

Figuring Out How to Control a Plant Virus by Figuring Out How to Control the Whitefly That Spreads the Virus

The Puzzle:

What's causing the disease that cuts tomato yields up to 70% in tomato fields in the Dominican Republic, in the Caribbean?



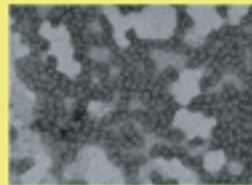
We wonder.... Could the disease new to the Dominican Republic be caused by a virus that had just recently come in to the country from someplace else?



What Could It Be? Plant diseases can be caused by poor soil, bad weather, viruses, bacteria, and fungi. Crops can also be harmed by insects, mites, and other plants.

Any Big Clues? A whitefly often found on tomato is also known to spread viruses. (The whitefly is called *Bemisia tabaci*.)

Any suspects? We suspected it could be Tomato Yellow Leaf Curl Virus (TYLCV).



How to Check if the Virus is in Tomato in the Dominican Republic?

Make copies of short pieces of DNA of the virus—pieces that are easy to see on X-ray film and that will stick to the DNA of the virus that is in juice of squashed leaves of tomato.



A DNA map of the suspect virus from tomato was identical to the DNA map of TYLCV. The DNA sequence of the suspect virus was 97% identical to TYLCV! Short pieces of DNA designed to stick to TYLCV DNA also stuck to DNA from infected tomatoes.

Once we figured out the disease is caused by the virus, what options did we have to control the disease? We tried at least two ways:

1. Control the virus by breeding for resistance.
2. Control the spread of the virus by cutting the number of whiteflies.

How can farmers cut the population of whiteflies?

They can cut the whiteflies' food supplies. The farmers agreed that every fall they would not grow crops that the whitefly grows on. The crops included tomato, beans, cucumber, eggplant and pepper.

*No crops for the whitefly from September through November.

*Fewer crops for the virus, too.

*There's just one wild weed that the whitefly likes.



Results: Giving the whiteflies a "fall vacation"—not growing crops they like from September through November—slowed the spread of the virus, and tomato yields were back to normal by 1996.

We are also breeding crops for resistance to the whitefly and to the virus.

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