

7/31/2026

Tomato Troubles Start Before Symptoms Show

Brandan A. Shur & Dr. Steve Rideout



Recently, we've spent more time reading labels in the produce section at my local grocery retailers. If you look closely at the tomatoes in clamshells, on the vine, in snack packs or under specialty brands, a surprising number began in a greenhouse, often in soilless substrate systems in the U.S., Canada or Mexico. That includes products from large North American greenhouse tomato producers such as Mastronardi Produce, NatureSweet, Windset Farms, Village Farms, Mucci Farms, Pure Flavor, Nature Fresh Farms and Red Sun Farms, as well as

newer projects like Pluck'd in Austinville, Virginia, that just started production in early 2026.

Figure 1. High-wire tomato production in a commercial greenhouse.

When greenhouse tomatoes are part of a year-round retail program, crop health is no longer just a production issue. It affects harvest flow, labor planning, packout, fruit quality and buyer trust. Grocers and distributors are not only buying fruit for today; they depend on a predictable crop load weeks into the future. Disease that reduces canopy health, removes plants or lowers marketable yield can quickly become a supply problem.

Protected production gives growers powerful tools. Rainfall is removed from the crop. Irrigation and fertility can be measured. Climate can be managed. Workers can prune, train, lower, harvest and scout. But anyone who's spent time in a long-season tomato greenhouse knows the structure doesn't make disease disappear—it changes the disease picture.

The crop is dense and the season is long. Plants are handled constantly: leaves are removed, stems are wounded, flower parts age and plant debris can accumulate if sanitation falls behind. Add high humidity, condensation, poor airflow or a contaminated water source and the greenhouse can shift from a protective structure to a disease-friendly microclimate. We're in this business to grow plants, not breed pathogens!

For greenhouse tomato growers, leaf mold, Botrytis and bacterial wilt are worth keeping high on the radar. They're different problems, but they share one lesson: disease management should start before symptoms

show up (Figure 1).

The greenhouse changes the risk

In the field, many tomato diseases depend on rain, splashing water and extended leaf wetness. A greenhouse roof removes much of that pressure, but it doesn't remove moisture from the equation. It changes where moisture shows up.

Instead of rain events, growers deal with humidity, condensation, dense foliage and localized areas of weak air movement. At night, as temperatures drop and relative humidity rises, plant surfaces can fall below the dew point. Corners, end walls, lower-canopy zones and thick vegetative areas may dry more slowly than the rest of the house. That's where leaf mold and Botrytis find opportunity.

Greenhouse systems also create root-zone and sanitation risks. Tomatoes may be grown in soil, substrate bags, slabs, containers or hydroponic systems, but all depend on clean transplants, water, tools and surfaces. In recirculating systems, water and plumbing can connect plants that otherwise look separate.



Leaf mold is a canopy warning sign

Leaf mold can be easy to miss early because it often starts quietly in the lower or middle canopy. The first symptoms may appear as yellow or light green patches on the upper surface of older leaves. Flip the leaf over and the more recognizable sign appears: olive-gray, velvety growth on the underside (Figure 2).

Figure 2. Early leaf mold symptoms on upper tomato leaves with pale yellow and purple-brown spots.

Figure 3. Gray mold on a tomato leaf, showing tan to gray necrotic lesions caused by Botrytis under high humidity.

Figure 4. Ghost spots on tomato fruit from transient Botrytis infection during high humidity.

That “flip the leaf over” step matters. Scouting only from the walkway can miss the disease when it is still manageable.

Leaf mold is favored by high relative humidity and moderate temperatures. Dense foliage, poor air movement

and delayed pruning can create pockets where the disease begins. Fruits aren't usually the main target, but severe defoliation reduces photosynthetic area and can pressure yield and quality.

Management starts with the canopy. Pruning should improve air movement and light penetration, not just make the crop look tidy. Horizontal airflow fans need to move air through the crop, not simply across an open aisle. Heating and ventilation decisions should be made with humidity and condensation in mind, especially overnight and early in the morning.

During high-risk periods, growers should scout two to three times per week, focusing on the lower and middle canopy, corners, end walls and areas that dry slowly. Infected tissue should be removed carefully and discarded outside the production area. Resistant varieties can help when available, but resistance is only one layer of the program.

Botrytis exploits weakness

If leaf mold is a canopy warning sign, Botrytis is the opportunist.

Botrytis cinerea, the fungus that causes gray mold, doesn't need perfect tissue to get started. In many cases, it prefers damaged, aging or dead material. Senescent leaves, old flower parts, pruning wounds, cracked stems and plant debris can all become entry points.

On tomato, Botrytis may show up as tan to gray lesions on leaves, fuzzy gray growth, stem cankers or fruit rot near the stem end (Figure 3). One familiar symptom is ghost spotting on fruit, which appears as pale rings after brief infection events under humid conditions. Ghost spots may not always make fruit unmarketable, but they still signal that humidity and Botrytis pressure lined up (Figure 4).

