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Soil management, mycorrhizal fungi, and plant-pest interactions

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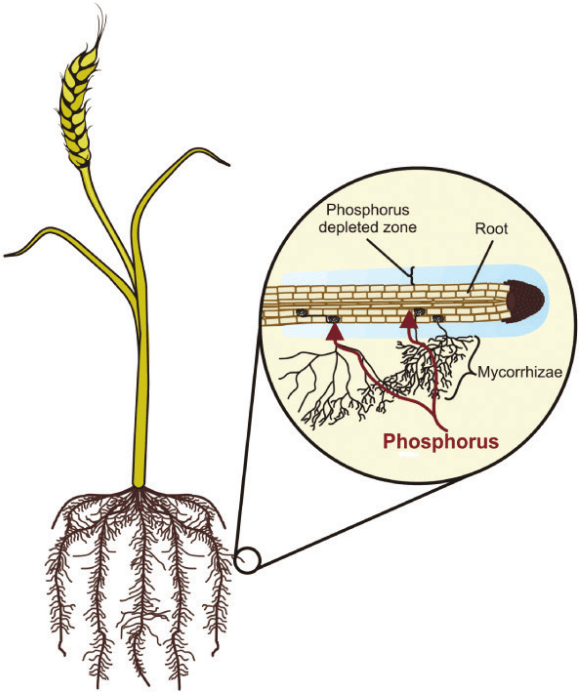
Why this study?

- Many microbial products are on the market but efficacy is unclear in field conditions, and multifunctionality is unclear.
- One available microbial product focuses on enhancing mycorrhizal interactions using inoculum applied to transplants
- Mycorrhizal fungi associate with tomatoes (and other crops), potentially enhancing nutrition and plant resilience to drought and/or pests.
- Mycorrhizal fungi can be depleted in agricultural soils, especially depending on other rotation crops and soil conditions.
- Soil with more organic matter and alternative plant hosts for fungi (cover crops) may be better for fungi but could also be depleted in fungi depending on conditions.
- Is inoculum effective in field conditions? Under which soil management conditions do plants benefit?

What are mycorrhizal fungi and why might they affect pests?



- Mycorrhizal fungi are from the Glomeromycota. They are 'symbiotic' fungi that have structures in both plant roots and soil.
- Mycorrhizal fungi gather nutrients (often P) from the soil, often better than roots, and transport to the plant.
- Fungi often increase plant size (when nutrient-limited), and can enhance plant resistance to pests and disease.
- Protective effects can be mediated by nutrition or plant defense signaling.

Goals and research questions:

The goal of this research is to develop recommendations for "smart" soil management practices for processing tomatoes that promotes effective mycorrhizal fungi, with particular focus on insect resistance and yield and tomato canning quality outcomes.

Our objectives are to:

1. Sequence and characterize root-associated mycorrhizal fungi across soil management backgrounds using mycorrhizal-specific sequencing.

    - Under which soil management types are mycorrhizal fungi often present?
    - Which species of fungi are found in which soil management types?

2. Assess effects of mycorrhizal inoculants on tomato traits across 3 soil management backgrounds.

    - Damage to leaflets
    - Attractiveness to leafhoppers
    - Plant response to pest attack
    - Root colonization