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Tomato Disease Control in the Home Garden

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Tomatoes are one of the most important vegetable crops in Indiana, the vast majority being grown for processing or fresh market. In addition, most home gardens have a few tomato plants.

Tomatoes are susceptible to certain diseases that limit or reduce yield and the quality of harvested produce. You can control certain diseases by using tolerant or resistant varieties, while other diseases can be controlled only through the application of a suitable chemical fungicide. Losses to several diseases can be minimized by planting tomatoes on well-drained soil with good water-holding capacity and fertility and by staking to keep fruits from contact with wet soil.

WILT DISEASES

Fusarium Wilt

Fusarium wilt is widespread and very damaging. The wilt-causing fungus, which persists in the soil for several years, is in most soils of Indiana where tomatoes have previously been grown. The fungus, Fusarium oxysporum f. sp. lycopersici affects only cultivated and certain wild species of tomato. It enters through the roots and moves upward in the plant, growing in the water-conducting vessels. As the disease progresses, leaves yellow, wilt, and die. Vascular tissues of infected stems show a characteristic brown discoloration, which is easily observed by either carefully removing a lower wilted leaf and sectioning the petiole or cutting away the epidermis of the main stem at ground level. Symptom development may first be localized on one portion or side of the plant but later spreads to other parts. Plants in early stages of infection may wilt during the day and recover at night.

The disease is favored by hot weather and soil temperatures of 82 to 84 degrees F. Although symptoms might appear at any time during the growing season, they generally appear shortly after bloom and/or set of the first cluster of fruit.

Fortunately, you can control tomato Fusarium wilt by growing resistant or highly tolerant varieties. Most seed
catalogs specify which tomato varieties resist or tolerate Fusarium wilt (noted by a capital F next to the variety name or in the variety description). Several varieties with Fusarium wilt tolerance are listed below.

**Verticillium Wilt**

Symptoms of Verticillium wilt closely resemble the symptoms of Fusarium wilt. Accurate diagnosis of both Verticillium and Fusarium wilt can be achieved only by laboratory procedures. The Verticillium wilt fungus, *Verticillium alboatrum*, attacks nearly 200 species of plants. Most seriously affected vegetables are eggplant, okra, pepper, and tomato. Hosts, which are seldom infected, include asparagus, bean, broccoli, cabbage and other cruciferous crops, lettuce, onion, parsley, peas and spinach. Crops that do not appear to be hosts include corn, cereals and grasses.

The fungus survives for several years in soil in the absence of a susceptible host. Losses to this disease are heaviest under cool, moist conditions and are generally most serious in the northern states. As with Fusarium wilt, the fungus enters the plant through the roots.

Control can be best achieved by planting varieties that are highly tolerant to Verticillium wilt. Seed catalogs generally denote those tomato varieties with tolerance to Verticillium wilt with a capital V.

**VF Varieties (Tolerant to both Verticillium and Fusarium wilt)**

A few of the more widely used varieties that can be successfully grown on Fusarium and Verticillium infested soil include the following: Ace VF, Beefmaster, Better Boy, Big Girl, Burpee VF, Campbell 1327, Heinz 1350, Heinz 1439, Jet Star, Small Fry, Spring Giant, Springset, and Supersonic.

**MAJOR FOLIAR AND FRUIT DISEASES IN INDIANA**

Several diseases of major importance are caused by fungi that produce spores, which are transported to susceptible tomato plants by either wind, splashing rain, or both. Once in contact with the host, spores require a film of moisture to germinate, penetrate the host surface, and initiate disease. Thus, these diseases are most abundant in wet seasons. Fungicides protect plants from these fungi by either preventing spore germination or killing the germinating spore before it can penetrate the plants. Wet, rainy seasons unfortunately restrict the effective application of fungicides and reduce the length of time fungicides remain on the plant surface. It is imperative that susceptible plant parts be coated with fungicides during wet periods that favor disease spread.

**Septoria Leaf Spot**

Septoria leaf spot caused by the fungus *Septoria lycopersici* produces small circular gray to tan spots with black or dark brown borders and black dots in the center. Disease appears first on the older leaves and gradually progresses to younger leaves under conditions of high humidity, abundant rainfall, and heavy fruit load. This disease can cause severe defoliation resulting in exposure of fruit to the sun and subsequent sunburning of the fruit.

