Scientists Say Microbes Create Hardier, Bigger Crops-Without Chemicals

By Clare Leschin-Hoar 12/12/2013

Scientists have discovered a tiny new natural friend for farmers that could mean using fewer agricultural chemicals to grow our food.

Ever since Michael Pollan shared the nitty-gritty details of his gut bacteria, a lot of us have been not-so-secretly obsessed with microbes. Supermarket shelves are jammed with products boasting good-for-you probiotics. What if microbes can give plants the same benefits?

Considered through the lens of a warming planet with a burgeoning population, that question has scientists buzzing with the possibility.

In the early 2000s, plant biologist Rusty Rodriquez studied plants that survived near Yellowstone National Park's geothermal vents. How could plants withstand the kind of heat that would cause other species to wither? It turns out, they weren't facing the intense heat alone—they carried a symbiotic fungus. Together, the fungus and the plant could survive Yellowstone's hot soil.

That discovery prompted Rodriquez and his colleagues to look at other habitats and plants; what they found were other similar symbiotic relationships, which may make it easier for the crops we humans rely on to weather a future in which temperatures are on the rise and droughts are more common.

How? Certain fungi can help a plant survive fluctuations in heat, survive drought, or flourish in salty soil, and the fungi can successfully be transferred to other plants. If you stop to take that in for a minute, the possibility is thrilling.

Dr. James White, who studies the microbial endophytes of plants at Rutgers University, says we're still in the early stages of this type of technology but that it holds great promise.

"We're finding microbial endophytes in plant after plant after plant. They're bacterial and fungal. There's a whole community there that contributes to how a plant performs. And understanding that might enable us to grow crops without so many agrichemicals on them," says White.

Field trials have been promising. Corn, rice, wheat, sugarcane, barley, and other seeds treated with a fungus identified by Rodriguez's company, Adaptive Symbiotic Technologies, showed increased yields during drought and required less water. Other trials showed seeds could do well in salt-affected soils, a problem faced by California farmers.

If this smacks of the debate over genetic modification, it's nothing like that.

"We are not modifying the plant genome. The fungal genome itself is not being modified. When you put a plant out in a field, it will get colonized with fungus. We're just bringing in a fungus we know will be a mutualist inside the plant. They're nontoxic, pose no threat to animals or invertebrates, and do not end up in the plant products themselves," says Rodriguez.

"It's nowhere near genetic modification," says White. "It's very comparable to the gut microbes that enhance the stress tolerance of a host and provide nutrients to a host."

Rodriguez says the ability to commercialize the process isn't far away.

"We're pursuing organic certification for our products," he says. If all goes well, a commercially available product could be launched by the first quarter of 2014.

How will it work? Farmers will buy seeds treated with the fungus.

"The farmer just sticks it in the ground. When the plant germinates, the fungus germinates, and they form a symbiosis within a few hours," says Rodriguez