L-475

Tomato Diseases

TEXAS AGRICULTURAL EXTENSION SERVICE
J. E. Hutchison, Director, College Station, Texas

TOMATO DISEASES

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Tomato diseases can be controlled if recommended management practices are followed. They seldom can be eradicated but growers can lessen their damage by using the following.

Rotate the location of your tomatoes each year. Grow tomatoes only one time in the same field every 5 years. Do not plan for tomatoes to follow peppers, Irish potatoes or eggplant. Grasses, grain sorghum, corn, rye, wheat, oat and barley are immune to most tomato diseases and may be used in the rotation if other factors permit.

Avoid southern blight, nematode and bacterial wilt-infested soil. Test for the presence of these pests by growing a few tomato plants in a representative soil sample.

Grow disease-resistant, adapted varieties. It is important to grow fusarium wilt-resistant varieties in East and South Texas. Ask your county agricultural agent about the newest disease-resistant varieties.

Based on soil tests, add adequate limestone to help prevent blossom-end rot.

Use transplants grown under disease-free conditions. Disease-free plants are produced as follows:

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*Respectively, plant pathologist, Texas Agricultural Extension Service, College Station, and plant pathologist in charge, Plant Disease Laboratory, Yoakum, Texas, The Texas A. & M. College System.

Use disease-free or chemically fumigated soil in the plant bed each year.

Use seed that have been treated with Arasan, Spergon or Captan.

Water the seedbed in the morning so that the surface of the soil may be dry before night.

Where hotbeds are used, remove the sheets in the daytime whenever the temperature is 45 degrees or higher, provided there is no severe wind or rain.

Remove or destroy diseased seedlings in the plant bed.

Drench the plant bed with copper oxychloride sulfate (Copper A compound or similar formulations) at the rate of 3 level tablespoons suspended in 3 gallons of water per 25 square feet of area. Drench once before plants come up and again when about 1 week old.

Spray or dust the plants in the plant bed with fixed copper every 7 days. Do not apply within one week of transplanting. Sprays are more effective than dusts.

Wash hands with laundry soap and water each time after using tobacco before handling plants.

Stake tomatoes in areas where fruit rot is common.

Follow a spray schedule.*

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*Use alternate sprays of zineb and fixed copper if bacterial spot and anthracnose have been problems. If curly top is a problem, it can be minimized by applying insecticides to control the beet leafhopper.

Begin when blooms appear and continue at 7 to 10 day intervals. Shorten the interval during periods of above-average rainfall.

Use 1½ to 2 pounds of actual wettable zineb or 1½ to 2 pounds of actual fixed copper in 100 gallons of water.

Apply sprays at the rate of 50 to 200 gallons per acre, depending on the size of plants and row width.

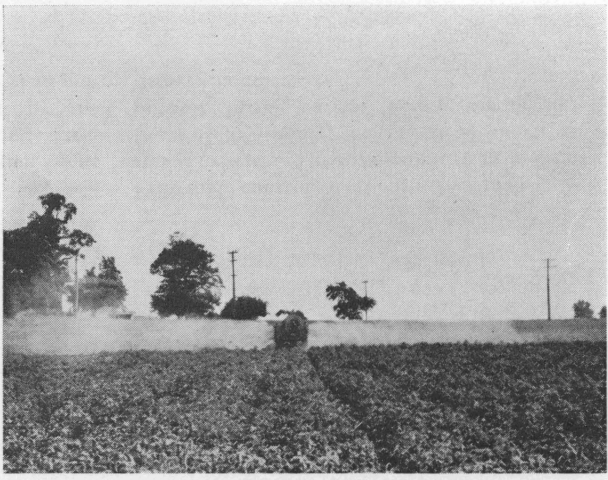
Dusts should only supplement sprays. Use copper dust as 5 to 7 percent metallic equivalent or zineb dust as 5.2 percent or higher.

Apply dusts at the rate of 20 to 40 pounds per acre, depending on the size of plants and row width.

