Florida Fights to Stop Citrus Canker

State scientists hope to wipe out a disease that threatens Florida's citrus industry—but local homeowners may stop them in their tracks

Every evening, in the quiet of his oak-shaded home, Wayne Dixon pauses at the mirror. He asks two questions: "Do I like what I've done today?" and "How do I feel about canker?"

Even for a plant pathologist, this nightly reflection on a bacterial disease may seem a tad odd. But then, citrus canker dominates many of Dixon's days. As head of the plant industry division of Florida's Department of Agriculture and Consumer Services (FDACS), he stands at the center of a controversy that has roiled the state for 6 years. Citrus canker, which scabs oranges, grapefruit, and other citrus with corklike lesions, has been storming across southern Florida since 1995. And so have chain saw–wielding work crews.

There's no cure for canker. So, in hopes of stopping the disease before it ravages central Florida's $8 billion commercial orchards, the crews have chopped down more than 1.8 million infected and exposed trees—roughly a third of them in Miami-Dade and Broward counties. In fact, the canker eradication effort, which has cost over $200 million, is the biggest single government-run program ever devoted to a plant disease. But where chain saws are screaming, so are homeowners who want to save their trees. Threats, sobs—and even lawsuits aimed at stopping the saws—greet canker eradication efforts.

The citrus industry is just as adamant that the efforts continue. Although growers could try to slow the disease spread with windbreaks, copper sprays, and inspections, those controls—and the fruit lost anyway—could cost well over $100 million a year, driving some growers out of business, says Andrew LaVigne, vice president of Florida Citrus Mutual, an industry trade group.

And the stakes go well beyond Florida's borders. Citrus canker is caused by the Asian strain of the bacterium *Xanthomonas axonopodis* pv. *citri*, which may have sneaked into the country on infected fruit from overseas. Such exotic invaders are becoming an international nuisance.

For instance, plum pox, an Old World disease, has struck in Pennsylvania. At the same time, some homegrown pests are invading new territory. In Napa Valley, a mere smudge of a bug from the southeastern United States—the glassy-winged sharpshooter—threatens California's wine industry. Can regulators keep these exotics in check? Citrus canker is like a training ground, Dixon says. "And we're getting a lot of practice."

Early warnings

The first hint of trouble came in 1995, when an employee with the U.S. Department of Agriculture's (USDA's) Animal and Plant Health Inspection Service (APHIS) noticed canker scabs on a citrus tree while checking fruit fly traps near Miami International Airport. At that time, scientists estimated that roughly 3.6 hectares of residential neighborhoods—possibly including 200,000 trees—were exposed to canker.

Because there's no way to detect infected trees before they develop symptoms, the scientists who found the canker outbreak near Miami proposed quickly clearing all citrus trees in the exposed area and then paying homeowners for their losses. But state agriculture administrators balked, unwilling to risk public outcry over the unexpected tree removal.

As a result, Florida's Citrus Canker Eradication Program (CCEP)—a joint effort by the FDACS and USDA-APHIS—got off to a slow start, with few funds and old science. State crews chopped down only actively infected trees and pruned back all citrus within 38 meters of the trees they removed. Relying on a 1980 study done in Argentina, which suggested that canker bacteria could spread an estimated 32 meters to other trees during windy storms, the scientists hoped their strategy would wipe out the disease. They were wrong.

By 1996, citrus canker had jumped across 23.6 ha. Work crews began removing, rather than just pruning, all citrus within 38 meters of an infected tree. Still, by the end of 1997, the citrus canker quarantine area stretched for 93.5 ha. With costs at $8.7 million, crews had destroyed citrus on more than 34,000 properties, mostly in southeast Florida. No end was in sight.

Meanwhile, city residents, many of whom see "exposed" trees as perfectly healthy—and worth keeping—were getting angry. "It's like a war zone," says Helen Ackerman, a homeowner in Plantation, Florida. "All of a sudden, you hear, 'We're coming into your backyard and cutting down your trees, and you have nothing to say about it.' Isn't this America? Can they *do* this?"

Pockmarked. This grapefruit and leaves show the characteristic lesions of citrus canker. In the inset, an FDACS crew member cuts down a citrus tree in the yard of a Florida resident in hopes of stopping canker's spread.

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Portrait of a Pathogen

As bacterial diseases go, citrus canker is not the most deadly. Rather than kill trees, canker-causing bacteria simply settle into the surface of fruit rinds, leaves, and twigs. Soon, the bacteria cause blistered or corky lesions on the infected tissue.

But blemishes are the least worry for Florida's citrus growers, most of whom sell their fruit for juice, anyway. Citrus canker's real damage is to the fruit's internal clock. As bacteria make a home in citrus tissue, they churn out excess ethylene, a plant hormone, which causes fruit to drop prematurely. That means citrus growers end up throwing out vast quantities of rotting fruit that dropped too soon. "You can't pick the fruit off the ground, because it's not mature enough," explains Andrew LaVigne, vice president of Florida Citrus Mutual, an industry trade group. "At the same time, you've got a smaller crop on the tree."

