Science Societies

First effective treatment for citrus greening disease discovered

By Jules Bernstein

August 23, 2020



Citrus greening (also known as huanglongbing or HLB), one of the most significant citrus diseases, was first detected in Florida in 2005. Source: Adobe Stock/Ellen.

University of California–Riverside (UC-Riverside) scientists have found the first substance capable of controlling citrus greening disease, which has devastated citrus farms in Florida and also threatens California.

The new treatment effectively kills the bacterium causing the disease with a naturally occurring molecule found in wild citrus relatives. This molecule, an antimicrobial peptide, offers numerous advantages over the antibiotics currently used to treat the disease.

Geneticist Hailing Jin, UC-Riverside, who discovered the cure after a five-year search, explained that unlike antibiotic sprays, the peptide is stable even when used outdoors in high heat, easy to manufacture, and safe for humans.

“This peptide is found in the fruit of greening-tolerant Australian finger limes, which has been consumed for hundreds of years,” Jin says. “It is much safer to use this natural plant product on agricultural crops than other synthetic chemicals.”

Currently, some growers in Florida are spraying antibiotics and pesticides in an attempt to save trees from the *Candidatus* Liberibacter asiaticus (*C*Las) bacterium that causes citrus greening, also known as huanglongbing or HLB.

“Most antibiotics are temperature sensitive, so their effects are largely reduced when applied in the hot weather,” Jin says. “By contrast, this peptide is stable even when

used in 130-degree heat."

Jin found the peptide by examining plants such as the Australian finger lime known to possess natural tolerance for the bacteria that causes citrus greening disease, and she isolated the genes that contribute to this innate immunity. One of these genes produces the peptide, which she then tested over the course of two years. Improvement was soon visible.

"You can see the bacteria drastically reduced, and the leaves appear healthy again only a few months after treatment," Jin says.

Because the peptide only needs to be reapplied a few times per year, it is highly cost effective for growers. This peptide can also be developed into a vaccine-like solution to protect young healthy plants from infection, as it is able to induce the plant's innate immunity to the bacteria.

Jin's peptide can be applied by injection or foliage spray, and it moves systemically through plants and remains stable, which makes the effect of the treatment stronger.

Bringing the Treatment to Market



The Asian citrus psyllid, pictured here, spreads the bacterium that causes citrus greening disease.

Source: Mike Lewis/UC-Riverside.

The treatment will be further enhanced with proprietary injection technology made by Invaio Sciences. The University of California–Riverside has entered into an exclusive, worldwide license agreement with Invaio, ensuring this new treatment goes exactly where it's needed in plants.

“Invaio is enthusiastic to partner with UC-Riverside and advance this innovative technology for combating the disease known as citrus greening or huanglongbing,” says Invaio Chief Science Officer Gerardo Ramos. “The prospect of addressing this previously incurable and devastating crop disease, helping agricultural communities, and improving the environmental impact of production is exciting and rewarding. This is crop protection in harmony with nature.”

The need for an HLB cure is a global problem, but especially in California as the state produces 80% of all the fresh citrus in the United States, says Brian Suh, director of technology commercialization in UC-Riverside's Office of Technology Partnerships, which helps bring university technology to market for the benefit of society through licenses, partnerships, and start-up companies.

“This license to Invaio opens up the opportunity for a product to get to market faster,” Suh says. “Cutting-edge research from [UC-Riverside], like the peptide identified by Dr. Jin, has a tremendous amount of commercial potential and can transform the trajectory of real-world problems with these innovative solutions.”

More integrated pest management

Back to issue

Back to home

Text © . The authors. CC BY-NC-ND 4.0. Except where otherwise noted, images are subject to copyright. Any reuse without express permission from the copyright owner is prohibited.