Zineb or fixed coppers are compatible with most insecticides. Combination fungicide and insecticide mixtures are available.

The foregoing practices may vary to fit local conditions. A spray and dust program for prevention of bacterial and fungus disease is needed more in some years than others. Above-average rainfall tends to build up bacterial and fungus diseases. A study of regional and local weather forecasts will aid timing applications. Many diseases tend to decrease in importance during drouth years. If foliage diseases were severe the previous year, they are more apt to be severe during the current year. Check tomato plants often to determine the presence of pests.

Fungicides control diseases, not by curing plants already infected, but by preventing diseases from beginning and spreading. Important steps to follow in a fungicide program are: (a) use a fungicide that will control the diseases that are threatening; (b) apply



Concentrate air sprayer.

before plants are infected; (c) apply often enough to cover new growth and to replace fungicide washed off by rain; and (d) completely cover all leaves, stems and fruits.

Research shows that the best tomato disease control is obtained with ground sprayers. Ground dusters are rated second and aerial application is considered inconsistent.

Liquid sprays can be applied when some wind is blowing. For best results, dust should be applied in early morning, late evening or at night when the air is still.

Proper spraying requires rigs that will develop pressures of 250 to 400 pounds per square inch. Spray booms should carry four to six nozzles per row and dusters two to three nozzles per row. They should be adjusted to give *complete* coverage of the plants, both upper and lower surfaces of leaves. Recently concentrate air sprayers have been used successfully.

Generally, sprays should be applied every 10 days and dusts every 7 days.

Fungus, Bacterial and Nematode Diseases and Their Causal Organisms

DISEASE	CAUSAL ORGANISM
Damping-off	*Pythium* and *Rhizoctonia* spp.
Collar rot and early blight	*Alternaria solani*
Southern blight	*Sclerotium rolfsii*
Root knot	*Meloidogyne* spp.
Fusarium wilt	*Fusarium oxysporium f. lycopersici*
Bacterial wilt	*Pseudomonas solanacearum*

DISEASE	CASUAL ORGANISM
Bacterial spot	*Xanthomonas vesicatoria*
Late blight	*Phytophthora infestans*
Gray leaf spot	*Stemphylium solani*
Leaf mold	*Cladosporium fulvum*
Anthracnose	*Gleosporium phomoides*
Soil rots	*Rhizoctonia* spp. and *Phytophthora* spp.

Additional Publications

USDA Farmers' Bulletin No. 1934 Tomato Diseases

TAES Circular 113 Tomato Diseases in Texas

USDA Agriculture Handbook No. 28 Market Diseases of Tomatoes, Peppers and Eggplant

TAES Plant Disease Handbook, for sale at the Exchange Store, College Station, Texas

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THE MOST IMPORTANT TOMATO DISEASES

Affecting the Entire Plant...

DAMPING-OFF

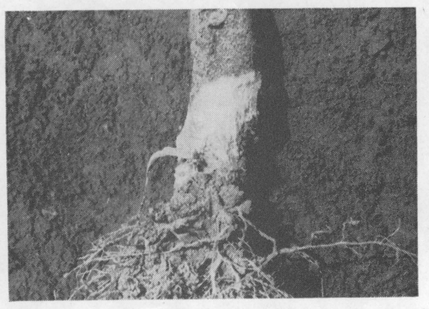
Main symptoms—The young seedlings may be killed before or soon after emergence. Stems are affected at or near the ground level. Seedlings wilt, usually fall over and die. Affected plants are confined to certain sections or spots in the plant bed. Small plants that survive may have hard, discolored stems.

Principal control methods—Use clean soil with good drainage, for the plant bed. Where practical, sterilize the soil. Treat the seed; avoid overcrowding and overwatering the seedlings. Provide adequate ventilation and sunlight in the plant bed. Drench with a fixed copper fungicide.

COLLAR ROT

Main symptoms—Black cankers may girdle the stems or rot them near the ground. Collar rot may be destructive in cold frames. It may cause a major loss of plants growing thickly in rows for marketing as transplants. It is caused by the same fungus that causes early blight.