The most damaging Botrytis problems often come from stem infections. A pruning wound or damaged stem can become infected, and the lesion may expand until it girdles the stem. At that point, it can collapse part of the plant and remove productive canopy (Figure 5).

This is why Botrytis management has to be built into routine crop work. Pruning should be clean, unnecessary wounding should be avoided and tools should be sanitized regularly. Dead leaves, dropped fruit, old clusters and other debris shouldn't sit on floors, gutters or benches. In a Botrytis-prone crop, sanitation isn't about appearances; it's inoculum management.

Humidity control is just as important. Foliage should dry quickly after foliar sprays, misting or overhead irrigation. In drip, substrate or hydroponic systems, the issue is often less about wetting foliage directly and more about avoiding condensation and stagnant air inside the canopy.



Bacterial wilt is the one to avoid

Bacterial wilt is different from leaf mold and *Botrytis* because it isn't primarily a canopy humidity problem; it's a vascular disease caused by *Ralstonia solanacearum*. And once it becomes established, it's extremely difficult to manage.

Figure 5. Gray mold stem canker on tomato with brown lesions that may girdle stems and cause collapse.

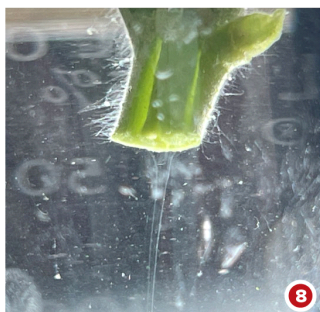
Figure 6. Tomato plants collapsing and wilting in a greenhouse due to bacterial wilt infection.

Figure 7. Sudden wilting from bacterial wilt, often seen despite adequate soil moisture.

The symptom that makes bacterial wilt so concerning is sudden collapse (Figure 6). A plant may look healthy, then wilt rapidly even when root-zone moisture is adequate (Figure 7). Yellowing may be limited or absent at first. When stems are cut, vascular tissue may appear brown, and bacterial streaming can sometimes be observed by placing a cut stem in water and watching for a milky stream (Figure 8).

That simple test can be useful, but suspected bacterial wilt should be confirmed through a diagnostic lab whenever possible. The response is too serious to rely on guesswork.

For bacterial wilt, prevention is everything. Growers should start with clean transplants and avoid questionable plant material. Growing media should be clean and pathogen-free. Tools, trays, benches, floors, irrigation components and surfaces should be cleaned and sanitized between crops. In hydroponic or recirculating systems, water sanitation and plumbing hygiene deserve attention because water can move pathogens if they enter the system.



If infected plants are found, they should be removed and destroyed quickly. They shouldn't be dragged through the greenhouse, composted near production areas or handled in a way that spreads contaminated substrate or water. Surrounding plants and irrigation zones should be monitored closely.

Products are tools, not the foundation

Chemical and biological products matter, but they shouldn't be treated as the foundation of the program. The foundation is still environment, sanitation, scouting and crop handling.

Figure 8. Bacterial streaming from a tomato stem in water is a field diagnostic sign consistent with bacterial wilt infection.

For fungal diseases like leaf mold and Botrytis, fungicides generally perform best when used preventively or very early in disease development. Products should be confirmed for greenhouse tomato use and applied according to the label. Greenhouse use should never be assumed just because a product is labeled for field tomatoes.

Resistance management also matters in long-season crops. Rotating by FRAC group, keeping accurate spray records and avoiding back-to-back applications of the same mode of action are basic, but important, practices.

Scout the entire growing system, not just the plant

Good scouting is more than looking for symptoms—growers should also scout the conditions that lead to symptoms.

Where is humidity collecting? Which areas dry last in the morning? Are lower leaves staying wet? Is debris accumulating under the crop? Are pruning wounds drying quickly? Are workers moving from suspect plants into clean areas? Are tools being sanitized? Is water moving in ways that could spread problems?

These questions are easy to overlook when the crop and staff are busy.

The best greenhouse tomato disease programs aren't built around fixing problems after they appear—they're built around consistency. A clean start, airflow, humidity control, sanitation, product rotation and scouting all work together.

By the time spots, fuzzy mold or sudden wilt show up, the crop is already telling a story. The strongest growers are usually the ones who learn to read that story early, while there's still time to protect the crop, the harvest schedule and the confidence of the customer waiting for that next box of tomatoes. **IG**

Brandan A. Shur is a Ph.D. researcher focusing on controlled environment agriculture (CEA) and plant pathology at Virginia Tech University in the School of Plant and Environmental Sciences. Dr. Steve Rideout is a Plant Pathology Professor specializing in vegetable crops and Director of Agricultural Technology Program at Virginia Tech University in the School of Plant and Environmental Sciences.