**Early Blight**

Leaf spots caused by the fungus *Alternaria solani* are much larger and usually less abundant than Septoria spots. The spots are readily identifiable because of concentric light and dark brown rings (spots resemble targets). Early blight is most abundant on plants with a heavy fruit load; also on older plants and on plants
grown in low-nitrogen soils. Unchecked, early blight results in severe defoliation and subsequent sunburning of the exposed fruit. Fruit infection can result in large black, leathery sunken areas.

**Late Blight**

Late blight, caused by the fungus *Phytophthora infestans*, is a problem in cool, wet years. Spread by rain and wind during wet days and nights, it is quickly checked by dry weather. Recognized by dark lesions with white, mildew-like growth on undersides of leaves, late blight infection results in large, dark, somewhat roughened and decayed sections on green and ripe fruit. The disease may be introduced to Indiana via infected transplants. Therefore, purchase only disease-free transplants.

**Gray Leaf Spot**

Gray leaf spot, caused by the fungus *Stemphylium spp.*, results in many small spots about 1/8 inch wide, which are usually angular in outline. Infection is often initiated on the oldest leaves and proceeds upward to younger leaves. Heavily infected foliage turns yellow and falls from plants resulting in severe defoliation. This disease generally occurs late in the season.

**Buckeye Fruit Rot**

Buckeye fruit rot, caused by the fungus *Phytophthora parasitica*, occurs only on the fruit. The disease resembles late blight fruit infection, but surfaces of decayed areas are quite smooth and may show concentric brown rings or a "buckeye" pattern. Buckeye fruit rot is most prevalent in warm weather after heavy rains and/or in low areas.

**Anthracnose Fruit Rot**

Anthracnose fruit rot caused by the fungus *Colletotrichum coccodes* is recognized by depressed saucer-shaped lesions up to half an inch in diameter on ripe fruit only. Centers of lesions become tan to brown with age and have numerous dark specks. Spores are spread by splashing rain.

**SIX TO TWELVE SPRAY APPLICATIONS**

Frequent and thorough applications of a suitable fungicide are the only reliable means for controlling leaf blight and fruit rot diseases. Make the first application when plants begin setting fruit and repeat at 7 to 10-day intervals to cover new growth and to replace material lost by weathering. If, however, disease symptoms occur prior to fruit set, start fungicide applications immediately.

Six to 12 applications are required during the growing season. In hot, dry weather, applications may be omitted, but it is important to coat the plants with a fresh spray or dust deposit ahead of rains. Spray residues are not completely removed from plant parts by rain, especially if spray droplets dry on the plant before rain. Dusts, however, readily wash off and must be replaced quickly, before the next rain. Dusts must be used more often than sprays for equal results.

**SUGGESTED TOMATO FUNGICIDES**

The following fungicides are suggested for control of the various leaf blights and fruit rots of tomatoes.

- chlorothalonil (75% WP or 6F) Bravo
- maneb (80% WP) Manzate, Dithane M22, etc. Do not use within 5 days of harvest.
- zinc ion maneb (80% WP) Dithane M45, Manzate 200. Do not use within 5 days of harvest.
- zineb (75% WP) Dithane Z-78, Parzate, etc. Do not use within 5 days of harvest.

All purpose mixes containing fungicide and insecticide are available.
These materials are available as wettable powders (WP) for use in spray form, being mixed with water in proportions indicated on the chemical containers.

All trade containers of these fungicides carry full directions for their use. Be sure to read the labels and carefully follow label directions.

HOW MUCH SPRAY TO APPLY

One gallon of spray containing the recommended amount of fungicide is sufficient spray for one application on 100 row feet of fully grown tomato plants. Use a small compressed air sprayer or other sprayer capable of delivering a fine droplet size. Uniformly cover upper and lower surfaces of leaves and fruit. Wash sprayer well after use to keep it in good working condition. Do not save leftover fungicide already mixed with water. Mix fresh wettable powder formulation with water just prior to application. Dispose of waste fungicide in a manner safe to humans, wildlife, and water. Do not pour waste fungicide into bodies of water or storm sewers. Do not use 2,4-D or other weed killers in the same sprayer used for fungicides. Always keep fungicides in their labeled containers out of children’s reach.

