

# BATTLING CITRUS GREENING

UCF professor's Zinkicide being tested as treatment for deadly disease

BY SUSAN JACOBSON  
Staff Writer

University of Central Florida professor Swadeshmukul Santra was at a conference on citrus greening when an idea came to him that could save the state's ailing citrus industry.

That light-bulb moment helped Santra, who works in UCF's NanoScience Technology Center, invent a zinc-based liquid that is being tested as a treatment for deadly citrus greening.

At stake is Florida's \$10.8 billion citrus industry.

"It's a 100-year-old disease," Santra said. "Nobody knows how to cultivate it in a lab, and there's no cure available to growers yet."

Santra, 47, who holds a doctorate in chemistry, invented Zinkicide in 2013. The bactericide, composed of zinc and undisclosed other ingredients, is being sprayed on citrus trees in St. Lucie County and at the University of Florida's Citrus Research and Education Center in Polk County.

The experiment began last month and is scheduled to run for five years, but Santra said scientists should have an idea of whether it works in about two years.

If it does, Zinkicide could be useful on vegetables and ornamental plants, too, he said. It already has shown promise in fighting citrus canker, a disease that has plagued citrus groves for decades.

"Canker is ugly," said Santra, who also is doing cancer research in a project funded by the National Sci-

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SUSAN JACOBSON/STAFF

Swadeshmukul "Swadesh" Santra heads a team that is researching a cure for citrus greening. He works at UCF's NanoScience Technology Center.

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*University of Central Florida professor Swadeshmukul Santra about citrus greening*

# CITRUS

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ence Foundation. "Greening is a killer."

UCF researchers have developed a process for producing a batch of Zinkicide in about six hours. The steps are proprietary and must be done by highly skilled, trained people.

The milky liquid is poured into orange plastic containers similar to painters' buckets, and the Zinkicide is trucked to the groves. Last month, the foliage of some trees was sprayed, the roots of other trees were drenched and some trees received both treatments, said Jim Graham, a soil microbiologist with the Citrus Research and Education Center.

Zinkicide's potential side effects will be studied, as will the ideal dosage, timing and amount. Santra's team will test the bactericide on minnows and in the lab on human lung and skin cells. Bee and soil-microorganism testing also is part of the study, said Evan Johnson, a plant pathologist at the Citrus Research and Education Center who is director of the overall Zinkicide project.

Santra's work is being financed through \$1.4 million of a \$4.6 million grant from the U.S. Department of Agriculture. The University of Florida is the grant recipient, but scientists from other universities also are involved.

Santra leads teams from UCF, which is responsible for development, and Oak Ridge National Laboratory, where scientists will use computer modeling and simulation to study Zinkicide's effect on plant tissue.

The Zinkicide research is one of four new projects UF is leading to find a solution to citrus greening. The others will try steam-generated heat therapy, the development of an insect-resistant tree and use of an antimicrobial.

The main challenge in treating citrus greening, also known by the Chinese



SUSAN JACOBSON/STAFF

This test tube contains a proprietary liquid called Zinkicide that UCF scientists hope will cure citrus greening, which is destroying Florida's citrus trees.

name Huanglongbing — yellow shoot disease — is that the bacteria live deep inside infected trees where they cannot be isolated or cultured, Santra said. Any treatment must be tiny enough to penetrate the plant tissues.

Trees infected with Huanglongbing, or HLB, develop blotchy, mottled leaves, sparse foliage and small fruit that drops off prematurely and tastes bitter or salty, rendering it useless even for juice. Eventually, the tree dies.

Citrus greening is spread by an insect called the Asian citrus psyllid. The insect feeds on what's known as phloem (pronounced FLOH-em), tissue that carries nutrients throughout the tree.

There are millions of the tiny psyllids in Florida, and they multiply rapidly, making insecticide an important part of control efforts, Johnson said.

"It is one of the most devastating things that's happened to an agricultural crop, and it's one of the hardest to control," he said.

First found in the U.S. in 2005 in the Homestead

area, greening has spread to all 29 citrus-producing counties in the state. Currently, the most effective way to curtail the spread of the disease is to cut down infected trees. The USDA has spent more than \$300 million trying to find a remedy.

Figures released this month by the USDA show that Florida is expected to produce 102,000 boxes of oranges this year, the lowest number since the state produced 100,500 boxes in 1968. Florida produced 242,000 boxes of oranges in 2004, the second highest ever.

"The research couldn't have come at a better time," said Matt McLean, founder and CEO of Uncle Matt's Organic in Clermont and a member of a subcommittee that advises the U.S. secretary of agriculture on citrus-disease research. "We are relying heavily on field research and scientists to help lead the charge as well as our own anecdotal research in the field, outside the lab."

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