Canker is hard to control, because it spreads quickly and quietly. When it rains, citrus lesions ooze the bacteria, which then ride the wind, splattering onto nearby trees. Canker bacteria seep into surface wounds on citrus tissue, like those caused by leaf miner insects. Strong winds (over 29 kilometers per hour) can also drive the bacteria directly into leaf stomates.

By the time an infected tree reveals telltale canker scabs, it has probably already infected dozens of surrounding trees, says James Graham, a microbiologist at the University of Florida's Citrus Research and Education Center in Lake Alfred. "The problem is knowing where canker is before it shows itself," says Graham. "You don't know exactly where to point the control measure—or how far-flung the disease is." **–K.B.**

In 1998, amid growing public outrage, Florida's Commissioner of Agriculture called a temporary halt to the cutting of citrus trees that had been exposed but not obviously infected. CCEP officials also asked Tim Gottwald, a plant epidemiologist with USDA's Agricultural Research Service in Fort Pierce, Florida, to try to find out why canker was spiraling out of control.

During the course of an 18-month study, Gottwald, microbiologist James Graham of the University of Florida's Citrus Research and Education Center in Lake Alfred, and colleagues tracked citrus canker as it moved, unchecked, across some 2.6 ha of roughly 19,000 healthy and diseased trees. The results came as a shock.

The scientists found that canker can travel a whopping 15 times farther than previously thought, in some cases spreading over 580 meters during a single storm. The study, which appeared in the January 2001 issue of *Phytopathology*, concluded that the only option was to wipe out all citrus within 580 meters of an infected tree—a decision that came to be known as the "1900-foot rule."

Outside scientists concur with that conclusion. "To me, the data look very methodical, very reasonable," says plant epidemiologist Christopher Mundt of Oregon State University in Corvallis. Harold Scherm, a plant epidemiologist at the University of Georgia, Athens, adds that the new data offer a more realistic look at how quickly canker can spread in Florida's dense neighborhoods. "In this case," Scherm says, "the 1900-foot rule is the right thing to do."

With the study in hand, the CCEP cranked into high gear. The state and USDA kicked in over $100 million in additional funding. Florida Citrus Mutual also chimed in, voicing support for the new 1900-foot rule. During the spring of 2000, over a period of 8 weeks, the eradication program boomed from a staff of roughly 300 to 1800—many of them temporary workers who went door to door, checking and marking trees, talking to residents, chopping citrus. "The program," says Gottwald, "was going at it full steam."

Unhappy. Florida residents protest the state's citrus canker control program, which requires the removal of all exposed trees, even those that seem healthy.

CREDIT: TONY GUTIERREZ/AP

A bitter divide

But the homeowners were definitely not on board. Part of the problem is a severe communication gap between them and CCEP staff. "We have been totally left out of the process," asserts Jack Haire, a resident of Fort Lauderdale. "When the 1900-foot study was agreed to in 1998, the public was not invited. The citrus interests were present, though. And the fact is, it's cheaper for them to cut our trees down here than to plan control remedies on their own land."

In response, Liz Compton, spokesperson for the Florida agriculture department, says the CCEP has spent over $1 million on newspaper ads, bilingual radio programs, hotlines, community liaison officials, billboards, and other educational efforts. For years, she says, open meetings on citrus canker attracted hardly any homeowners. "People just didn't hear it until the chain saws were in their backyard," Compton says. Still, many charge that the CCEP's public relations effort has fallen far short of its goals. "In the future, in other plant disease scenarios, something has to be done differently," remarks Scherm.

As for the charge that the citrus industry is benefiting at the expense of homeowners, LaVigne points out that, at press time, eradication crews had chopped down over 1.3 million commercial citrus trees—compared to just 579,000 residential trees. Cutting crews have wiped out much of Miami's lime industry, he adds.

But the frustrated homeowners aren't about to give up the fight. They've taken to the courts—and scored some victories. Last November, a circuit judge in Broward county halted the cutting of exposed trees in the 1900-foot canker exposure radius, allowing only the removal of actively infected citrus. The state has appealed the verdict. Meanwhile, a Miami-Dade circuit judge ruled in May that the agriculture department must notify homeowners if a tree will be removed; the homeowners then have 10 days to object before cutting crews arrive. And lawsuits filed by homeowners still loom in Palm Beach and Delray Beach.

Scientists say ongoing court clashes threaten the entire eradication program. "Delay is often tantamount to failure in an eradication effort," says Tim Schubert, a plant pathologist with FDACS. The CCEP estimates that over 6000 exposed citrus trees in southern Florida have become infected with canker as the lawsuits drag on. Schubert is as frustrated as any homeowner. "How long will it take to settle the issue?" he asks. "And will we still have an achievable goal at the end of it all?" Those are the kinds of questions that prompt Dixon's nightly reflections. He calls the situation "maddening." And that may be the one point all sides agree on.

–KATHRYN BROWN