BRANCHING OUT
IPM NEWSLETTER FOR TREES & SHRUBS

Sudden Oak Death—Time for an update

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What's old:

Sudden oak death captured the attention of foresters, landscape managers, and the press as early as the mid-1990s when an inexplicable death of live oaks and tanoaks in California seemed to occurring at abnormal frequency in about 200 miles of coastal landscapes and forests. Most severely affected areas were just south and north of San Francisco. In addition to relatively rapid death, affected trees almost always showed outward appearance of bleeding cankers which concealed extensive areas of dead cambial tissue beneath. Most of the cankers were on the lower 10 feet or so of tree trunks, but they were occasionally higher and on branches. When research teams at UC-Berkeley finally reported their conclusions that a microbe—*Phytophthora ramorum*—was the cause of a disease responsible for the tree deaths, the scientific community in the region nudged the political machinery into action. Funds to learn more about the scope and gravity of the situation with an eye toward prevention were quick to follow. As the enormous threat of the disease to the state's nursery and landscape industry became apparent, representatives of trade groups in those areas also willingly

P.ramorum infected hillside © Joseph OBrien, USDA Forest Service, Bugwood.org

P.ramorum symptoms—bleeding discoloration and cracks © Joseph OBrien, USDA Forest Service, Bugwood.org

joined the battle. An overarching collaborative study group—The California Oak Mortality Task Force—came into being within a month of the *P. ramorum* announcement and it remains the most comprehensive source of historical and up-to-date information about the disease. See for yourself at www.suddenoakdeath.org/.

A black or reddish ooze often bleeds from the cankers caused by P. ramorum © Joseph OBrien, USDA Forest Service, Bugwood.org

By January 2001, the grim situation in the tree world took an even more ominous turn when scientists found the pathogen on first on rhododendrons and eventually on other common shrubs in nurseries and forests. They also found the pathogen in nursery irrigation water which turned out to be an effective means for spread within production areas. In subsequent months, surveys in both forests and nurseries lead to a host list that continues to grow, now exceeding over 120 plant species. Because many of the nursery-grown plants were intended for export to sites throughout North America, an extensive survey and testing program began, first at production sites on the West Coast but eventually on the receiving sites in nursery and garden centers throughout the country but especially in the mid-Atlantic states.

The disease continues to spread up and down the West Coast.

What's newer:

Discovery of *P. ramorum* in irrigation water caused survey crews to start looking for the pathogen in other bodies of water but especially in free flowing streams throughout the country. And they found it, first as expected in water flowing from sites with known incidence of the disease in trees but later in places with no other known occurrence of the pathogen, *including some relatively remote sites in the East.* These latter discoveries still have people scratching their heads, wondering if their baiting/testing procedures are reliable (which they seem to be) and otherwise confounded by the finds with no other evidence of disease. However, the other somewhat frustrating realization is that although *P. ramorum* causes bleeding cankers on some species of trees, it causes myriad other symptoms on smaller plants. Shoot blights and leaf spots that can easily be confused with those caused by any number of other microbes can also be caused by the SOD pathogen, and that means that to do it right, *every* suspicious plant ought to be run through the *P. ramorum* screen … which is essentially impossible. Furthermore, it's not uncommon to find the pathogen on or very close to plants showing absolutely no symptoms of anything. What's that about? Stay tuned.

One question among many that persists is "Where did the pathogen come from?". That one remains unanswered, but we do now know that there are at least three "strains" of the pathogen. One is common in Europe; the other two occur on the West Coast where they are "sexually compatible". That means if the two compatible strains grow close to one another, sexual reproduction can occur. If and when efforts to develop reliable chemical controls or resistant cultivars start to yield encouraging results, the ability of the pathogen to evolve "around" such control measures will surely become important. (The third strain was known only from Europe until 2007 when it showed up in several West Coast surveys, noticeably from nurseries in Washington State. Continued genetic sequencing of *P. ramorum* and other Phytophthora raises further concerns about pathogen "adaptability" as an "…unprecedented number of genes and genetic flexibility compared to fungal pathogens…" becomes apparent.

P. ramorum symptoms on Rhododendron in central CA © Joseph OBrien, USDA Forest Service, Bugwood.org

In the meantime, the disease continues to spread up and down the West Coast, into southern Oregon with occasional finds in Washington. The host range continues to grow with the addition of a number of conifer species and popularly traded nursery shrubs like Kalmia, Camelia, azalea, Rhododendron, and a long list of others. If there is any good news from all of this, it's that the rate and intensity of mortality on California's highly susceptible tanoaks and other oaks *seems* to be slowing. Maybe that's because reporters are just tired of saying the same thing over and over again but hopefully the observation has more practical weight than that. One good piece of news from nursery-based research is that *P. ramorum* doesn't seem to spread very far overland … in the air. In fact, in the best experiment I've seen to test that possibility, wind-blown propagules go less than 6 feet before they fall to the ground and presumably die. That may not help nurserymen with crowded planting beds to deal with, but it does bode well for an accidental introduction to an open-grown landscape site if the pathogen should otherwise escape detection.

What's newest?

As monitoring of disease spread to new areas and new plants and lab research into the basic biology of the pathogen continues in both Europe and the U.S., the saga has taken yet another possibly ominous twist. And that is that European pathologists sampling from bleeding cankers first on European beech and then on other tree species have discovered yet another virulent species of Phytophthora. It's known as *Phytophthora kernoviae* and by all accounts is even more virulent that *P. ramorum* on host plants on the continent.