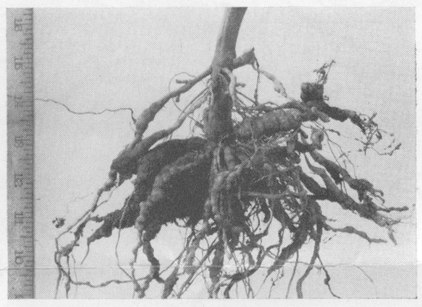
Principal control methods—Drench or spray plants every 7 days with a fixed or insoluble copper fungicide. Do not apply within 1 week of transplanting. Texto 2 variety is resistant. Ask your county agriculture agent about the most recent disease-resistant varieties.



SOUTHERN BLIGHT

Main symptoms—Sudden wilting of entire plant without much change in foliage color. At soil line, main stem decays and becomes covered with a white fungus growth, usually containing small, dark, seedlike bodies. This disease also may attack fruits on or near the ground. It is caused by the fungus *Sclerotium rolfsii*. The fungus can live on dead organic matter on or near the surface of the soil.

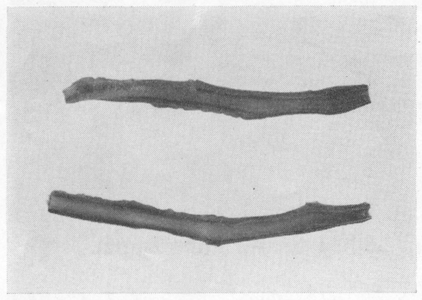
Principal control methods—Grow resistant crops such as grasses, grain sorghum, rye, wheat, oats or corn for at least 5 years. Use calcium nitrate as the nitrogen source in the sidedressing. Research shows that 150 pounds per acre should be used. Calcium nitrate also helps control blossom-end rot. Prior to planting, investigate the use of Terraclor, Vapam or VPM. Use according to manufacturers' directions.



ROOT KNOT

Main symptoms—Severely affected plants are stunted and sickly; they wilt in dry weather but may recover at night for a time, then die. Roots of such plants may have swellings or galls. Root knot is caused by several species of nematodes.

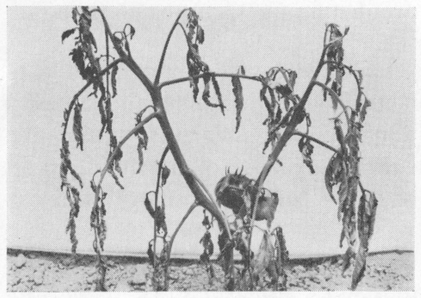
Principal control methods—Use disease-free transplants. Avoid soil that is infested with nematodes. Soil fumigation is practical under some conditions.



FUSARIUM WILT

Main symptoms—Lower leaves turn yellow to brown and the plant may wilt first on only one side. The entire plant gradually turns yellow or brown, wilts and dies. Cut stems show dark-brown streaks on the inside. The disease is most serious during warm weather and usually appears shortly before the first fruits ripen.

Principal control methods—Use disease-resistant, adapted varieties. This disease will not damage other crops.

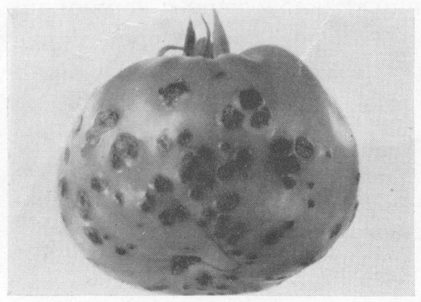


BACTERIAL WILT

Main symptoms—Plants often are dwarfed. The base of stems may be a dirty-green, brown or black and shriveled. Leaves may wilt within 2 days after stem symptoms appear. When the base of a diseased stem is cut, a slimy whitish material flows from the water tubes within a few minutes.

