



Bolstering Plants' Defenses

Like a stealth invader, a disease-causing bacterium strikes where plants are weakest. By following the bacterium behind enemy lines, a UNL scientist is making discoveries to help improve agricultural crops' defenses against a broad range of diseases.

James Alfano, Charles Bessey Professor of Plant Pathology, studies *Pseudomonas syringae*, a bacterial pathogen that disables a plant's immune response by using a syringe-like mechanism to inject virulence proteins, or Type III effectors, into plant cells. These proteins attack a plant's immune response and help the pathogen infect its host.

By stalking these virulence proteins to identify the pathogen's target – a plant's weak spots – Alfano and colleagues in UNL's Center for Plant Science Innovation can strengthen those areas to boost the plant's own immunity.

"I look at these Type III effectors as very unique tools to discover new components of plant immunity that can't be discovered using other, conventional tools," he said.

For example, Alfano identified one bacterial protein, HopU1, which knocks out a component that helps detect the pathogen's presence. By inducing greenhouse-grown soybeans to make more of that component, his team improved the plants' immune response. They'll soon test that immune response in field trials.



Next, the researchers will test for strengthened immunity in other agricultural crops and against a range of pathogens.

Alfano recently identified another virulence protein that prevents defensive compounds from leaving cells to fight the pathogen. This discovery also may lead to enhancing immunity by boosting a plant's disease-fighting compounds.

While *P. syringae* is not a major costly disease in U.S. crops, the immune boost is effective against other pathogens, including many viruses and fungi, as well as bacteria.

Because plant and animal immune systems have components in common, this research also may lead to improvements in human health.

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Top: James Alfano and graduate student Anna Joe
Above: Test plants