



Figure 1. Pine branch infected with "Sudden Oak Death" (photo from Oregon Department of Agriculture)

Sudden Oak Death

Phytophthora ramorum

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Introduction. In April 2004, USDA issued an emergency order restricting the movement of nursery stock from California nurseries in 12 counties to prevent the spread of Sudden Oak Death (SOD), *Phytophthora ramorum* to non-infested areas of the United States outside of California. SOD, also known as Phytophthora canker disease, was recently confirmed in ornamental nursery stock at a southern California nursery. This discovery has serious implications for the nursery industry and forestry in the U.S.

Distribution. *P. ramorum* was first identified in 1993 in Germany and the Netherlands on ornamental rhododendrons. It was isolated in 2000 from dying trees in California and confirmed in central coastal counties that summer. SOD has been found in California, Oregon, Washington, and British Columbia (Canada). Camellias infected with *P. ramorum* were discovered at a small nursery in Washington last year. Pathologists have since traced those plants back to Monrovia Growers in Southern California, where a survey in March 2004 disclosed that six varieties of camellias were infected. The disease was also detected at Specialty Nurseries, another Southern California mail-order nursery. Monrovia is one of the largest commercial nurseries in the country and has shipped host material to more than 1,700 nurseries in as many as 40 states, including the eastern United States, which is considered to have high-risk areas.



Figure 2. Other plants infected with "Sudden Oak Death" (photos from Oregon Department of Agriculture)

Hosts. It is believed that since 1995, this pathogen has caused dieback and death of several oak species in California. Today, 38 plant species are known to be susceptible to SOD, 22 of which are listed as regulated host plants by the USDA Animal and Plant Health Inspection Service Plant Protection and Quarantine (USDA-APHIS-PPQ) and by the California Department of Food and Agriculture (CDFA). The other 16 species are listed as associated with the disease, but have not been formally documented as hosts.

Symptoms. The most common symptom on oaks is the formation of a trunk canker that eventually girdles and kills the tree. This canker may "bleed" or ooze a dark sap. Infected leaves develop a blight or necrotic lesions with diffused margins. Mortality is most often associated with oaks, rather than others hosts, such as Douglas fir, rhododendron, California bay laurel, and camellia.

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Importance. SOD is a serious fungal disease that affects not only oaks but other plants including azaleas, rhododendrons, camellias, and maples. This pathogen has a wide host range and may infect other plants in Hawaii. Another strain of *P. ramorum* is known to exist in Europe. There is great concern that this strain, known as A1, could combine with the North American strain (A2) to form an even more virulent variety.

Control. Clear-cutting, burning, and herbicide applications, are currently underway at infected sites on the mainland. There are no chemical treatments available.

Testing. Testing for *P. ramorum* is by a two-step method. Polymerase chain reaction (PCR) testing is a molecular diagnostic tool that tests for the presence of DNA of the organism. If positive, the pathogen is cultured on an appropriate media and identification is confirmed by observation of certain structures.

Impact to Hawaii. Hawaii is the only state in the Western Region that has not received any plants from either Monrovia or Specialty Plants. However, each year, ornamental plants like azaleas and camellias are imported to Hawaii in large numbers for special occasions.

Hosts. The disease appears to be deadly to some members of the beech family (Fagaceae) specifically to oaks and tanoaks, none of which are naturalized in the islands. Members of this family also include beeches, oaks, and chestnuts. According to *In Gardens of Hawaii* (Neal, 1965) a few chestnuts and oaks have been planted in Hawaii, the American chestnut (*Castanea dentata*), Japanese chestnut (*C. crenata*), and cork oak (*Quercus suber*).

Other associated hosts in the Hawaiian Islands include garden camellia (*Camellia sasanqua*), toyon or photinia, a California Christmas berry (*Heteromeles arbutifolia*), buckthorn or coffeeberry (*Rhamnus californica*), Victorian box, orange pittosporum, or Victorian laurel (*Pittosporum undulatum*), and rhododendron (*Rhododendron* spp.).

For more information about SOD, visit the following web sites:

USDA-APHIS-PPQ
<http://www.aphis.usda.gov/lpa/issues/sod/sod.html>
www.aphis.usda.gov/ppq/ispm/sod

California Oak Mortality Task Force
<http://www.suddenoakdeath.org/>

SOD in Hawaii. If anyone suspects they have received plants from affected nurseries or have plants that are showing symptoms of SOD, call the Department's PEST HOTLINE at:

Oahu	586-PEST (7378)
Big Island	974-4000 ext. 67378
Maui	984-2400 ext. 67378
Kauai	274-3141 ext. 67378
Molokai & Lanai	1-800-468-4644 ext. 67378

Acknowledgement. Photos were provided by the Oregon Department of Agriculture:
<http://www.oda.state.or.us/information/news/Images/SOD/index.htm>