker. Trees growing on clay, sandy, rocky or other poor soils are highly susceptible to this disease, particularly during

extended drought. Some of the most commonly affected oak species are post, southern red, white, water, and blackjack. Nevertheless, all oak species are vulnerable under conditions favorable to the development of the fungus.

Any condition that reduces vigor can predispose trees to *Hypoxylon* canker. Site and species factors also influence susceptibility. When put together these factors could show whether *Hypoxylon* canker may be likely to present problems in a given stand. Some of the more important factors to consider are:

- Tree Species—Oaks as a group are more susceptible.
- Site—The disease is more common on droughty soils.
- Site Changes—These could include flooding, erosion, etc.
- Tree Age—All ages, except seedlings, are susceptible, but older trees are more so.
- Tree Injury— Logging injury, root injury, soil compaction caused by construction activities, lightning strikes, insect defoliation, and spring frost are all examples of stress factors that can cause *Hypoxylon* canker to flourish.
- Tree Exposure — Forest trees are sometimes suddenly exposed to intense sunlight or site changes. In response, trees often undergo physiological changes. The result may be lower vigor and subsequent *Hypoxylon* canker-caused decline and death.

What to do in forested areas

In forested areas, the key is prevention. Forest management practices such as thinning are very beneficial and increase tree vigor. However,

improperly applied practices can actually worsen *Hypoxylon* infection through injury, exposure, and site changes. Basically, any forestry practice that increases stand vigor is encouraged. Conversely, any practice that stresses trees must be evaluated very carefully. Often, you must consider whether active stand management is likely to increase or decrease damage from *Hypoxylon* canker. It is advisable to delay stand disturbances during drought.

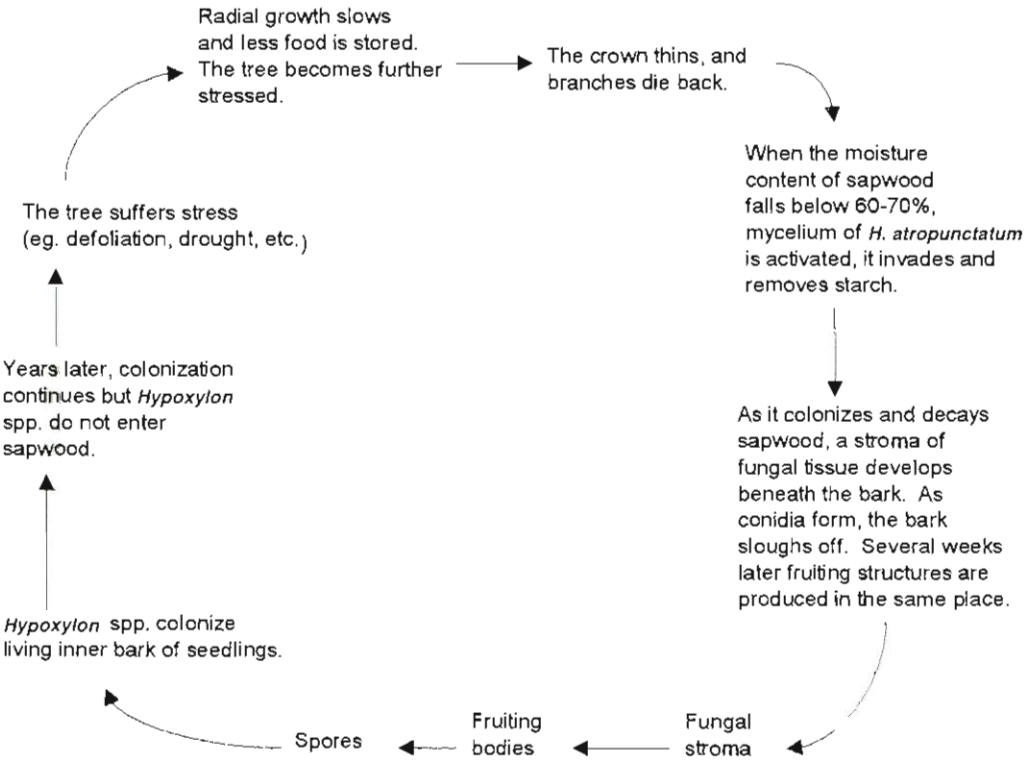
When *Hypoxylon* canker is present in a forested stand, evaluate it from the aspect of tree species and number of trees affected. If practical, salvage infected trees before they die. Proceed carefully, because the stress of logging may aggravate stand stresses. If removal of infected trees may result in an understocked stand, consider a final harvest cut. Then regenerate with species that are immune or resistant to *Hypoxylon* canker. An option for large forests is to set aside infected timber stands for other objectives such as wildlife.

What to do in urban areas

The key to *Hypoxylon* canker-free trees is prevention. Minimize injury to trees during construction (especially trenching). Avoid herbicide injury and minimize site changes. These steps will help maintain tree vigor. Fertilization, watering during droughts, and mulching will help ward off losses to *Hypoxylon* canker. For high-value trees, consider lightning protection. When planting trees be sure to select the appropriate species, the proper site and use good planting techniques.

Trees showing fruiting structures of *Hypoxylon* usually will not survive, regardless of treatment.

Carefully prune branches that have a local infection to help slow the advance of the fungus.



Life Cycle of *H. atropunctatum*

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