

Managing Bacterial Canker in Tomato

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Symptoms of bacterial canker

Dark brown to black, irregularly-shaped spots develop on leaves, petioles, stems and fruit when the pathogen invades a plant through its surface. Spots on fruit become raised and turn white often with a dark center. The pathogen can also invade a plant systemically. Early symptoms of systemic infection include wilting (often on 1 side of a leaf or plant), curling of leaflets, browning of leaves (often only on 1 side), and yellowish brown discoloration of vascular tissue inside the stem. Leaf edges become brown with a yellow inner border. Open cankers develop on stems. Unfortunately symptoms may not develop shortly after infection occurs. It is possible for plants to be infected yet appear healthy until exposed to specific stresses and/or environmental conditions in the field (it is not known what these are). Symptoms may not be seen until plants begin to blossom, which could be as long as 84 days after infection. See posted [photographs](#).

Why should I care about canker?

Canker is one of three tomato diseases caused by bacterial pathogens occurring in NY, and arguably the most destructive and difficult to manage. Bacterial canker is dispersed by splashing water and infects while the leaf surface is wet. It can also be moved from plant to plant mechanically (vectored by human/tool contact) or be seed-borne. Bacterial diseases are generally more difficult to manage than those caused by fungi and oomycetes primarily because fungicides with activity against bacteria are inherently less effective than modern, targeted fungicides labeled for the other types of pathogens. Additionally, bacterial pathogens have developed resistance to copper, which has been the primary fungicide used. Consequently, a successful management program for canker focuses on avoiding the pathogen and eliminating it after an outbreak at a farm rather than just trying to manage it in a crop. There are no resistant varieties unfortunately. Practices described below for managing canker are also recommended for bacterial spot and bacterial speck.

Management Tactics for Bacterial Canker

- 1. Use clean seed:** Purchase seed that has been tested for the canker pathogen and also treated with hot water or steam, which some seed companies do. Hot water treatment can be done on farm. Directions for on-farm hot water treatment are available [online](#). There is equipment growers can use at three locations in western and eastern NY and on Long Island.
- 2. Sanitize the transplant greenhouse:** Thoroughly clean and disinfect greenhouse surfaces and any planting materials that are being reused. Remove any weeds. Do not reuse trays and other planting materials following an outbreak of canker. Bacterial pathogens can survive on surfaces for a while, especially wood and other porous surfaces because they can get down into the nooks and crannies where they are protected. Painting wooden benches with a deck or other water-resistant, sealing paint will reduce the porosity and make them easier to clean. A power washer is recommended to achieve thorough cleaning of benches as well as other surfaces and also field stakes. Disinfect with 10% Clorox or a quaternary ammonium disinfectant like KleenGro. Finally, before the growing season begins, close up the greenhouse especially on warm, sunny days to promote hot, dry conditions.

3. **Minimize spread in the greenhouse:** Tight spacing and favorable conditions promote greenhouse spread of canker. Separate varieties to minimize impact in the event seed of one variety is contaminated; using clean seed (step 1) is important, it is not a guarantee there will be no pathogen present. Alternating trays of tomatoes with trays of other seedlings being grown at the same time is a good approach. Water during the day when foliage is dry and will quickly dry afterwards. Minimize handling of plants as bacteria can be moved mechanically. Brushing to obtain short plants with thick stems is a great way to spread bacteria plus the small wounds that occur (e.g. broken hairs) provide bacteria a way to enter plant tissue. Scout frequently for signs of disease. Discard trays with seedlings confirmed to be diseased. Note that bacterial pathogens can be present without causing symptoms when at low numbers and/or when conditions are not favorable. When transplants will be grown by someone else, discuss their disease management plan in advance.

4. **Rotate:** Select a field where tomatoes were not grown for at least 3 years.

5. **Don't let stakes re-infect fields!** Wash off dirt and then disinfect tomato stakes before reusing. New stakes are recommended after canker developed in a crop.

6. **Strive for dry leaves in the field:** Promote dry foliage by orienting rows parallel to the prevailing wind direction, trellising, and using drip rather than overhead irrigation. If drip is not an option, overhead irrigate when foliage is dry and there will be time for it to dry before night. Select field where trees or buildings will not create shade, and water drainage and air flow are good. Remove weeds to promote air flow and reduce canopy humidity.

7. **Use preventative spray materials:** Apply fungicides starting before symptoms develop. Apply when leaves are dry. While applying fungicides with high pressure has been recommended to obtain good spray coverage throughout the plant canopy for fungal pathogens, this is not recommended for bacterial diseases because the force of the spray can move bacteria and also create small wounds providing bacteria a way to enter plants. Do not use an airblast sprayer because the force of the wind created can move bacteria across rows. Few fungicide/bactericides labeled for bacterial speck and spot are also labeled for canker, including copper. Badge (X2 and SC) and Nordox are labeled copper fungicides. Labeled products with other active ingredients include the biopesticide AgriPhage-CMM and plant-derived BacStop.

8. **Detect disease early – Scout!** Inspect plants in the greenhouse and field at least once a week for symptoms of canker and other diseases; obtain diagnosis if you're not sure of the cause of symptoms seen. CCE staff can help make a rapid diagnosis. Alternatively, immunostrips are an on-farm test that can confirm canker within minutes. Quality immunostrips are available commercially, [such as these from Agdia](#), listed for Tomato Bacterial Canker or CMM (referring to the bacteria's Latin name). Remove affected plants when feasible.

9. **Don't spread canker mechanically!** Avoid moving bacterial pathogens on equipment and hands. Work progressively from least to most affected plants. Bacteria are easily disseminated during pruning, tying, staking, and harvesting. Workers should periodically wash hands or disinfect/change gloves.

10. **Control alternative hosts:** Control solanaceous weeds (nightshades, horse nettle) and volunteer solanaceous crop plants during current and subsequent years.

11. Remove or destroy crop debris. Removing debris with canker from the field is worthwhile when feasible. When not, promptly after harvest chop debris well and incorporate into soil to hasten decomposition.

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

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