SOME MISCELLANEOUS TOMATO DISEASES

Soil Rot of Fruit

Soil rot may be identified either as well-defined circular, rotten areas, sometimes with star-shaped breaks in skin, or as ill-defined rots, associated with contact of fruit with wet soil. Good drainage and supporting of plants and fruit off the ground provide some control.

Injury from 2,4-D

Tomatoes are very sensitive to the commonly used weed killer, 2,4-D. Fumes or drift of spray droplets of this material can affect tomatoes up to a mile away. Malformation of leaves is the most common symptom. To avoid drift of spray droplets, only non-volatile forms of 2,4-D applied at low pressure in still air should be used near tomatoes.

Blossom-End Rot

Blossom-end rot occurs on fruit of vigorously growing plants following sudden heat and drought. The disorder appears as a dry, leathery rot at the blossom-end of fruit. An even moisture supply and adequate super-phosphate with limited nitrogen fertilization provide some control.

See Purdue Publication BP-8-10 Blossom End Rot of Tomato for further information on control.

Walnut Wilt

Tomato plants may wilt, and sometimes die, if their roots come in contact with a toxic chemical given off by the roots of black walnut trees or even by waste black walnut hulls dumped in a garden the fall before. Symptoms are often confused with Verticillium and Fusarium Wilt. Do not plant tomatoes within 50 feet of walnut trees or areas where walnuts have been removed in recent years.

Bacterial Diseases

Bacterial diseases known as canker, wilt, spot, and speck frequently result in crop losses. Symptoms of bacterial diseases are often confused with those of other diseases. There are, however, certain characteristic symptoms that can be used to identify bacterial diseases.

Plants affected with bacterial canker first show a one-sided wilting. Light-colored streaks soon appear on the surface of the stem and petioles. The streaks may break open to form cankers. Pith tissue becomes spongy in texture and yellow to tan
SOME COMMON TOMATO TROUBLES

Foliage Diseases

Septoria Leaf Spot

Gray Leaf Spot

Early Blight

Tomato Late Blight
Fruit Diseases

Late Blight

Buckeye Rot

Anthracnose Fruit Rot

Early Blight Fruit Rot

Soil Rot
in color. Symptoms of canker infection on fruit appear as small white bordered spots with slightly raised centers having a bird's-eye appearance.

Bacterial wilt affected plants suddenly wilt and die. Those plants that survive remain greatly stunted. If the stem of a severely diseased plant is cut at ground level, pith tissue will appear water soaked and dark brown to black in color.

Symptoms of bacterial spot and speck are found on both foliage and fruits. Foliar symptoms of both diseases begin as tiny water soaked spots that enlarge to form small (1/8 inch across) irregular dark greasy spots in the case of bacterial spot or slightly smaller spots in the case of bacterial speck. Heavy foliar infection may result in premature defoliation. Fruit lesions of bacterial spot are dark brown, slightly raised, scabby, and up to 1/4 inch across. Fruit lesions of bacterial speck are dark brown, very small (less than 1/16 inch across) and usually do not extend below the skin layer. Fruit blemishes caused by both diseases reduce marketability of affected fruits.

Since most bacterial diseases appear to enter Indiana on transplants or seeds, purchase of planting materials from a reputable dealer is recommended. Never purchase transplants that show leaf spots or poor vigor. Once introduced, bacterial pathogens may persist in soil debris for 1 to 3 years in Indiana. Thus care should be taken to insure that all transplants are healthy at planting.

Fungicides containing a fixed form of copper may help to check secondary spread of bacterial diseases, if wind-driven rainfall does not occur. It is difficult, however, to obtain control even under ideal weather conditions.

Virus Diseases

Tobacco and cucumber mosaic viruses along with other virus diseases may cause losses in home garden plantings. Mottling of leaves, leaf malformations and plant stunting are some of the common symptoms. Occasionally fruits are blemished by virus infection. Cucumber mosaic virus is spread primarily by plant lice (aphids), while tobacco mosaic virus is easily transmitted by handling or mechanical rubbing of infected and healthy plant parts. Control measures include purchasing healthy transplants and disease free seed, controlling aphid populations and minimizing handling of plants and roguing out immediately suspect plants.

COMPLETE TOMATO DISEASE INFORMATION