Principal control methods—Rotate tomatoes with grasses, grain sorghum, corn or small grains. Delay 4 or more years before again planting tomatoes, peppers, Irish potatoes or eggplant. Removal and destruction of diseased plants, coupled with insect control, help prevent further spread.

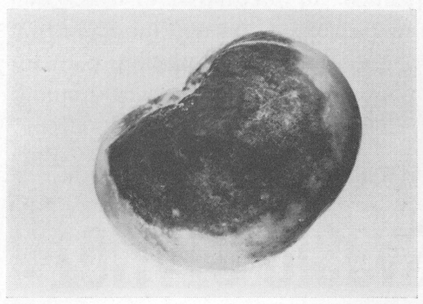
Affecting Foliage and Fruit...



BACTERIAL SPOT

Main symptoms—Small, dark, irregular greasy spots appear on the leaves. These spots enlarge later, blacken and become slightly sunken on the underside of the leaf. Severely affected leaves turn yellow and drop off. On the green fruit the spots at first are small, white and raised, later becoming slightly sunken and light brown with a rough surface.

Principal control methods—When bacterial spot is found on a few plants, they should be destroyed or removed from the field immediately. After this, workers should wash the hands with soapy water before handling healthy tomato or pepper plants. Spray with fixed copper according to manufacturers' suggestions. Use seed from healthy plants. If seed are infected, treat by using 1 ounce of bichloride of mercury per 7 gallons of water, (one 8-grain tablet per pint of water). Soak seed in solution for 5 minutes, rinse thoroughly in water for 15 minutes. Dry and treat with Arasan, Spergon or Captan.

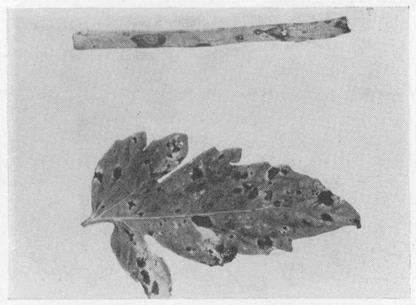


LATE BLIGHT

Main symptoms—Leaves, stems and fruit are affected. On leaves, greenish-black, irregular, water-soaked patches develop. Under damp conditions spots enlarge rapidly. A moldy growth may develop on the lower leaf surface. Rainy, foggy weather with temperatures of 40 to 60 degrees at night and 70 to 80 degrees in the daytime favors the disease. Elongated black cankers may develop on stem and leaf petioles. On the fruit, water-soaked spots develop, enlarge rapidly and gradually turn a blotchy greenish-brown. The surface of the areas is firm and irregular, sometimes covering half the fruit.

Principal control methods—Use disease-free transplants and follow the regular spray schedule.

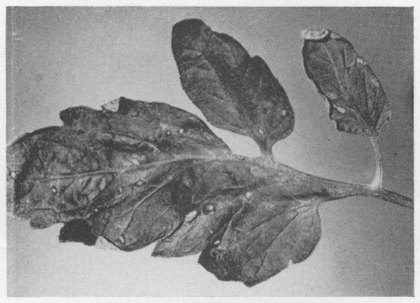
Chiefly Affecting Foliage...



EARLY BLIGHT

Main symptoms—Large, dark circular spots with concentric markings (target spot effect) appear on leaves and dark sunken spots on stems. Spots occur on lower leaves first. In severe attacks, leaves fall off. Fruits may develop dark leathery spots at or near the stem end. See collar rot disease.

Principal control methods—The use of disease-free plants is important. Practice rotation, apply regular spray schedule in the plant bed and field. Well-fertilized soils usually have less damage.



GRAY LEAF SPOT

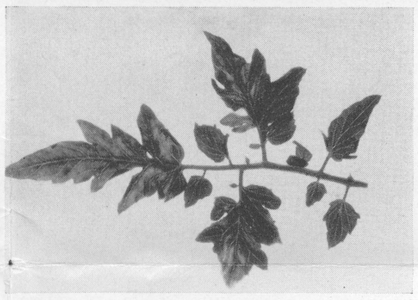
Main symptoms—Many grayish-brown shiny spots 1/16 to 1/8 inch wide appear on the leaves in warm, wet weather. Later the leaves may turn yellow beginning with the lower leaves, wither and drop, almost defoliating the plants.

