☒ **Talk** ☐ **Poster**

Elucidating Zinc Tolerance Mechanisms in Ectomycorrhizal Fungi and Their Pine Hosts

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Zinc (Zn) is an essential micronutrient for plants and fungi but elevated concentrations can be toxic which affects growth, metabolism, and symbiotic interactions. Understanding the mechanisms of Zn tolerance in ectomycorrhizal fungi (EMF) and their host plants is critical for predicting ecosystem resilience in nutrient-stressed soils and for developing strategies to improve forest health.

In this study, we investigated Zn distribution and chemical speciation in symbiotic systems involving Zn-tolerant and Zn-sensitive strains of the EMF (*Suillus tomentosus*) grown with *Pinus taeda* seedlings. X-ray Fluorescence Microscopy (XFM) was used to visualize and compare Zn accumulation patterns in fungal tissues, pine roots, and the plant–fungus interface at the micron scale. Microbeam X-ray Absorption Spectroscopy (µXAS) provided insights into Zn speciation, revealing differences in coordination chemistry between tolerant and sensitive fungal strains under varying Zn exposures.

To explore cell wall remodeling as a potential mechanism for metal tolerance, we applied Fourier Transform infrared (FTIR) spectroscopy to fungal tissues grown under controlled Zn concentrations. This approach allowed us to detect biochemical shifts in cell wall polysaccharides, proteins, and other functional groups, providing evidence for structural modifications linked to Zn sequestration or exclusion.

By integrating high-resolution elemental mapping, chemical speciation analysis, and molecular fingerprinting, this work provides a comprehensive view of Zn handling strategies in EMF–pine symbiosis. Our results highlight distinct physiological and biochemical adaptations in Zn-tolerant strains, offering new perspectives on the role of fungal–plant partnerships in nutrient-stressed environments.