

Sudden Oak Death: A Threat to Texas' Forests Third of the "Dirty Dozen"

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Editor's Note: An introductory article discussing exotic invasive pests that could threaten forest resources in Texas was included in the June 2005 issue of *Texas Forestry*. As a follow-up to that article, a series of 12 short articles about specific exotic pests that are either present in Texas or are at our doorstep is being prepared. The authors (Joe Pase, Ron Billings, and Kim Camilli) are calling this series the "Dirty Dozen." Last month, Ron described the Asian long horned beetle, the second invasive pest in the series. Sudden oak death is the third exotic pest to be presented. Although not presently known to exist in the landscapes of Texas, this disease has been found in several of our state's nurseries so a monitoring program to detect this disease is continuing.

Oak trees in Central Texas have long been affected by oak wilt, a native fungal disease that has killed thousands of red oaks and live oaks in both rural and urban areas. Now, a non-native disease given the ominous common name of "Sudden Oak Death" (SOD) is a new cause for concern throughout Texas. Sudden oak death, caused by *Phytophthora ramorum*, was first identified in 1993 in Germany and The Netherlands on ornamental rhododendrons. In 1995, the first report of the sudden oak death phenomenon in the United States occurred in coastal forests of central California. Numerous tanoaks and coastal live oaks were declining and dying in the vicinity of Marin County, CA from an unknown cause. In 2000, a plant pathologist at the University of California Davis identified the causal agent as *Phytophthora ramorum*.

The geographic origin of the sudden oak death pathogen is unknown, but it is believed to be a recent introduction into the United States. As of January 2002, it was only known to occur in California and one location in southwestern Oregon. In 2003, *P. ramorum*-infected nursery plants (*Camellia japonica* and *Viburnum tinus*) were unintentionally shipped from a California nursery to wholesale and retail nurseries across the U.S., including to Texas. Surveys of these nurseries, called trace forward surveys, were conducted in 2003 and 2004 to detect for *P. ramorum*. As a result, the disease organism has been identified from infected nurseries in Texas and 21 other states.

In California, SOD has had a huge impact. *P. ramorum* has killed hundreds of thousands of tanoaks, live oaks, and other oak species, and caused twig and foliar diseases in various shrub hosts in 14 counties. In Los Padres National Forest alone, recent aerial surveys found an estimated 119,000 tanoaks that were infected with SOD on 8,000 acres. This disease has also impacted hikers and campers in the area due to the many regulatory issues that have been put into effect to prevent the spread of the pathogen.

P. ramorum is a water mold that grows best in cool, moist conditions and is spread by spores. Symptoms of SOD on infected host plants consist of bleeding cankers, twig dieback and leaf spot. The pathogen affects a wide variety of host tree species in California, including tanoak (*Lithocarpus densiflorus*), coastal live oak (*Quercus agrifolia*), black oak (*Q. kelloggii*), coast redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*) and others. On the hardwood hosts, the pathogen causes oozing bleeding cankers on the stem and twig dieback, often leading to tree death. On Douglas-fir and coast redwood, only tip dieback has been observed. The host shrub species consist of rhododendron (*Rhododendron spp.*), huckleberry (*Vaccinium ovatum*), bay laurel (*Umbellularia californica*), Pacific

madrone (*Arbutus menziesii*), bigleaf maple (*Acer macrophyllum*) and California buckeye (*Aesculus californica*). On these host species, the pathogen causes only leaf spots and twig dieback.

P. ramorum is spread to new locations by infected plant material and by spores via rainwater, wind and soil. Infected shrubs hosts may produce enough spores to spread this water mold to the bark of susceptible trees growing nearby, resulting in the formation of lethal cankers. Infection on ornamental plants, such as rhododendron and camellia, are characterized as brown to black dieback on the tips of the leaves. On susceptible tree species, spontaneous drooping or wilting of new growth may occur.

Cankers of SOD are characterized by oozing reddish-brown to tar-black viscous sap on the trunks of hardwood trees. Cankers typically occur above ground on the lower 10 feet of the trunk. If you remove the outer bark of symptomatic trees, you will see diseased tissue and healthy tissue separated by a distinctive black line called a zone line. The zone lines are very characteristic of this pathogen and are very useful as a diagnostic tool. The cankers are believed to cause mortality by eventually girdling the trees, and most oaks die within one year after initial infection occurs.

Early detection is the most important step in controlling and eradicating this pathogen from established areas and preventing it from spreading to new susceptible areas. In Texas, nurseries that have received infected plant material from Monrovia are being surveyed and samples are being taken from host plant material for laboratory diagnosis. The native vegetation around the perimeter of these nurseries also is being surveyed and sampled for the presence of SOD.

To date, *P. ramorum* has been found in 11 nurseries with contaminated stock in Texas, but the disease has not been found in any of the native vegetation adjacent to these nurseries. There are many other native pathogens and pests that cause symptoms that can be confused with those of sudden oak death. These include canker rots, slime flux, leaf scorch, root diseases, freeze damage, and herbicide injury. In Texas, symptoms associated with oak wilt, oak decline and red oak borer damage are most likely to be confused with those of SOD.

Like the Asian longhorned beetle described last month, sudden oak death is an exotic forest pest we definitely do not want in Texas. If you detect a tree in Texas that you think might be infected with this disease, contact TFS Forest Resource Development in Austin (Phone: 512-451-2178) or e-mail Kim Camilli at kcamilli@tfs.tamu.edu.

Next in the series: Chinese tallow.



Photo caption 1: Leaf spot on California bay laurel leaf (*Umbellularia californica*), a typical symptom of Sudden Oak Death. Leaf spots usually occur at the leaf tip and progress inward towards the base of the leaf.

Photo caption 2: Bleeding canker on California live oak (*Quercus agrifolia*) and black zone lines present under the bark at the site of canker caused by *P. ramorum*, causal agent of Sudden Oak Death. Photos by Joseph O'Brien, USDA Forest Service.