

Quarantine expanded as killer bacterium spreads to California orange groves, GMO only hope

Officials with [California Department of Food and Agriculture have quarantined](#) 113 square miles of citrus grove around Bakersfield in an attempt to stave off the bacterial citrus greening disease that has ravaged the Florida citrus industry.

The Asian citrus psyllid which spreads the disease is known to have affected only one tree in a private yard in California, officials say. The quarantine prohibits the movement of citrus trees or fruit out of affected areas. The newly cordoned area near Bakersfield adds to a quarantine in the citrus belt of the San Joaquin Valley that covers 1,000 square miles, making the cordon larger than the state of Rhode Island.

Growers are hoping to avoid the ruin that has wracked Florida's groves. The disease that sours citrus crops and leaves them half green has already ravaged crops across the world. As Amy Harmon of the New York Times [reported](#) in her seminal article, "To slow the spread of the bacterium that causes the scourge, [Florida growers have] chopped down hundreds of thousands of infected trees and sprayed an expanding array of [pesticides](#) on the winged insect that carries it. But the contagion could not be contained." As a result, growers have begun to abandon groves infected by citrus greening.

Attempts to come up with a solution using organic or conventional agriculture have failed. Plant geneticists are now experimenting with a genetically engineered resistance to the diseases for which standard treatments have proven elusive. Scientists are experimenting with a form of a transgenic orange bred with a gene from spinach that resists the bacterial infection. The effort is well on its way, but major hurdles remain.

[Brad Haire, a reporter with Southeast Farm Press,](#) outlines the scope of the problem:

More than 6 million citrus trees need to be removed and replanted to curtail the damage caused by citrus greening in Florida. Through the federal Tree Assistance Program, Florida citrus growers now can get money to help get it done.

"It's important for us to aggressively attack citrus greening. There has been serious concern of orchards being abandoned (in Florida) with owners who didn't know what to do with them," said Agriculture Secretary Tom Vilsack in a conference call Sept. 17. "(What this program does) is provides them a chance to think and pencil out whether or not they can cost effectively and efficiently remove the diseased trees and replant. And if they do, over a period of time, hopefully recoup the cost."

Abandoning the infected groves has exacerbated the problem. A University of Florida study has confirmed that as farmers have abandoned ruined groves, they have become a haven for the citrus psyllids, making a solution all the more pressing.

As Amy Harmon reported last year, the quest to find a solution was initiated by Rick Kress, the president of Southern Gardens Citrus.

They scoured Central Florida's half-million acres of emerald groves and sent search parties around the world to find a naturally immune tree that could serve as a new progenitor for a crop that has thrived in the state since its arrival, it is said, with Ponce de León. But such a tree did not exist. "In all of cultivated citrus, there is no evidence of immunity," the plant pathologist heading a National Research Council task force on the disease said.

In all of citrus, but perhaps not in all of nature. With a precipitous decline in Florida's harvest predicted within the decade, the only chance left to save it, Mr. Kress believed, was one that his industry and others had long avoided for fear of consumer rejection. They would have to alter the orange's DNA — with a gene from a different species.

There are concerns that consumers might reject orange juice made from transgenic oranges. But as the damage from the disease has grown, Florida growers have begun putting aside their qualms as various plant breeders experiment with various transgenic options.

To fight (the bacteria), Dean Gabriel at the University of Florida had chosen a gene from a virus that destroys bacteria as it replicates itself. Though such viruses, called bacteriophages ("phage" means to devour), are harmless to humans, Mr. Irey sometimes urged Mr. Kress to consider the public relations hurdle that might come with such a strange-sounding source of the DNA. "A gene from a virus," he would ask pointedly, "that infects bacteria?"

But Mr. Kress's chief concern was that Gabriel was taking too long to perfect his approach.

A second contender, Erik Mirkov of Texas A&M University, was further along with trees he had endowed with a gene from spinach — a food, he reminded Kress, that "we give to babies." The gene, which exists in slightly different forms in hundreds of plants and animals, produces a protein that attacks invading bacteria.

Reporter Paul Voosen at National Geographic recently [detailed](#) Mirkov's efforts:

Yet in a few select Floridian orchards, there are now trees that, thanks to innovative technology, can fight the greening tide. These trees have the potential to keep Florida orange juice on your breakfast table—provided you are willing to drink the juice of oranges that have

been genetically modified to contain genes from spinach.

The trees are the work of Erik Mirkov, a plant pathologist at Texas A&M University who has spent his career applying the tools of biotechnology to citrus. Over the past few years, his research on genetically modified oranges has gone from an academic sideshow to one of the great hopes of the industry. It's highly unlikely, researchers and growers agree, that oranges will remain in Florida unless new, modified strains like Mirkov's are widely grown.

Overall, Mirkov is on his fifth version of the technology, and they've begun applying it to the whole diversity of Florida citrus: grapefruit, lemon, and, importantly, the rootstocks, like sour orange, that growers use as a base for their trees.

Southern Gardens is now seeking to deregulate these oranges for free use, a long process that requires approval from the Environmental Protection Agency, the Department of Agriculture, and the Food and Drug Administration. It's a process that tends to dissuade academic scientists; except in a few rare cases, like [genetically modified papaya](#) in Hawaii, only wealthy seed companies pursue deregulation of biotech crops.

The GM papaya rescued the Hawaiian papaya from near extinction, and so far consumer resistance has been minimal. But the public debate has intensified in the years since it was developed. The approval process for a transgenic orange could be long and anti-GMO groups are sure to create a public relations ruckus to try to scuttle the effort. However, a transgenic orange would not be paired with an herbicide, nor would there be the environmental and cross pollination concerns for Bt crops, so the environmental concerns would be lower than for herbicide resistant and Bt crops.

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