Researchers bombard plant-killing fungus with silver nanoparticles

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Deep in the soil, underneath more than 400 plant and tree species, lurks a lethal fungus threatening Florida's $15 billion a year ornamental horticulture industry.

But University of Florida plant pathologist G. Shad Ali has found an economical and eco-friendly way to combat the plant destroyer known as phytophthora before it attacks the leaves and roots of everything from tomato plants to oak trees.

Ali and a team of researchers with UF's Institute of Food and Agricultural Sciences, along with the University of Central Florida and the New Jersey Institute of Technology, have found that silver nanoparticles produced with an extract of wormwood, an herb with strong antioxidant properties, can stop several strains of the deadly fungus.

"The silver nanoparticles are extremely effective in eliminating the fungus in all stages of its life cycle," Ali said. "In addition, it has no adverse effects on plant growth."

The silver nanoparticles measure 5 to 100 nanometers in diameter – about one one-thousandth the width of a human hair. Once the nanoparticles are sprayed onto a plant, they shield it from fungus. Since the nanoparticles display multiple ways of inhibiting fungus growth, the chances of pathogens developing resistance to them are minimized, Ali said. Because of that, they may be used for controlling fungicide-

resistant plant pathogens more effectively.

That's good news for the horticulture industry. Worldwide crop losses due to phytophthora fungus diseases are estimated to be in the multibillion dollar range, with $6.7 billion in losses in potato crops due to late blight – the cause of the Irish Potato Famine in the mid-1800s when more than 1 million people died – and $1 billion to $2 billion in soybean loss.

Silver nanoparticles are being investigated for applications in various industries, including medicine, diagnostics, cosmetics and food processing. They already are used in wound dressings, food packaging and in consumer products such as textiles and footwear for fighting odor-causing microorganisms.

Other members of the UF research team were Mohammad Ali, a visiting doctoral student from the Quaid-i-Azam University, Islamabad, Pakistan; David Norman and Mary Brennan with the University of Florida's Plant Pathology-Mid Florida Research and Education Center; Bosung Kim with the University of Central Florida's chemistry department; Kevin Belfield with the College of Science and Liberal Arts at the New Jersey Institute of Technology and the University of Central Florida's chemistry department.

The team's work was published this month in the journal *Phytopathology*.

Provided by University of Florida