

UA Licenses Patent for Natural Fungicide



Mike Stanghellini

A UA patent may help combat many plant diseases, including downy mildew of pumpkin.

Natural product fights plant diseases

By Mari N. Jensen

The University of Arizona has licensed its patent for a natural fungicide to Jeneil Biosurfactant Company, a winner of the 2004 Presidential Green Chemistry Challenge Award.

The patent is for the use of a natural product called rhamnolipid to combat fungus-like organisms that cause some of the most economically damaging plant diseases in the world.

Compared with other fungicides, "rhamnolipid, because of its biological nature, has less toxicity and better biodegradability," said Raina M. Maier, a professor in UA's department of soil, water and environmental science who is one of the inventors.

Other inventors listed on the patent are Michael E. Stanghellini, UA professor emeritus of plant pathology and now a professor at the University of California at Riverside, retired UA senior research specialist Scott Lynn Rasmussen, former UA graduate student Do Hoon Kim and former UA postdoctoral researcher Yimin Zhang.

The organisms, known as zoosporic plant pathogens, cause diseases that in-

clude root rots of citrus and pepper, downy mildew of pumpkin, cucumber, grape and pepper, and the late blight of potato, the disease associated with the 19th century Irish potato famine. Zoosporic plant pathogens also cause the sudden oak death affecting oak trees in California and Europe.

In the spring of 2004, Jeneil obtained U.S. Environmental Protection Agency approval to use a rhamnolipid product as a fungicide, said the company's president, N. R. Gandhi.

Any revenue that the University of Arizona receives from the patent license will fund future research and future patent expenses, said Mary Louise Trammell, senior licensing associate in UA's Office of Technology Transfer.

"It's all turned back into the R&D endeavor or the commercialization endeavor," she said. "We're trying to make products available for the public good."

The discovery of the fungicidal properties of rhamnolipid happened in a classic way—by accident.

In 1995, Michael Stanghellini, then a professor in UA's department of plant pa-

thology, was using synthetic surfactants, or detergents, to control zoosporic plant pathogens in hydroponic systems.

However, one of the systems seemed immune to the pathogens even without having the synthetic surfactant added. Moreover, the system was foaming, just as if soap had been added. He found the system was contaminated with a microorganism that produced a natural surfactant, a biosurfactant.

One day as he walked in from the parking lot with another professor, Stanghellini mentioned his finding. He recalls that the other man said, "You need to talk to Raina, she's the queen of biosurfactants."

Maier studies how to use biosurfactants from soil organisms to clean up environmental contamination. So Stanghellini teamed up with Maier to investigate a novel use of biosurfactants.

The researchers verified that the natural surfactants in Stanghellini's hydroponic system were rhamnolipids produced by a common soil bacterium, *Pseudomonas aeruginosa*.

The team went farther and showed that such rhamnolipids could vanquish zoosporic plant pathogens by exploding the zoospore, the mobile, infectious part of the pathogen.

Maier said when rhamnolipid is added to a solution containing zoospores, "In 60 seconds—they're gone."

Moreover, the team showed that adding rhamnolipid to the water in a hydroponic greenhouse system could protect plants from infection by zoosporic plant pathogens.

The researchers patented their discovery in 1998.

Maier said about their finding, "It was very exciting. It's what science is all about." ■

Read more about Maier and Stanghellini's research on biosurfactants to control plant pathogens in "Exploding Zoospores," cals.arizona.edu/pubs/general/resrpt/1997/exploding_zoospores.html

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