

The 'Speck'-ter haunting New York tomato fields

November 9 2015



A tomato in the BTI experimental field showing signs of bacterial speck disease.
Credit: Greg Martin

The 2015 growing season was a tough one for tomato researchers at the Boyce Thompson Institute, as bacterial speck disease descended on their field, but those infected plants may one day save others from a similar, spotted fate.

Cool weather and heavy rains in early summer created the perfect environment for speck—a bacterial disease that attacks [tomatoes](#), causing dark spots on leaves and fruits and withered flowers. The outbreak of speck turned Boyce Thompson Institute's tomato field in Freeville, New York into a withered, mottled mess.

When BTI tomato researchers saw spots, farm manager Steve McKay called in Chris Smart, a plant pathologist at Cornell University's Geneva campus, and BTI Professor Greg Martin to diagnose the problem. Martin specializes in the study of tomato's interactions with the bacterium that causes speck, *Pseudomonas syringae* pv. tomato.

"This year speck really has been devastating to a lot of growers throughout the state of New York and to some researchers too," said Smart.

Since 2009, speck has been an issue for commercial producers in upstate New York who grow heirloom and fresh market tomatoes—the kind on grocery store shelves. Most of the tomatoes that end up in ketchup and tomato sauce, called processing tomatoes, carry a gene that makes them resistant to the bacteria.

"Although it creates serious problems for growers, the outbreak gives us the opportunity to observe if any established or experimental varieties have resistance to the local strains of the bacteria," said Martin.

The tragedy of bacterial speck disease is that once farmers identify the problem, it likely has already progressed to a point where it is very

difficult to control. In a bad year, growers can lose whole fields.

"There are very few control products for [bacterial diseases](#) of vegetables," said Smart. "If the symptoms are present in the field, the only thing they can do is to spray copper-based bactericides."

Because controlling speck once it takes hold is so difficult, prevention is key, said Smart. Growers should buy certified clean seed that is free of bacterial diseases, or they can heat treat their own seeds. They should also thoroughly clean all equipment, including trellis stakes, nursery flats, and greenhouse benches with a sterilizing solution.

The bacteria survive in plant debris in the soil for up to three years, so Smart recommends rotating crops so that tomatoes—or related crops like peppers, eggplant and potatoes—grow in a field once every three years.

A farmer's best chance against speck is to use tomatoes that are naturally resistant. The gene present in processing tomatoes gives resistance only to types of *Pseudomonas syringae* pv. tomato designated as race 0. Another type, classified as race 1, has become much more common in recent years.

"There isn't any resistance to race 1 strains in cultivated tomatoes," said Martin. "I have gotten more interested in race 1 strains because they're emerging as more and more of a problem."

In a new paper published in *The Plant Genome*, Martin reports finding a segment of DNA from a wild relative of the cultivated tomato, which imparts resistance to race 1 bacteria. To find this stretch of chromosome, dubbed qRph1, researchers in his lab screened seeds from the Tomato Genetics Resource Center at the University of California at Davis. One sample of the fuzzy, green-fruited species *Solanaum habrochaites*, collected from Ecuador, showed resistance. They

hybridized it to a cultivated tomato and then did the genetic work to map out the location of the gene.

In future work, they will continue their breeding experiments to generate a variety of the cultivated tomato that carries the qRph1 resistance gene. The work highlights the importance of using wild relatives of cultivated crops as a source of valuable traits that have been lost through domestication.

Martin and Smart plan to use the speck-infested Freeville field next year to field-test different plants' resistance to the natural speck strains there. With any luck, they'll find resistance genes in wild tomato plants that may spare future New York farmers from plowing under a speckled crop.

Provided by Boyce Thompson Institute for Plant Research

Citation: The 'Speck'-ter haunting New York tomato fields (2015, November 9) retrieved 24 April 2024 from <https://phys.org/news/2015-11-speck-ter-york-tomato-fields.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.