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TREE CARE INDUSTRY



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Sudden OAK DEATH Update

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Sudden OAK DEATH

Continues to Threaten California's Coastal Oaks

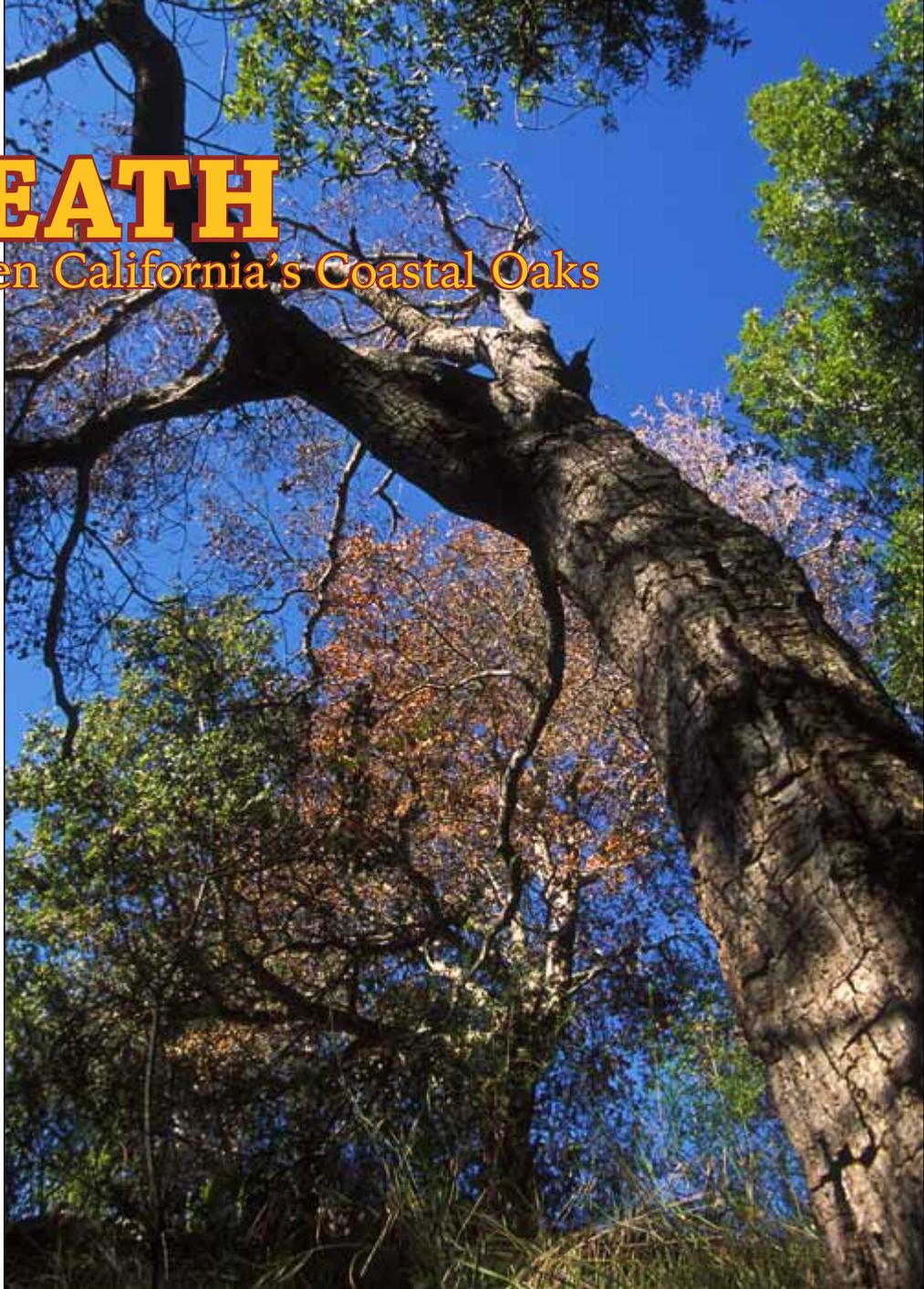
*Concern growing
it may spread to
the East through
nursery stock*

By Brenda Carol

Sudden oak death continues to wreak havoc on California's coastal communities as well as one county in Southwestern Oregon. Concern is growing that it could spread further northward into Oregon and Washington and even become a transcontinental problem in eastern forests via introduction from infected nursery stock. Why it "suddenly" showed up in California and how to tackle it effectively has elicited a range of opinions and prompted an extensive research effort over the past decade from public and private scientists, tree care professionals, foresters and the nursery industry.

