

# Soil microbes ally with plants to fight disease and tolerate stress

June 2 2015

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Much like the microbes in our gut, the plant microbiome also elicits a low-level immune response in the host plant, according to research presented at the annual meeting of the American Society for Microbiology. Researchers found that when microbe-free plants were exposed to the pathogen responsible for speck disease in tomato, *Pseudomonas syringae*, disease was significantly less in plants with a microbiome.

At all times, [plants](#) in nature actively sense and respond to microbe-specific molecules. "The goal of our research is to unravel the complexity of the plant microbiome to understand its functions and benefits to plant health. Intelligent tweaking of the plant microbiome could give rise to constellations of microbes that robustly increase yield and protect against disease," said James Kremer, lead author.

To investigate the function of the plant microbiome, Kremer and colleagues at Michigan State University used microbe-free seeds, sterile growth vessels and unique bottom-irrigated pots (FlowPots), to raise completely microbe-free plants rooted in a sterile potting mix. "We seeded FlowPots with diverse microbial communities from various soils across North America, and found that much like the microbes in our gut, the plant microbiome produces a low-level immune response in the [host plant](#)," said Kremer.

As the global population increases and energy demands continue to rise, the importance of reliable, high-yielding agriculture is paramount.

Losses due to disease and drought will become more severe, and marginal lands will need to be reconsidered as cropland.

How can agriculture evolve to meet these demands without compromising the integrity of our environment?

Microbes just might be the answer. Soil is an incredible reservoir of microbial diversity. A single gram contains thousands of species capable of colonizing plants, many with beneficial effects. While certain soil-borne bacteria and fungi are known to contribute to plant health under controlled conditions, crop responses to individual microbes have historically been unpredictable and location-specific. The naturally occurring complex community of plant-associated microbes, or the plant microbiome, ultimately wins out.

A lot more research still remains to be done in the field. "Many more questions remain to be explored: how do plants recruit particular microbes? Which [microbes](#) work together to help the plant? What characteristics does a microbe need to invade and persist in a [microbiome](#)? The untapped potential of plant microbiota foreshadows a bright and exciting future full of discoveries for microbiology, medicine, and agriculture," said Kremer.

**More information:** This research was presented as part of the 2015 General Meeting of the American Society for Microbiology held May 31- June 2, 2015 in New Orleans, Louisiana.

Provided by American Society for Microbiology

Citation: Soil microbes ally with plants to fight disease and tolerate stress (2015, June 2) retrieved 25 April 2024 from

<https://phys.org/news/2015-06-soil-microbes-ally-disease-tolerate.html>

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