Silent Killer

The ongoing fight to save California's oaks

IN CAIFORNIA, RAIN CAN BRING an unwelcome guest: *Phytophthora ramorum,* the exotic pathogen that causes sudden oak death (SOD). The disease was first reported in the state in 1995, and has killed more than 1 million native oaks and other trees. Matteo Garbelotto, a Berkeley adjunct professor of Environmental Science, Policy, and Management who in 2000 helped identify the pathogen as a new species, says managing vegetation and treating uninfected trees with the systemic fungicide phosphonate can slow the affliction, but early intervention is required.

To mobilize the community to action, Garbelotto started SOD "blitzes," surveys of California's coastal areas conducted by citizen scientists trained to identify the disease's symptoms. Now in its fifth year, the project serves to educate the public about SOD, Garbelotto says. "We also get a huge area of California surveyed, which we couldn't do without all these volunteers." This year's blitzes, which take place in the spring, so far include groups from Marin to Monterey counties.

Below is an edited version of a conversation with Garbelotto.

***California:* What are some key findings from the SOD blitz last fall?**

Almost every time we have a blitz we discover a new area that we didn't know was infected. If we can make the discovery when the disease has just arrived, then we have the time to tell people what they can do to successfully slow the spread of the disease. This is incredible.

The other deliverable of the blitz, which has been very interesting, is that we can now split California into two different regions. There is a coastal strip where the infection level remains high. In the interior areas, during dry years, like we had between 2007 and 2010, the infection level goes down dramatically. So the epidemiology has different patterns in different areas. We thought this was the case, but we had no data to show it. This year, we are fully convinced that we're dealing with two different situations.

What is the biggest factor in how the disease is spread?

The organism that causes sudden oak death requires a film of water to complete its life cycle. It remains viable for a really long time in regions on the coast, so all that it requires is one short rainfall before infection can occur. On the eastern side [of the range of infection], several rain events are required to make the pathogen active. The other major factor is how much bay laurel you have. Bay laurel is like the mosquito that spreads malaria—it's the main vector in California for sudden oak death.

If landowners do one thing to save their oaks what should they do?

There's no single remedy. And there's no way we can protect every single tree. It's simply not feasible. So we tell landowners to pick the trees that mean a lot to them or that can become hazards if they become infected. And then we tell people to take away small- to medium-size bay laurels that are growing within 30 feet of those oaks. Then, if the oaks have not been infected yet, you can give them a chemical [phosphonate] that boosts up their immune system.

So you can manage the disease, but is there hope for a cure?

I think it's not realistic. What we have right now is quite amazing—we have a preventative that makes about 80 percent of the trees more resistant. A different approach is to genetically engineer trees that are resistant. But that's dangerous, because [the resistant trees] may be very susceptible to new strains [of *Phytophthora*] or new diseases. That's a very serious concern because in the nurseries in California there are actually three different strains. Of course, regulators, scientists, and the nursery industry itself know about the other two strains so a lot of controls have been put in place. But we're very concerned because those other two strains are substantially different.

Assuming the disease progresses as it has, what will California's landscape look like in the future?

Tanoaks may become really marginal. That's already happening throughout the range of redwoods. This is dramatic because tanoaks, which are killed by sudden oak death, not only offer the shade that redwoods like so much but are also the big mast-producing [tree nuts] species on the coast, so many animals depend mostly on them for food.

True oaks [*Quercus spp.*], which are now common in the coastal forest, are going to become very spotty. Also, bay laurel will increase in frequency and abundance because there's more space available to them. So this is kind of an evil cycle: Not only do we lose the oaks, but we also get more bay laurel, and the more bay laurel we have, the higher the infection rate. But as you move into the open savannah-type landscape, those oaks are going to survive.

For more information on sudden oak death and SOD blitzes, visit suddenoakdeath.org.

PHOTOGRAPH BY MARCUS HANSCHEN

Picture This

WESTERN SONOMA COUNTY

CHINA CAMP, MARIN COUNTY

BIG SUR, MONTEREY COUNTY

Deadly Trace

LAST FALL, SOME 500 CITIZEN SCIENTISTS, armed with GPS devices and collection kits, hiked California's woodlands in search of sudden oak death (SOD), a pathogenic disease that is slowly killing the state's trees. The annual SOD "blitz" is now in its fifth year, and in 2011 alone participants sampled almost 2,000 trees across more than 50,000 acres. The effort to quantify and halt the spread of the disease is led by Matteo Garbelotto (see "Silent Killer," p. 16).

The map below incorporates and compares data collected in 2011 and 2009. Data are not available for all 14 counties in which positive cases of SOD have been identified.

CALIFORNIA BAY LAUREL

CALIFORNIA BUCKEYE

MADRONE

Sudden oak death kills tanoak *(Lithocarpus densiflorus)*, California black oak *(Quercus kelloggii)*, coast live oak *(Q. agrifolia)*, canyon live oak *(Q. chrysolepis)*, and Shreve oak *(Q. parvula var. shrevei)*.

Scientists have so far identified 137 plant species that can harbor and transmit the pathogen though they themselves aren't killed. Many of these are popular ornamental species such as rhododendron and camellia. Many of California's most iconic native plant species are also on the list, notably California bay laurel *(Umbellularia californica)*, California buckeye *(Aesculus californica)*, madrone *(Arbutus menziesii)*, manzanita *(Arctostaphylos manzanita)*, and coast redwood *(Sequoia sempervirens)*.