Sudden oak death (SOD) is a disease caused by the plant pathogen *Phytophthora ramorum*. This pathogen has caused widespread dieback of tanoak and several oak species (coast live oak, California black oak, Shreve's oak, and canyon live oak) in California's central and northern coastal counties over the past 11 years. It also infects the leaves and twigs of ornamental species such as California bay laurel, camellia and rhododendrons. Although these plants do not die from the disease, they aid in the spread of *P. ramorum* by serving as a reservoir for inoculum.

P. ramorum thrives in cool, wet climates. In California, it has been found in natural



Early signs (dying leaves) of sudden oak death on an oak tree. Photo by Peggy Greb, courtesy of US Dept. of Agriculture.

settings in 14 central and northern coastal counties. The 14 regulated California counties are: Humboldt, Mendocino, Lake, Sonoma, Napa, Solano, Marin, Contra Costa, Alameda, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Monterey. The disease is also present in native environments in Oregon's Curry County and has been detected in European wildlands and nurseries, where it was first discovered in the mid-1990s. In recent years, *P. ramorum* has been detected in exported nursery stock in 21 states and British Columbia.

"There is no evidence at this point that it has moved from infected nursery stock to native plants in those areas," cautions David Rizzo, assistant plant pathologist with the University of California at Davis. "However, it is obviously very much a concern."

Depending on the plant species, *P. ramorum* infections may occur on the trunk, branches and leaves. Cankers on the trunks of oak and tanoak are the most damaging and often result in the ultimate death of the tree. Additionally, all diseased trees are

much more susceptible to other pathogens and pests such as bark beetles once they are weakened. Often, a combination of factors will coalesce to bring down a tree.

Climatic weather patterns seem to have a substantial influence on the onset and severity of SOD, according to Rizzo. “When it first became widely recognizable in about 2000, California had just experienced four to five years of very heavy rainfall,” he says. “This pathogen thrives in water. It was not as severe for the past few years and then ramped up again this year. We saw a lot more problems and new infestations in 2005, and that corresponded with a lot of heavy rainfall in late May and early June. Additionally, it seems that late spring rains are more conducive to the problem than normal winter rainfall patterns.”

There are currently very few chemical treatments that are available to combat SOD. Generally, the most effective option is a combination of Agri-Fos and PentraBark. Agri-Fos is a systemic fungicide, while Pentra-Bark is a surfactant. The combination was approved in October 2003, under a FIFRA Section 24c Special Local Need Label, by the California Department of Pesticide Regulation to treat oaks and tanoaks at high risk of becoming infected with *P. ramorum*. The treatment is only approved for use on oak (coast live oak, Shreve oak, black oak and canyon live oak) and tanoak trees. Copper hydroxide and other phosphorous acid compounds are also being studied as preventative treatments. Privately owned trees are the most likely candidates for treatment, as well as for important trees in public parks

In the wild, California bay laurel trees are considered the most important vector for spreading sudden oak death. Spores congregate on the leaves of those trees, where they can easily become airborne.

Agri-Fos is a fungicide that has been effective for other *Phytophthora* species. On *P. ramorum*, the treatment is primarily a preventative measure, effective for inhibiting the disease in uninfected or newly infected trees.



Signs and symptoms – Above, P. ramorum zone lines on coast live oak. Below, this leaf was confirmed as positive for P. ramorum. Photos by Joseph OBrien, courtesy of USDA Forest Service.



For best results, the treatment should begin before or within one to two months of the first signs of an infection. It is not recommended for trees that have had symptoms for six months or longer.

Matteo Garbelotto, an extension specialist and adjunct professor in the Department of Environmental Science, Policy, and Management, Ecosystem Sciences Division at UC Berkeley is credited with developing a way of increasing the effectiveness of the phosphite compound by combining it with an organosilicate carrier, Pentra-Bark, that helps trees absorb the treatment gradually over time. Instead of injecting the compound, Garbelotto sprayed it directly onto the bark of the trees. While this method has been successful on true oaks, it is only effective on tanoaks by injection.

The cost of the chemical and the application is reasonable for high value trees, according to Nate Dodds, president of J.J. Mauget Company. Mauget recently received a label to market Agri-Fos under the name of “ArborFos” – an encapsulated injectable formulation developed specifically for the tree care industry.

“At the retail level, the chemical would cost about \$25 for a 20-inch diameter tree,” Dodds says. This doesn’t account for labor and other costs associated with tree injection.

ArborFos also has activity against other *Phytophthora* species as well as other diseases such as anthracnose, apple scab and bacterial blight.

The choice of application method is dependent upon a number of factors. In general, injection treatments require additional equipment in the form of syringe-type injectors that maintain a positive pressure or a backpack mounted hydraulic injector. Injections use significantly less product and are site-specific with no spillage or damage to surrounding vegetation.

Trunk sprays are simple, quick, and do not leave entry wounds in the tree. However, they require significantly more



Symptoms of sudden oak death. Photo by Joseph OBrien, USDA Forest Service.

temperature should be avoided as well as during leaf emergence. Treatments applied during leaf emergence tend to result in accumulations of the active ingredient within the leaves rather than the trunk where it is needed. Arborists should allow three to six weeks for the chemical to take full effect.

