ALABAMA COOPERATIVE Extension SYSTEM

ANR-71

ALABAMA A&M AND AUBURN UNIVERSITIES

Foliar Diseases of Tomatoes

Foliar diseases are major obstacles to successful commercial and home tomato production in Alabama. Both commercial producers and home gardeners must control this group of diseases to produce good yields and top quality fruit.

Early blight, Septoria leaf spot, bacterial spot, and bacterial speck are the most common foliar diseases on tomatoes in Alabama. Late blight can sometimes be a severe problem when cool, moist conditions prevail. Early detection and a timely disease control program will prevent substantial crop losses that could result from these diseases.

Early Blight, *Alternaria solani*

Early blight is the most common and widespread foliar disease on tomatoes. If not controlled, this disease can severely damage fruit quality and lower yields.

Symptoms. On young plants, dark brown, irregular zonate lesions form and completely encircle the stem, causing plants to quickly wither and die. On older plants, the zonate lesion is restricted to one side of the stem.

Leaf spots, which typically occur first on older leaves, begin as small (1⁄16 to 1⁄8 inch in diameter), dark, irregular spots and enlarge to form zonate spots up to ½ inch in diameter (Figure 1). Tissue surrounding the leaf spots often turns yellow, resulting in defoliation. On severely infected plants, fruit may become sunscalded.

Early blight lesions are not common on the fruit. When present, they appear on the stem end as dark, leathery, sunken spots which may form the characteristic targetlike pattern. These fruit spots slowly enlarge until they decay much of the surface area and internal flesh.

Septoria Leaf Spot, *Septoria lycopersici*

Septoria leaf spot on tomatoes is often seen during the spring and fall months in Alabama. Favored by moderate temperatures and humid conditions, this disease becomes less severe during the hot summer months.

Symptoms. Septoria leaf spot is confined mainly to the leaves although it occasionally appears on stems and fruits. Although Septoria can infect tomatoes of any age, it usually appears after plants begin to set fruit. Small, water-soaked, circular spots first appear on older leaves and develop into lesions (1⁄16 to ¼ inch in diameter) with white-gray centers surrounded by dark brown margins (Figure 2). Upon close examination, tiny black dots, which are the fruiting bodies of the fungus, can be seen in the center of the spot.

The disease can completely defoliate the plant. Beginning with older leaves, leaf drop may progress until only a few leaves remain at the top

Figure 1. Early blight on tomato foliage

Figure 2. Septoria leaf spot on tomato foliage

of the plant. Fruits produced on diseased plants are small and often show sunscald symptoms. Reinfection will continue throughout the growing season between temperatures of 60° to 80°F.

Late Blight, *Phytophthora infestans*

Late blight is a very destructive disease of tomatoes. Fortunately, the disease is not a problem most years since it only occurs when spring weather is cool and wet. Foliage and fruits are susceptible to late blight at every developmental stage.

Symptoms. On leaves, the disease begins as greenish black, water-soaked, irregular blotches which rapidly develop into large purple-black, papery lesions (Figure 3). The lesion margin is often thin and pale yellow. During moist conditions, white, glistening, weblike, fungal growths often appear on the lower leaf surface at the lesion's edge. If cool, moist conditions persist, blight will spread rapidly and kill the plant.

On fruit, gray-green, water-soaked, greasy spots appear near the stem end (Figure 4). As lesions develop, they become brown and wrinkled. When cool, moist conditions exist, lesions quickly expand, covering up to half of the fruit's surface. Decay may extend several inches deep into fruit. When cracking occurs on fruit skin, a delicate white web of fungal growth may develop in this area. Soft-rot bacteria often invade cracks, causing a soft water rot.

Figure 3. Late blight lesion on tomato leaflet

Figure 4. Symptom of late blight on infected tomato fruit

Control Measures for Early Blight, Late Blight, and Septoria Leaf Spot

- At the end of the season, remove or burn old tomato and solanaceous weeds such as horsenettle, jimsonweed, and nightshade to prevent disease carryover.
- Plant disease-free seeds or transplants.
- Follow a regular spray schedule using one of the fungicides recommended in Table 1. Fungicide treatments should begin 7 to 10 days after transplanting and continue at 7- to 10-day intervals until harvest.
- Keep tomato plants healthy and vigorous by following a good fertility and weed control program.

Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*

Bacterial Speck, *Pseudomonas syringae pv. tomato*

In recent years, bacterial spot and bacterial speck have become increasingly widespread and, in some cases, have caused considerable damage on tomatoes in Alabama. On the basis of symptoms alone, it is often difficult to tell the difference between the two bacterial diseases, both of which form small spots on leaves and fruits. Since control recommendations for bacterial spot and bacterial speck are similar, it is usually not necessary to separate the two.

