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Why is my oak tree dying?

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The title reflects the most popular greeting line I have received when answering my office phone over the past month. My usual response to the statement is as follows: “Well, we are not sure...can you send a sample of your dying tree to Plant Disease and Insect Diagnostic Laboratory (PDIDL) at Oklahoma State University?” Unfortunately, when our diagnostician examines the samples we often find no disease causing pathogens. We have examined leaves, twigs, roots and wood. We have conducted fancy laboratory assays, used good old-fashion culturing techniques and have been unable to definitively determine the cause of the ailment affecting many oak plantings in Oklahoma. We often find opportunistic organisms associated with these samples. However, the presence of these organisms does not suggest or refute that they are the primary cause of the death of the tree (this will be discussed below).

I have visited several sites around the state, including forest areas and landscape sites. I have noted that several oak species appear to be in a state of decline in those areas. Symptoms of decline can include sparse canopies, slow growth, browning of leaf margins, defoliation, premature autumn color, abnormally large crops of fruit, and dieback of branches and twigs. A decline is defined by Sinclair and Lyon (2005) “as a loss of vitality and is a natural part of the life cycle of all higher organisms...while premature decline reflects the influence of stressing factors over many years.” Stressing factors can be living (biotic) or non-living (abiotic). These factors can work by themselves or in concert with each other.

Sinclair and Lyon (2005) explain tree decline by several models:

- **Decline caused by constant stress from a single factor** – These factors may be biotic or abiotic. Biotic factors include organisms such as viruses, phytoplasmas, certain fungi, and insects (those that can parasitize non-stressed trees) that can continuously attack and irritate a tree to the point of decline. Abiotic factors such as air and soil pollution can also cause decline.
- **Decline caused by drastic injury plus secondary stress** – Factors such as severe drought stress or mechanical injury can lead to damage by opportunistic insects and fungi (organisms that typically aren’t considered pests, but can act as pests on stressed trees) resulting in persistent damage that leads to decline.
- **Decline caused by interchangeable predisposing, inciting, and contributing factors** – Trees are weakened (predisposed) by physical (e.g. drought, freeze damage, mechanical damage, site disturbance), chemical (e.g. nutrient imbalance, soil acidification) and

biotic (e.g. insects, fungi, bacteria, viruses, nematodes) factors that can act singly or in combination in a manner that one more stressing factor (or the predisposing factors themselves) can tip the scale to tree decline.

- **Cohort senescence** – Trees of a particular cohort reach a point where their biomass is no longer supported by the resources at a particular site. Age of trees and competition in the area play major roles in this type of decline. Therefore, if trees in a particular area are very old, then decline in that particular location might be considered “normal.”

Obviously decline can be a very complicated process and may be difficult to identify. However, my recent visitations coupled with the evidence from samples sent to our diagnostic lab suggest that we may be experiencing a sort of decline. We have experienced rather extreme weather conditions over the last several years in Oklahoma. Environmental stress induced by severe drought across much the State in 2006, an overabundance of water in 2007, and temperatures that change drastically from unseasonably cool to abnormally hot may have predisposed many trees to attack by various organisms. I have also identified stressed trees where sites have been disturbed by construction and the trees were subjected to improper care, (e.g. over watering, under watering etc.). Some microorganisms (e.g. fungi) that are frequently associated with previously stressed trees include *Biscognauxia atropunctata* which causes hypoxylon canker (Fig. 1) on several species of trees including oaks; *Botryosphaeria* die-back and canker (Fig. 2) caused by fungi in the *Botryosphaeria* group; *Ganoderma* root-basal rot (Fig. 3) caused by several species of fungi in the group *Ganoderma*; and *Armillaria* root rot (Fig. 4) caused by *Armillaria* species of fungi. These organisms are only a few examples that can be associated with decline in oak trees. Several of these organisms have been identified on some of the samples of oak decline sent to the diagnostic lab and specimens examined during field visitations.



Fig. 1. Hypoxylon canker of oak.



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Fig. 2. Botryosphaeria canker. Photo Credits: University of Georgia Plant Pathology Archive, Bugwood.org.



Fig. 3. Ganoderma root-basal rot.



Fig. 4. Armillaria root rot. Photo Credits: Theodor D. Leininger, USDA Forest Service, Bugwood.org.

More investigation is needed to determine if other factors or organisms are involved in the decline of oak trees in Oklahoma. We are working to identify the factors involved in this problem but this will take time. If you believe you have a disease or insect problem with an oak, or any plant, a sample can be

submitted to the Oklahoma State University Plant Disease and Insect Diagnostic Laboratory (PDIDL). Be sure to include a completed sample form with your sample. Be sure to include as much information about the tree and the symptoms as is possible. The more evidence we have to work with, the more likely we might be able to identify the problem. Sample forms can be found at <http://entopl.okstate.edu/pddl/pdidl-form.pdf>. Any pertinent digital pictures should be sent to jen.olson@okstate.edu.

LITERATURE CITED

Jones, R.K., and Benson, D.M. 2003. Diseases of woody ornamentals. APS Press, St. Paul, MN. pp. 65-66.

Sinclair, W.A., and Lyon, H.H. 2005. Diseases of trees and shrubs. Cornell University Press, Ithaca, NY. p. 226.

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