



# Extension FactSheet

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## Bacterial Spot, Speck, and Canker of Tomatoes

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**B**acterial spot, bacterial speck, and bacterial canker are widespread diseases of tomato that can cause localized epidemics during warm (spot and canker) or cool (speck), moist conditions. Bacterial spot can cause moderate to severe defoliation, blossom blight, and lesions on developing fruit. Bacterial speck also causes these symptoms but is usually not as severe in Ohio as bacterial spot. Bacterial canker causes wilt, vascular discoloration, scorching of leaf margins, and lesions on fruit.

### Symptoms

Foliar symptoms of bacterial spot and speck are identical (Figure 1). Small, water-soaked, greasy spots about 1/8 inch in diameter appear on infected leaflets. After a few days, these lesions are often surrounded by yellow halos and the centers dry out and frequently tear. Lesions may coalesce to form large, irregular dead spots. In mature plants, leaflet infection is most concentrated on fully-expanded and older leaves and some defoliation may occur. Spots may also appear on seedling stems and fruit pedicels. In some cases, blossom blight may



Figure 1. Symptoms of bacterial spot on tomato. Note lesions on fruit, leaves and stems.

occur, causing flower abortion. This is more severe with bacterial spot and may result in a split fruit set which is especially troublesome with determinate cultivars intended for mechanical harvest.

Bacterial spot and speck can usually be differentiated by symptoms on immature fruits. Bacterial spot lesions (Figure 1) are small water-soaked spots that become slightly raised and enlarged until they are about 1/4 inch in diameter. The centers of these spots later become irregular, light brown, slightly sunken with a rough, scabby surface. In the early stages of infection, a white halo may surround each lesion at which time it resembles the fruit spot of bacterial canker. Small lesions which have not yet become scabby are often confused with lesions of bacterial speck. Bacterial speck appears on immature fruit as a black, slightly sunken stippling, eventually causing lesions less than 1/16 inch in diameter (Figure 2). Fruit lesions are not initiated on mature fruit in either disease.

Primary or systemic symptoms of bacterial canker (from infections originating in seeds or young seedlings) include stunting, wilting, vascular discoloration, development of open stem cankers, and fruit lesions. When affected stems are split open lengthwise, a thin, reddish-brown discoloration of the vascular tissue is observed, especially at the base of the plant. On young seedlings in the greenhouse, lesions may appear as raised pustules on leaves and stems. These plants rarely survive the season in the field. Secondary symptoms in the field include leaf “firing” (necrotic marginal leaf tissue adjacent to a thin band of chlorotic tissue; Figure 3) and fruit lesions. Spots on fruit are relatively small (1/32 to 1/16 inch) surrounded by a white halo (“bird’s-eye” spots; Figure 4). Canker bacteria may also invade internal fruit tissues, causing a yellow to brown breakdown.

### Causal Organisms

Bacterial spot is caused by the bacterium, *Xanthomonas campestris* pv. *vesicatoria*, which can be carried as a contaminant on the surface of infested seed and has been found to



Figure 2. Fruit symptoms of bacterial speck on fresh market tomato.



Figure 3. Leaf marginal necrosis or “firing” symptom of bacterial canker. Photo courtesy of S. Johnston, Rutgers University.



Figure 4. “Bird’s-eye” spots of bacterial canker on tomato fruit.

overwinter in soil associated with plant debris. Bacterial speck is caused by another bacterium, *Pseudomonas syringae* pv. *tomato*. This bacterium may also be seedborne and can overwinter on plant debris in soil and on the roots of many perennial plants. Bacterial canker is caused by *Clavibacter michiganensis* subsp. *michiganensis*, which, unlike the spot and speck pathogens, has the ability to infect tomato plants systemically. It is seedborne and can survive on infested plant debris in soil.

All three organisms may exist at low populations on leaf surfaces of symptomless plants. At the onset of favorable conditions, these low populations can increase rapidly and bacteria can then enter plants through stomata or small wounds and begin infection. Bacteria can spread rapidly with spattering rain and widespread epidemics may develop. Penetration of tomato fruit occurs through wounds created by windblown sand, breaking of hairs, or by insect punctures. Optimal conditions for bacterial spot and canker are high moisture, high relative humidity and warm temperatures (75 to 90 degrees F). Bacterial speck is more likely to occur under cool (64 to 75 degrees F), moist conditions.

## Management

1. Rotate tomatoes with non-solanaceous crops with at least 2 to 3 years between tomato crops. Avoid rotation with peppers, which are also susceptible to bacterial spot.
2. Plant only seed from disease-free plants or seed treated to reduce any bacterial populations. Treatments include:

- a. fermentation of tomato pulp and seeds at room temperature for 4–5 days;
- b. soaking seeds in 0.6–0.8% acetic acid for 24 hr at 70 degrees F;
- c. soaking seeds 5–10 hr in 5% hydrochloric acid;
- d. hot water treatment of seeds (122 degrees F for 25 minutes); or
- e. sodium hypochlorite (bleach) treatment [20–40 minute soak of seeds in 1% sodium hypochlorite (20% bleach)].

Some decrease in germination may be expected from these treatments.

3. Use only transplants free of disease symptoms.
4. Carry out proper sanitation of transplant production greenhouses. Remove all weeds and plant debris, clean all tools with disinfectant solution, and wash hands thoroughly before and after handling plants. Water plants early in the day to reduce the amount of time foliage is wet. Do not handle plants when they are wet. After each crop, clean greenhouse walls, benches, etc., with hot soapy water, followed by thorough rinsing and treatment with a disinfectant. If possible, close up greenhouse after transplant production is completed to allow natural heating during the summer. Use only new plug trays and pathogen-free planting mixes. Avoid growing peppers and tomatoes in the same greenhouse unless pepper seed has also been treated as in step 2.
5. In the field, control irrigation to minimize the time foliage is wet and avoid working among wet plants to minimize spread of disease.
6. Applications of mancozeb plus copper soon after transplanting may help retard development and spread of bacterial spot and speck. This practice is not particularly effective for management of bacterial canker. Many tomato processors will not accept tomatoes treated with mancozeb or other EBDC fungicides. Check with your processor before applying one of these fungicides. Consult the Ohio Vegetable Production Guide (OSU Extension Bulletin No. 672) for current recommendations.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author, The Ohio State University and Ohio State University Extension assume no liability resulting from the use of these recommendations.

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