Table 1. Chemical Control Program for Early Blight, Septoria Leaf Spot, and Late Blight

Fungicide[a]	Rate		Minimum Days To Harvest
	Per Gallon	Per Acre	
Chlorothalonil			
Bravo 720	2 t.	2 - 3 pt.	0
Maneb 80% WP			
Maneb 80	2 T.	2 - 3 lb.	5
Maneb Flowable			
Manex	1 T.	1½ qt.	5
Mancozeb			
Dithane M-45	2 T.	2 - 3 lb.	5
Manzate 200	2 T.	2 - 3 lb.	5
Metalaxyl + Manzate			
Ridomil MZ58	2T.	1½ - 2 lb.	5

[a]Begin applications when plants are 8 to 10 inches high and repeat at 7- to 10-day intervals.
T. = Tablespoon; t. = teaspoon.

Symptoms. Bacterial spot symptoms can be found on all aboveground plant parts of tomatoes, peppers, and nightshades. Initially, leaf spots appear as small, circular to irregular, water-soaked, dark green areas on the lower leaf surface. As spots develop, they become purplish gray with black centers. Spots on the upper leaf surface become raised. Occasionally, spots are surrounded by narrow yellow borders or halos. When leaf spots are numerous, surrounding tissue often turns brown and the whole leaf will die. Diseased tissue in the center of the lesion will dry and fall out, giving the leaf a ragged, twisted appearance (Figure 5).

In very wet weather, spots may grow together producing large, black areas on the leaf. Disease spots on stems and petioles are slightly more elongated than leaf spots. Fruit spots first appear as small, dark, raised areas which are sometimes surrounded by water-soaked borders. As these spots age, they become slightly larger (⅛ inch in diameter) and scabby (Figure 6). Although spots remain small and do not penetrate very deeply into fruit, large numbers of these spots will lower the quality of the fruit.

Leaf and fruit symptoms of bacterial speck are similar to those described for bacterial spot. However, bacterial speck can sometimes be distinguished on the basis of halo development. Large areas of tissue bordering the spots may become yellow or white. On fruits, tissue bordering the lesions will sometimes become white. The white or yellow discoloration of bacterial speck is much more extensive than the halo which sometimes is produced by bacterial spot. Bacterial speck will infect only tomatoes naturally.

Figure 5. Bacterial spot on tomato foliage

Figure 6. Bacterial spot on fruit

Control Measures for Bacterial Spot and Bacterial Speck

Both cultural and chemical control recommendations are available for management of these bacterial diseases.

- Do not grow tomatoes or peppers for at least 4 years in fields severely infested with bacterial spot or speck.
- Disinfest all soil, flats, and frames that are used for seedling production.
- Use disease-free seed and transplants.
- To ensure disease-free seed, treat seeds with a 0.6-percent acetic acid solution (¾ ounce acetic acid per gallon of water). Place 1 pound of seeds in a cloth bag and immerse in 1 gallon of acetic acid solution for 24 hours. Keep the solution agitated and at a temperature of 75°F.
- If bacterial spot or bacterial speck occurs during the growing season, treat plants with a copper-maneb spray program (Table 2). Always follow all directions, precautions, and restrictions that are listed on the manufacturer's label.

Table 2. Chemical Control Program for Bacterial Spot and Bacterial Speck

Material	Rate Per Gallon	Rate Per Acre	Minimum Days To Harvest	Remarks[a]
Tribasic copper sulfate or copper hydroxide + Mancozeb	2 T.	4 lb.	0	Begin spraying 7 days after transplants straighten up or at first sign of disease.
Dithane M-45	2 T.	2 lb.	5	Repeat at 7-day intervals.
Manzate 200	2 T.	2 lb.	5	
Chlorothalonil + Maneb + Copper Bravo C/M	_	4-6 lb.	5	

[a]These directions apply to both spray formulations.

Tomato Spotted Wilt

Tomato spotted wilt virus (TSWV) first appeared in Alabama in 1986. This disease has caused big losses on commercial and home garden tomatoes. Tomato spotted wilt is now widespread and poses a potential threat to tomato production.

Symptoms. Tomato plants infected with spotted wilt become stunted and often die. Initially, leaves in the terminal part of the plant stop growing, become distorted, and turn pale green. In young leaves, veins thicken and turn purple, causing the leaves to appear bronze. Necrotic spots or ring spots are frequently present on infected leaves (Figure 7). Infected stems often have streaks. Infected fruit may contain numerous ring spots and blotches and may become distorted if infected with the virus when immature (Figure 8).

Figure 7. Necrotic spots and ring spots on TSWV-infected leaves

Control Measures for TSWV

There may be no effective means of controlling tomato spotted wilt. To reduce the source of infection, try the following

- Control TSWV-infected weeds adjacent to the field.
- Apply systemic insecticides to the soil at planting to slow the initial spread of the virus into the field.
- Apply foliar insecticides later when thrips begin to build up.
- Spray weeds bordering the field with insecticides.

Figure 8. Ring spots on TSWV-infected fruit

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