

Tomato Organic Management and Improvement (TOMI) Project

Biocontrol Studies

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The Challenge: Demand for organically grown tomatoes sold through local, direct-to-consumer markets continues to rise. Yet growers struggle to meet this demand because of foliar diseases that routinely reduce both yield and fruit quality. These challenges are intensifying as shifting weather patterns introduce new pathogens and existing pathogens evolve to overcome genetic resistance in commercial tomato varieties. Copper-based fungicides remain one of the few tools available to organic growers, but they are costly and can degrade soil health when used repeatedly.

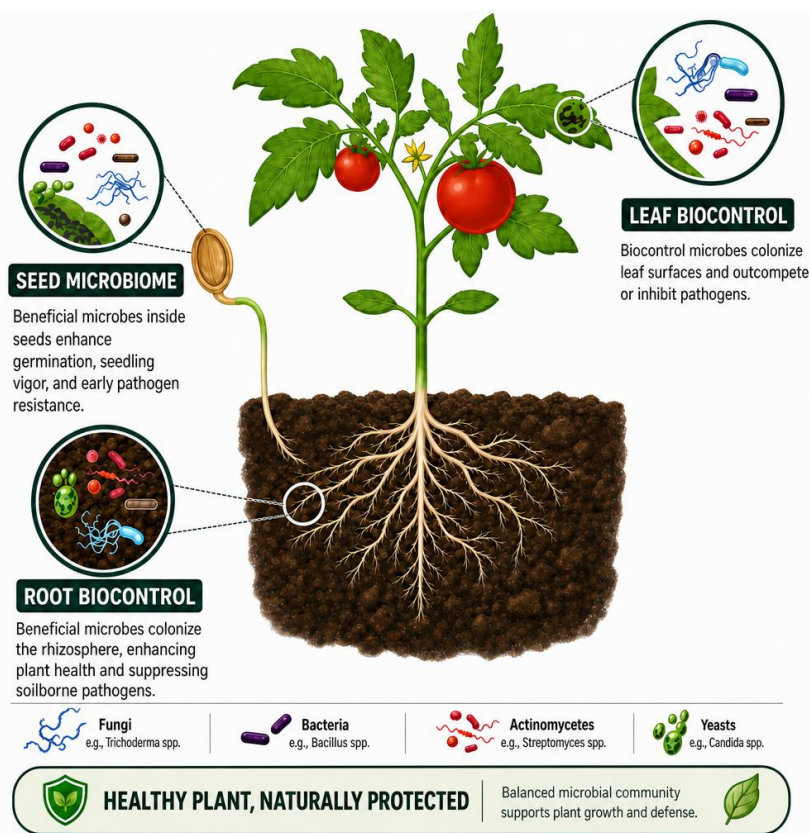


The Opportunity: A wide range of soil- and plant-associated microbes can suppress foliar pathogens through mechanisms that include antagonism, parasitism, and the activation of induced system resistance (ISR). Although many of these microbes have been isolated and commercialized as inoculants, their performance in field settings is highly inconsistent despite strong efficacy in greenhouse trials.

The **overarching goal** of these studies is to identify key ecological, environmental, and management factors that govern biocontrol efficacy under field conditions and to develop practical tools and resources that enable organic tomato growers to more reliably harness microbial disease suppression.

Our approach:

- **Field trials across 6 states** (IN, NC, VI, WI, OR, CA) are evaluating how soil conditions and local environments influence pathogen pressure and biocontrol performance in open-field and high tunnel systems. Local isolates collected from each site are being compared with broadly adapted strains to determine which microbes survive and function best under different conditions.
- **Greenhouse genetic studies** are assessing how tomato genetics affect a plant's ability to recruit and benefit from biocontrol microbes. These studies are identifying genomic regions associated with stronger microbial engagement, laying the framework for future breeding efforts that incorporate this trial.
- All data from field, lab, and greenhouse experiments will feed into a **decision support tool** designed to help organic tomato growers improve biocontrol reliability and make more informed management decisions.



For more information about the TOMI project and our biocontrol trials visit our website (<https://eorganic.info./tomi>) or contact the TOMI project PI: **Dr. Lori Hoagland**, lhoaglan@purdue.edu