

Oak Decline (OD)

OD is a slow-acting disease complex that involves the interaction of several predisposing factors such as weather, site quality, and advancing tree age. The first indication of OD is usually progressive tip dieback in the upper crown. Typically, the progression of the tip dieback is slow, occurring over a period of several years. However, once the dieback involves more than a third of the tree's canopy, the odds of remediating the decline are poor, and complete tree death is likely.

No single cause is responsible for the decline. Rather, it is thought that prolonged stress precipitates a cascade of events where the weakened tree is invaded and killed by insects and diseases that do not normally attack a healthy tree. Trees react to prolonged stress by converting starch stored in the roots to sugar to support continued metabolism. Once these stored reserves are depleted, trees are not able to maintain the status quo and begin to decline.

[Drought](#), early frost injury, and insect defoliation are the initiating stress factors most associated with OD. But other stress factors compromising the tree's underlying health and defenses may include [soil compaction](#), [grade changes](#), a [buried root flare](#), and/or [nutrient deficiencies](#). Initial chemical control of any insects and/or fungi is warranted, but any underlying stress factors **must** also be addressed to stop the decline and prevent other stress-exacerbated diseases from occurring.



Adult twolined chestnut borer shown on leaf vein



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Control

Since environmental factors such as drought or frost cannot be controlled, the best way to decrease the risk of oak decline is to manage your forest to enhance overall stand health. Remove dying trees to ensure twolined chestnut borer populations do not build up. Thin stands to keep trees growing vigorously and minimize competition for resources.

For valuable landscape oak trees, proper tree maintenance can increase your tree's health and vigor, while reducing the potential for oak decline. Moisture limitations can be controlled by watering and mulching to reduce competition with turf grass. Proper mulch depth is 2 inches to 4 inches and mulch should be placed no closer than 3 inches from the tree trunk. Nutrient deficiencies can be treated by proper fertilization techniques. Proper pruning to eliminate competing, dead, or diseased branches enhances overall tree health. Homeowners should consult an International Society of Arboriculture (ISA) Certified Arborist for proper tree care recommendations and for assistance with diagnosing and managing specific insect and disease problems.

References:

Wargo et al. 1983. Oak Decline. Forest Insect and Disease Leaflet 165. USDA Forest Service.
<http://www.na.fs.fed.us/spfo/pubs/fidls/oakdecline/oakdecline.htm>

Haack and Acciavatti. 1992. Forest Insect and Disease Leaflet 168. USDA Forest Service.
<http://www.na.fs.fed.us/Spfo/pubs/fidls/chestnutborer/chestnutborer.htm>

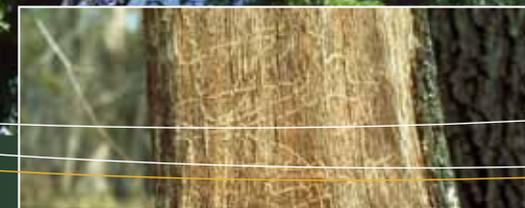
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Oak Decline



Introduction

Oak decline has been documented since the early 1900s. Decline complexes, such as oak decline, are not caused by a single insect or disease but are instead the product of the interaction between environmental conditions and forest pests.

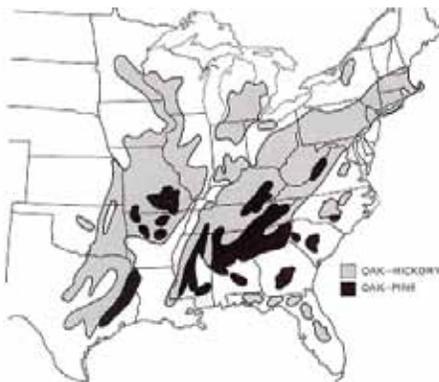
Oak decline can be problematic in both urban areas and forests.

An indication of oak decline is dieback from the branch tips.
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Hosts

Oak decline tends to be most damaging and common among red, scarlet, pin and black oaks in the red oak group and white and chestnut oaks in the white oak group. Though trees in both the red oak and the white oak groups can be affected by oak decline, the red oak group is often more susceptible. The distribution map below shows the range of oak forest types in the eastern United States, detailing areas where oak decline is likely to occur.



Source: <http://www.na.fs.fed.us/spfo/pubs/fidls/oakdecline/oakdecline.htm>

Decline Process

Trees affected by defoliation or environmental stressors, like drought and frost, become weakened. Once trees have been weakened, they become more susceptible to insects and diseases that do not normally kill trees. These normally secondary pests are able to overcome the tree's defenses and slowly kill the tree. The decline can take several years to kill a tree.

Symptoms

Oak decline is first noticeable as dieback from the branch tips. Yellowing of the leaves and/or leaf drop prior to autumn as well as sprouting from the main stem are other common oak decline symptoms.

Damaging agents

There are two major damaging agents associated with oak decline. One is an insect and the other is a disease. These two damaging agents generally work together to cause tree mortality.

Armillaria root rot, *Armillaria mellea* (Vahl: Fr.), is the disease often associated with oak decline. This disease is common in forests, though it is usually found on the roots of dead trees. When the oaks are in a weakened state, the root rot is able to successfully infect the roots and girdle them over time. This girdling action stops the flow of water and nutrients up and down the stem, cutting off the food supply for root and shoot growth, which causes the eventual death of the tree. Some identifying signs of armillaria root rot are shown here.



Armillaria root rot fungus found under the bark at the base of an infected oak.
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Armillaria root rot mushrooms visible during fall months near the base of an infected tree.
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The insect commonly associated with oak decline is the twolined chestnut borer *Agrilus bilineatus* (Weber). This beetle feeds primarily on oaks and tends to attack stressed or weakened trees. Urban trees, injured or otherwise weakened from human activity, are also very susceptible to this beetle.

The larvae of this beetle feed under the bark of the tree creating feeding tunnels called galleries. As these galleries begin to overlap, the tree is slowly girdled, resulting in tree death. The adult twolined chestnut borer and their galleries are shown on the next page.



Twolined chestnut borer larval galleries.
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