

GRADUATE RESEARCH SEMINAR SERIES

Friday
April 28, 2017

12:15 PM

Research Pavilion
NSTC
Conference Room 169

*Pizza and drinks
will be provided*

Studying the Uptake and Translocation of Zinc-Based Treatments Aimed at Tackling Phloem-Restricted Diseases in Citrus Plants

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Spread of pathogens and invasive plant diseases constitute a significant challenge in agriculture. Many of these diseases are caused by bacterial infections, which colonize critical parts of the plant such as the phloem or the xylem, causing a disruption in water and nutrient transport. Nanoparticle-based treatments, which can cross over the plant barriers to target pathogens systemically, are a great interest.



Here, we present a study of Zinc-based nanoparticle treatment uptake in citrus seedlings. The particles were designed to exhibit antibacterial properties as they translocate systemically to terminate pathogens residing in the phloem and/or xylem. We will discuss how Zn content in the plant can be quantified in leaves with X-ray Fluorescence Spectroscopy. We will also present evidence that Energy Dispersive X-ray Spectroscopy and Scanning Electron Microscopy can be used to determine Zn concentration in selected plant tissues. The results suggest that the nanoparticles travel throughout the plant within 24 hours, and we demonstrate their presence in both the phloem and the xylem. This is critical to enable targeting the bacteria. We then characterize the traits of the nanoparticles' effect on the plant tissue using Raman spectroscopy. Finally, we discuss protocols for future studies to determine the effect of the treatment on the plant tissue at the cellular and subcellular levels.