



# DETECTIVE DENDRO THE DIAGNOSTIC SLEUTH

By Lorraine Graney and Wes Kocher

## The Case of the Lacebark Elm Succumbing in the Sweltering South

The heat was stifling.

Weeks on end of sweltering temperatures, no rain, and intense sun. These were the conditions that brought us back to Austin, Texas, for some good-ol'-fashioned detective work. About a week ago, I swung by the home of the Paperbark family—a client who I have known

for years—to collect some twig and leaf samples from a lacebark elm (*Ulmus parvifolia*) that had withered and browned in the early summer heat of the Lone Star State. I sent the samples to a lab for assessment, but the samples were too small, so I came back to collect and send root samples and larger cuttings. This would also give me the perfect opportunity to sneak in a visit with my nieces, Willow and Juniper. We have a standing date whenever I'm in town to go roller skating and hit Amy's Ice Creams in the Arboretum, soon indulging in my favorite flavor, Mantecado (sweet cream blended with lemon zest and cinnamon bark).

Of course, I knew that a big chunk of the southern United States had been under drought conditions for years, but the browning in early July seemed a bit unusual for a young and vigorous 12-inch (30.5 cm) diameter tree.

During my first visit, the client assured me that no pesticides or chemicals had been applied anywhere near the tree, except for a standard dose of balanced fertilizer last year. My well-honed sleuthing skills indicated that the ground was moist at the time of the initial inspection; a simple soil sample showed that the clay had a pH of 8.4. I also located a whitish growth on the soil near the tree that could have been a slime mold, but there was no way to be sure without a lab test. Codit's aerial inspection showed no evidence of fungal twig/leaf pathogens or arthropod pests, and he confirmed my guess that the twigs were still alive and pliable.

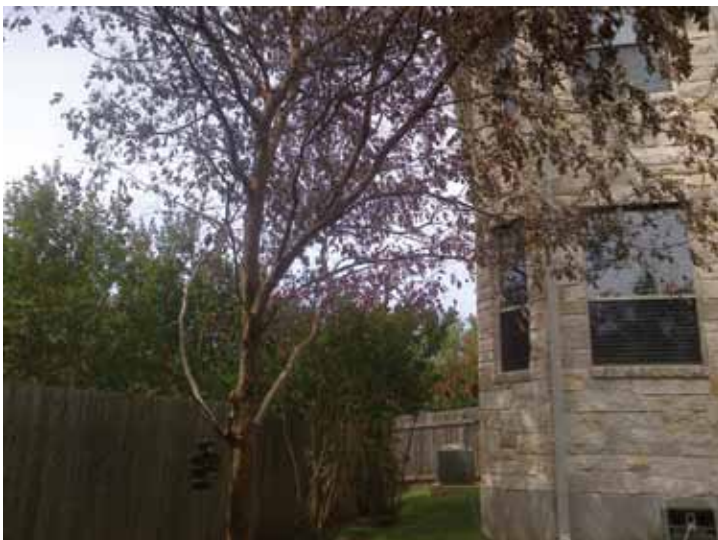
But what a difference a week makes! As I turned down the Paperbark's driveway with my roller skates clattering in the bed of the truck, the dramatic decline of the elm dropped my jaw.

"Drought can't kill a tree that fast, can it, boss?" Codit exclaimed as he unclipped his seatbelt and jumped from the pickup.

"You should know better than to limit the range of possible causes to only things we can see, Codit! Drought severely stresses trees, often opening the door to other causes of decline and death," I said, joining him at the base of the tree. As I approached, I noticed that the dead brown leaves in the crown remained attached to their twigs.

Based on the initial tests, the lab analyst, Elizabeth, recommended that I assess the basal stem region and buttress roots for live tissue beneath the bark in various places. She also suggested I locate any underground utilities in the area and gauge the possibility of leaks that could have affected the roots.

But with that all said, I could tell right away that underground utility lines would be nowhere near the tree, since it was located diagonally behind the house, with water, gas, and electricity all entering the property from the street side.



What's up with this lacebark elm (*Ulmus parvifolia*)? Dendro and Codit are on the case.

