Oak Decline

Research Issue

Management solutions are urgently needed to cope with the large number of oak trees that are declining and dying in oak-dominated forests. This problem is referred to as oak decline and has become a chronic problem for the region's aging oak forests. Oaks most susceptible to decline are red oak group species such as northern red oak (Quercus rubra) black oak (http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/quercus/velutina.htm) (Quercus velutina) and scarlet oak (http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/quercus/coccinea.htm) (Q. coccinea); relatively old (>70 years) or large trees; growing on dry sites with shallow or rocky soils, especially on broad ridges or south-facing slopes.

Periodic large-scale episodes of oak decline are often associated with drought. Other events that can incite decline include repeated defoliation by insects or injury from frost, ice, or wind. Once oaks begin to decline, they become susceptible to many other kinds of diseases and insect pests that cause further stress or damage. These include armillaria root rots (http://ncrs.fs.fed.us/pubs/viewpub.asp?key=860), which girdle tree root; hypoxylon cankers (http://ncrs.fs.fed.us/pubs/viewpub.asp?key=930), which kill stems; red oak borer (http://ncrs.fs.fed.us/pubs/viewpub.asp?key=952) larvae and carpenter worms, which damage wood; and two-lined chestnut borers (http://ncrs.fs.fed.us/pubs/viewpub.asp?key=978), which kill branches and whole trees by girdling them with their tunnels.

Even though oak decline and associated diseases and insect infestations have occurred in the past, the extent of these problems today is unprecedented because

red oaks are now the most common tree species on poor-quality sites. These red oaks largely established after the extensive timber harvesting and grazing practices of the late 1800s and early 1900s. Now thousands of acres of forest land containing red oaks are reaching or surpassing maturity and are thus increasingly susceptible to oak decline. This combination of forest age, species composition, and accumulated diseases and stresses has caused oak decline to change from an episodic problem to a chronic one that has greatly affected not just the oak forests themselves but also the animals and people who live in or near them. These effects include decreased timber value; decreased acorn production, which affects both oak reproduction and wildlife food amounts; increased fire danger; and reduced recreation opportunities.

Our research

We are investigating oak decline and identifying management solutions specific for the Ozarks Highlands. Research includes:
Developing silvicultural methods for mitigating oak decline and maintaining healthy oak forests and woodlands. In this work, we are developing methods to identify at-risk trees and methods for thinning and stand improvement harvesting that can reduce oak mortality. We are cooperating with the Mississippi State University, the University of Missouri and the Ozark National Forest.

Expected Outcomes

Expected outcomes include management guides and recommendations to be used by professional foresters and forest landowners for restoring and managing oak forests.

Research Results

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