Alternative approach

Other scientists are somewhat at odds over the “mainstream” philosophy to address the SOD problem. Dr. Lee Klinger, independent scientist and tree specialist in Big Sur, Calif., believes soil acidification is the primary problem.

“The problem isn’t the disease,” he says. “It’s the soil. Over the years, as active fire suppression has become a standard practice, our soils have slowly been depleted of

minerals and become acidified. I don’t think there is anything ‘sudden’ about sudden oak death. I think the pathogen has been present for years, but has only recently become a problem due to the declining health of our soils.”

Klinger’s theory is somewhat controversial among his peers, who say there is no scientific evidence that the incidence of SOD is higher in more acidic soils or even that soils have become more acidic over the past 50 to 100 years. However, Klinger claims that his efforts to treat the soil around sick and dying trees has produced tangible results in many cases.

“We are finding dramatic success as trees are coming back to health often in less than a year after treatment,” he asserts. “Thousands of trees have already been saved in Sonoma, Marin, Santa Cruz, and

product and may damage surrounding vegetation, including moss and lichens.

Regardless of method, applications should be made when the tree is actively transpiring. Treatment during extremes in

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Alternative approach—Photo of dying 250-year-old coast live oak in Marin before (left) treatment for SCD with lime-rich mineral applications, and after (right). Photos by Lee Klinger.

Monterey counties of California using this approach to tree care.”

Klinger calls the phenomenon “Sudden Oak Life” – a result of added mineral nutrients, which are taken up by the trees and immediately work to improve growth processes and health. Lime-rich mineral applications help prevent and even reverse the process of acidification that causes loss of mineral nutrients as systems age. Klinger uses a naturally occurring, mined product – Azomite – to reintroduce calcium and other essential minerals to the soil. Azomite, available from Peak Minerals-Azomite Inc. of Branson, Mo., contains potash, calcium and up to 70 trace minerals. Klinger recommends treatments once a year for the first two to three years with subsequent treatments at less frequent intervals as the soil becomes healthier. Cost per treatment, including application, will run somewhere in the range of \$50 to \$150 per tree depending on the size.

Minimizing the spread of the disease

The California Oak Mortality Task Force has developed additional management guidelines for professional arborists to help minimize the spread of the disease.

- ▶ Clean equipment, boots, tires, etc. that may spread contaminated soil to a new, uninfested site.
- ▶ Disinfect tools with Lysol spray, a 70 percent or greater solution of alcohol, or a Clorox solution (1 part Clorox to 9 parts water or Clorox Clean-up). Rinse gear after sanitation.
- ▶ Report suspected cases of *P. ramorum* to the local county agricultural commissioner.
- ▶ Keep oaks healthy by creating favorable growing conditions and avoiding disturbances to the root zone.
- ▶ Avoid unnecessary pruning.
- ▶ Prune properly.
- ▶ Avoid harmful landscaping and gardening practices.
- ▶ Mitigate environmental stress for the general health of oaks.



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Pruning considerations for infected plants and shrubs

Pruning of host plants should be avoided or minimized during an outbreak of SOD, since wounds may serve as entry sites for the disease and attract bark beetles. If possible, pruning should be avoided in winter and spring months when there is increased risk of pathogen spread.

Pruning of *P. ramorum* infected trees or shrubs should be scheduled from June through October when the weather is drier. Even then, excess pruning should be avoided to maintain the health of the tree. Removing more than 20 percent of a mature oak's foliage can render it more susceptible to disease and destructive pests.

Multi-faceted approach to management

Although there are differing philosophies about why SOD has so dramatically impacted California's coastal communities and differing points of view on how to manage it, there is also common ground. No one argues that the health of the tree is inconsequential. It is well documented that various environmental extremes and chemical and physical imbalances within the root zone can create stress and increase a tree's vulnerability to diseases and pests. Drought, unusually wet springs, improper irrigation, drainage problems, nutrient deficiencies, pH imbalances and soil compaction are among factors that create stressful conditions.

"In urban landscape situations we see a lot of examples where improper management practices negatively impact the health

of the soil and the root zone," Rizzo says. "Overwatering is a common mistake, particularly with native oaks. Compaction, concrete sidewalks, competitive plants and other poorly designed additions to the landscape also create a variety of problems that can lead to poor tree health and predispose a tree to infection."

Maintaining or restoring favorable growing conditions and avoiding unnecessary disturbances are important keys to maintaining long-term tree health in landscape environments. Chemical intervention and selective removal of infected trees are also important tools that can be used to help prevent the spread of SOD. While high value trees are really the only economically justifiable treatment candidates at this point, researchers are continuing to look for broader solutions to the problem. ♣



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