With a sharp, sterilized knife, I wedged and turned the bark, confirming that the tree's vascular system was still in good shape. I turned to Codit, "What's your assessment of the other trees in the area?"

"Well, they all look to be surviving this drought a lot better than this elm! That fungal mat beneath the crape-myrtle (*Lagerstroemia indica*) doesn't seem to be affecting the tree." Codit arched an eyebrow. "Why is it that during this drought the ground is so wet?"

I stooped to check the soil moisture and noted it was about the same as during our last visit, which was to say moist but not saturated. "I attribute that to the homeowners manually watering the tree—thinking as you do that drought is the likely cause of this decline. Why don't you get a spade from the truck and start a small excavation so we can cut some one-inch (2.54 cm) diameter roots to send to the lab?"

Codit had several small root sections bagged-up and taped for laboratory assessment in no time. He sighed and snipped some one-inch diameter branches with a pole-pruner to include in the package to the lab. "I'm stumped . . . the soil is moist, there's no herbicide application, that fungal mat looks like innocuous slime mold, and nearby trees aren't showing any of the same symptoms. What on Earth is going on here, Detective?"



A possible fungal mat?

"I think we are going to get that answer from the diagnosticians at the lab, Codit, but I suspect something below the soil surface is sickening this specimen."

*Turn to page 42 for the solution.*

## The Landscape Below Ground III

This book contains more than fifty research papers in the subject areas of managing soil in urban environments for root development; tree production, planting, and establishment; and managing root systems in urban environments. The first two installments of this book series are also available from ISA. (©2009, 403 pp., softcover) #P1536



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## WHAT'S THE SOLUTION?

Just a few days later, I received word from Elizabeth and the results were conclusive: cotton root rot disease, caused by the fungus *Phymatotrichopsis omnivora*.

Elizabeth confirmed that the thick-batter textured fungal mat Codit and I observed under the elm and crapemyrtle could be produced by *P. omnivora*, but warned that field observations of this fungus' growth should not be used for definitive diagnosis. She explained that this fungus often does not produce visible spore mats, which makes lab diagnosis critical in identifying this scary sickness.

My further research into the disease verified that late spring, summer, and early autumn are times when the fungus causes rapid wilting and quick death in susceptible hosts, including the lacebark elm. The fungus does not proliferate through airborne spores, but instead through dense, underground collections of hyphae, spreading at depths of up to 12 feet (3.7 m). These hyphal strands can infect healthy roots of nearby plants, or form into specialized structures called sclerotia, which can survive or live in the soil for extended periods.

Codit wasn't pleased when I broke the news. "So what are we supposed to do?" he said, pouting.



Root closeup. The tannish brown lines are the hyphal strands.

"There aren't many options available for treatment of cotton root rot disease," I explained. "The best option is to plant trees and shrubs that aren't susceptible to the disease, as there are no methods for ridding the soil of the disease-causing fungus."

"Why doesn't the crapemyrtle show symptoms, since the fungal mat was right over its root zone?"

"Some trees are more susceptible to the disease than others, and I couldn't find anything in my research about crapemyrtle's defenses. Besides, we don't know if that fungal mat was slime mold or related to this fungus. I did come across one treatment method that might suppress the fungus," I said. Codit seized the optimistic tone in my voice and his face shifted from dejection to excitement in a flash.

"What . . . what is it?"

"*P. omnivora* thrives in high pH soils. There is an amendment that can be incorporated with air excavation equipment that helps lower soil pH while making the soil less conducive to fungal growth. Significant sulfur additions may also be effective."

"When is the treatment scheduled? Do I get to run the equipment?" Codit asked, unable to contain his excitement and getting a little ahead of himself like usual.

"Slow down there, buddy," I said, calming down my protégé. "The homeowners have yet to agree to the treatments, as they may have no effect on a tree that is already in such steep decline. I will, however, present them with the options, noting that treatments may help keep the fungus from infecting other susceptible plants nearby." I patted Codit on the shoulder and gave a reassuring nod. "Now, how about I drop you off at Barton Springs for a swim on my way to pick up Willow and Juniper? A little sunset backstroke might be just the thing to soothe your nerves."

"Sounds good, boss."

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