

Sudden Oak Death plagues local groves

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The disease starts slowly in the tree: reddish-black stains discolor the bark and dark sap bleeds from cankers in the trunk. Bark beetles move into the spaces, hastening the tree's demise. Its green, leafy crown turns brown and shrivels within a few weeks. Another oak dies from Sudden Oak Death.

Millions of trees along the coast, from Southern California to Brookings, Ore., have died from Sudden Oak Death – or SOD – since it arrived two decades ago. Though it has long been a problem in Big Sur and the San Francisco peninsula, the disease has moved into Garland Ranch Regional Park in Carmel Valley, and scientists have found infected trees in Gilroy and Prunedale. Scientists and land managers have been unsuccessful at finding ways to cure or contain the disease, but certain precautions may slow its spread.

Though warm weather conditions will likely keep SOD out of the Salinas Valley, the disease is having a deadly effect on nearby forests. Almost 300,000 trees have died from the disease in 2013 alone, leaving bald patches in state and national forests along the California coast.

“The organism has a really significant impact on our forests,” said Matteo Garbelotto, a forest pathologist at the University of California, Berkeley. He notes that adult tanoaks – an evergreen species closely related to oaks – are almost entirely wiped out in some areas. In redwood forests, tanoaks produce large numbers of acorns that animal species depend on. As tanoaks disappear, the forests are more open and the sun dries out the soil. Redwoods do not grow as well in the drier environment, and are more at risk for fire, Garbelotto said.

Disease is spreading

So far, the organism that causes SOD inhabits only about 15 percent of available oak forests, but the problem will likely get worse. People visiting infested areas should not remove leaves or branches, and should clean the dirt from their shoes before leaving, to prevent spreading the pathogen. Oak populations do not have much natural resistance to the disease, and once it arrives in a forest, no one knows how to eradicate it.

Garbelotto's lab is working to find tanoaks that are naturally resistant to the disease. but it's a slow business. Even the few trees that can tolerate it will die when surrounded by infested tanoaks. The resistant trees will likely need to be planted in large groups to survive, he said.

Managers at the Elkhorn Slough Reserve in north Monterey County have tried for years to protect their oak woodlands from hitchhiking spores. They ask visitors to scrape mud off of their shoes using a brush at the visitor center. So far they have not had an outbreak, according to Mark Silberstein, executive director of the Elkhorn Slough Foundation.

“Even though it's called Sudden Oak Death, it's not particularly all that sudden,” said David Rizzo, a plant pathologist at UC Irvine.

Slow-death organism

Sudden Oak Death kills slowly, taking several months or years to take over a tree, before triggering the characteristic leaf die-off. The pathogen that causes it is a fungus-like organism called *Phytophthora ramorum*. It is deadly to several local oak species, including coast live oak, California black oak, shreve oak, and canyon live oak.

No one knows exactly where this plant pathogen came from. In 1995, residents noticed that tanoaks were dying off in Marin and Santa Cruz counties, but no one knew the cause. Around the same time, European nurseries identified the fungus-like pathogen as *P. ramorum*. Scientists think that the organism traveled to the U.S. and Europe on an ornamental tree, such as a rhododendron, but the original source of the disease is unknown.

Though primarily lethal to oaks, the pathogen can grow on more than 150 different plant species. It will reproduce on the leaves, creating brown spots, but not killing the tree. Douglas fir, coast redwood and several ornamental trees such as rhododendrons can harbor the disease and spread it to nearby oaks.

Laurel: 'Typhoid Mary'

The worst of these “carrier” trees is the Californian bay laurel. Rizzo describes them as the “Typhoid Mary” of trees. When rain splashes onto infested leaves, the water carries large numbers of spores onto the ground and to the foliage of other trees.

Since it grows on ornamental trees, the pathogen can be an expensive problem for nurseries if an outbreak occurs. The federal government has designated the organism as a “quarantined pathogen” so all plant products exported from the 14 coastal counties between Monterey and Humboldt must be tested for the disease. Wholesale nurseries in these counties must test their soil, plants and water each year to prevent sending the disease home to customers.

Homeowners in affected areas who want to protect existing oaks should remove bay laurels within 10 or 20 yards of the tree, said Garbelotto. They should also avoid watering during the rainy season because the pathogen thrives in wet environments. Additionally, there is also a chemical treatment called Agri-Fos that can help it to fight off the pathogen, if trees become exposed.

Dying, infested trees should be burned, or chopped into logs to dry out. The quicker the wood dries, the faster the organism dies, Garbelotto said. Some experts recommend burning the wood locally, to prevent spreading the disease to new neighborhoods.

“In communities that are rampant with Sudden Oak Death we recommend alternative plantings,” said Steve McShane, owner of McShane’s nursery in Salinas. Instead of oaks, he suggests sycamore, madrone or a pine tree for home gardeners.

For customers who are “in love with oaks,” and will plant anyway, he recommends keeping the tree healthy with regular pruning and organic fertilizer. A healthier tree will be better able to fight off the pathogen. Gardeners can also plant resistant species of tree around the oak to create a buffer around it.

Identifying infection

To identify a potential SOD infection, contact a local County Agricultural Commissioner or UC Cooperative Extension county office. Local nurseries can also offer advice about potential infestations, but do not bring

a tree clipping to a garden store, to avoid spreading the pathogen.

Garbelotto's lab maintains www.sodmap.com, a website that maps the location of all tested trees and water samples from all over California. The phone app version, called Sodmap mobile, not only shows the user the location of infected trees, but will also calculate whether trees in a designated area are at a high or low risk of infection. The app can help homeowners to make informed decisions about protecting their trees.

Each year, Garbelotto runs a program called SOD Blitz where he teaches local residents to identify signs of the disease. These "citizen-scientists" then canvas their neighborhoods to look for affected trees. Besides being a community social event, the results from the study are documented on the SODmap. The next SOD Blitz will take place in January.

Salinas based research

Researchers at the Salinas USDA office are working to create a quick, affordable and accurate method to give on-the-spot results of whether a tree is infested with SOD. The test costs just \$5 per sample, and gives results in under 30 minutes. Though the current instrument requires a car battery to power it, they hope eventually to run the device by attaching it to a cell phone, said Timothy Miles, a plant pathologist at the USDA who is developing the test,

The method requires a \$4,000 detection device, so it will not be available for home use any time soon. But the technology could save time for government regulators who must inspect imported plant products, or land managers making decisions about acres of trees in a reserve. The test will not be available for several years, but could potentially stop the pathogen – and related diseases – before its host plant is unloaded in a shipment.

Frank Martin, a plant pathologist at the Salinas USDA office, who is overseeing the development of the test, points out that once the disease takes root in a forest, even cutting down infected the trees won't stop its spread. State and county governments have neither the funding nor the know-how to institute forest-wide controls.

"You can't put the genie back in the bottle," Martin said. But being careful about its spread may slow down the disease until scientists find resistant strains to replace Monterey County's oak forests.