Principal control methods—Use the same control methods as for early blight.

LEAF MOLD

Main symptoms—Yellowish-green blotches on the upper sides of the leaves, accompanied by greenish-brown, moldy spots on the lower sides. Leaf mold may be destructive in fields in cool, wet weather and in greenhouses.

Principal control methods—Use maneb or zineb in a regular spray schedule.



MOSAIC

Main symptoms—Plants bear fewer, smaller fruits than normal plants. Yellowish-green mottled spots with some wrinkling of the leaflets. The mottling may disappear in hot weather. The virus survives in commercial brands of tobacco from which it is transmitted by hands to tomato, pepper and other plants.

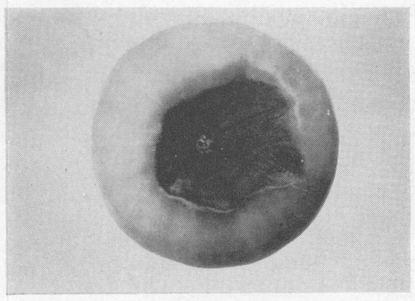
Principal control methods—Wash hands with laundry soap and water before handling plants. Avoid excessive handling of plants in the plant beds or in the field.

CURLY TOP

Main symptoms—This disease is primarily a problem in irrigated areas of West and South Texas. Upper leaves first turn grayish-green. Soon leaves become crisp, brittle and roll upward. Leaves turn light green to yellow with purple veins on the lower sides. Plants stop growing, fail to ripen fruit and die within a few weeks.

Principal control methods—Thick stands of plants, 6 to 12 inches apart, help to provide enough plants to escape. Control the beet leafhoppers by regular spraying or dusting with insecticides.

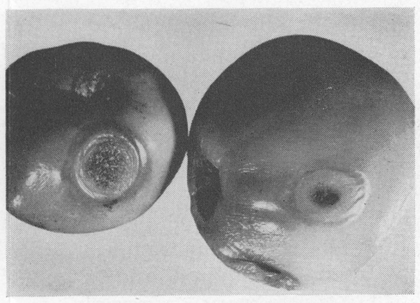
Affecting Fruit Only...



BLOSSOM-END ROT

Main symptoms—Dark, sunken, leathery spots appear on blossom-end of green fruits. The spots vary in size, sometimes affecting half the fruit. This is a physiological disease caused by fluctuating moisture supply and lack of available calcium.

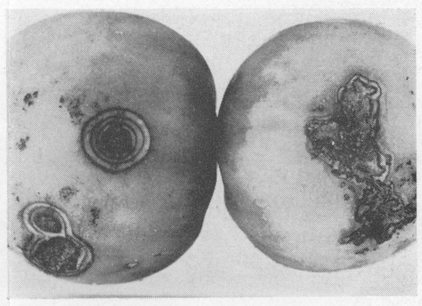
Principal control methods—Based on a soil test, add adequate limestone to deficient soils. Use adapted varieties. Adding calcium chloride to the spray or the use of calcium nitrate as a sidedressing may be beneficial. Maintain uniform soil moisture supply.



ANTHRACNOSE

Main symptoms—Light-brown, circular, sunken spots with rings of darker color develop on ripe fruit. Small black specks often develop in the center of these spots. Soft rots may develop.

Principal control methods—Use alternate sprays of zineb and fixed copper. Practice rotation. Avoid poorly drained soil. Staking or mulching will reduce the disease.



SOIL ROT

Main symptoms—Fruits touching wet soil often develop large, cracked, rotten spots with alternating bands of light and dark-brown color. The rot is caused by the fungus, Rhizoctonia, that is common in cultivated soil.

Principal control methods—Tie plants to stakes or wires. Time irrigation so as to keep the soil dry under the plants as much as possible during harvest. Follow the regular spray schedule.