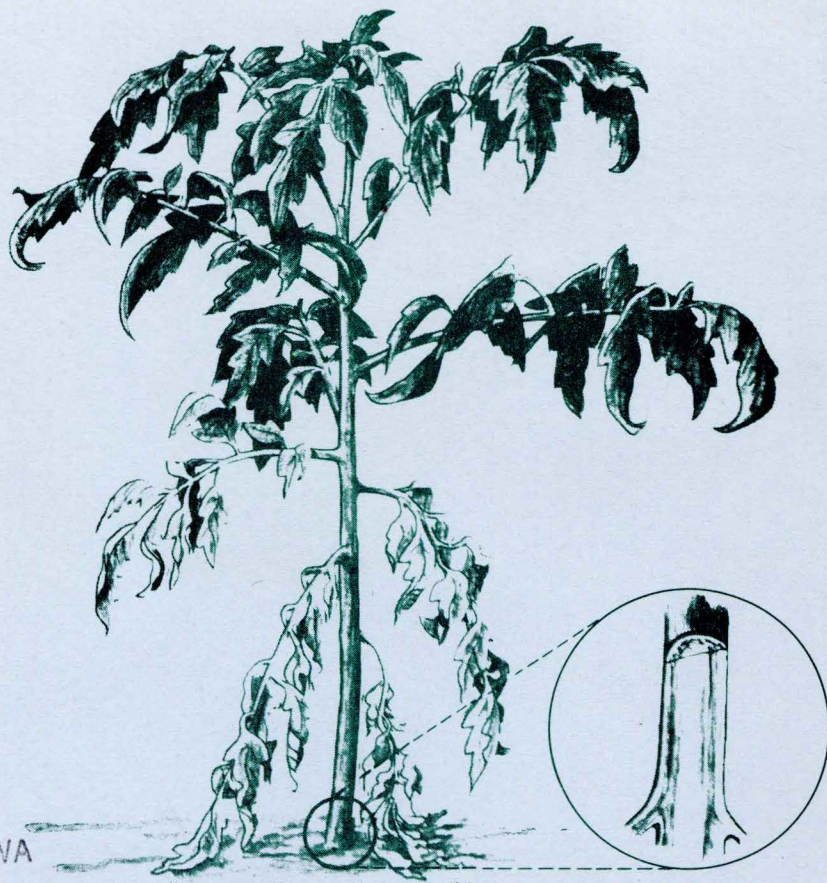


S
544.3
.I8
P36
no.610
1975

Fusarium Wilt of Tomato



STATE LIBRARY COMMISSION OF IOWA
Historical Building
DES MOINES, IOWA 50319

Fusarium wilt of tomato. Insert shows the brown discoloration inside the stem.

Fusarium wilt, one of the most common and damaging diseases of tomatoes, is caused by a soil-borne fungus *Fusarium oxysporum* f. *lycospercici*. It occurs in field and garden plantings of all sizes and in the greenhouse as well. Incidence or frequency of the disease is highest and damage is most serious in the southern half of Iowa. It is still a major factor in the northern counties, however, especially during abnormally warm, dry growing seasons.

Typically, the fungus attacks the plant via the roots. It may invade directly through intact roots or through wounds in the roots resulting from transplanting or cultivating operations. Wounds result from feeding by soil insects and plant parasitic nematodes. The fungus invades and colonizes the water-conducting tissues which eventually become dysfunctional. Wilt results from the inability of the infected vascular tissue to transport water in sufficient amount to replace that lost from the top of the plant (leaves, stems, flowers and fruit) by normal transpiration. During periods of hot, dry weather, the rate of water loss is increased;

Prepared by A.H. Epstein, extension plant pathologist, and L.E. Peterson, manager, Fruitland Experimental Farm.

hence, symptoms of wilt may appear sooner and are apt to be more severe under such conditions.

Fusarium wilt is most destructive when soil temperatures are between 75 and 95 degrees F. The fungus may invade the root at any time during the life of the plant. However, the earlier infections are most destructive, especially those which cause symptoms by the time the plant starts to bloom or soon after the set of the crown cluster of fruit. Such infections occurring early in the growth cycle of the plants usually kill the plant before it is able to produce any usable fruit.

The causal fungus may be introduced into uninfested soil in a variety of ways. It may be found—

1. on a small percentage of seed.
2. on transplants grown in infested soil.
3. in soil blown by wind or washed by water from infested areas.
4. on farm equipment.
5. on the feet of animals and people walking from infested to uninfested parts of the field.

Once introduced, the fungus seems to be capable of persisting in soil almost indefinitely even in the absence of tomato crops.



Transplants growing in infested soils usually do not express symptoms for some time—often not until soil temperatures reach 75 degrees F or higher.

Symptoms

The first outward symptom consists of yellowing of one to a few leaflets or wilting of a single shoot on one of the stems. As the fungus invades more of the vascular system, more leaves begin to exhibit symptoms on the original stem and symptoms may then appear on other stems. This one-sided appearance is usually only temporary, since in most cases the fungus invades the vascular system of all of the stems of the affected plant. The yellowing of leaves starts on the bottom of the plant and gradually progresses toward the top. Yellowed and wilted leaves usually drop prematurely. Affected plants die early and produce few if any fruits.

Internal symptoms may be detected by cutting the affected stem and removing the epidermis and cortical tissues (bark) to expose the underlying vascular system. If the fusarium fungus is present, dark brown discolorations will be evident. These are usually in the form of streaks extending vertically from the roots and can usually be traced up through the stem and branches and into the petioles of the leaves.

During periods of wet weather, the fungus may produce pinkish-white masses of spores on dead stems or in wound and leaf scars (where infected leaves have abscised and fallen off) of severely affected plants. At this advanced stage, the fungus will also cause kill-

ing and rot of the side roots, which hastens wilting and death of the plant top. Seedbed infections can cause very severe plant losses, especially during warm growing seasons.

Symptoms of fusarium wilt may be confused with those caused by another common soil-borne fungus *Verticillium dahliae*. Positive identification of these organisms can be made only in the laboratory. The verticillium fungus occurs more commonly at cooler temperatures, hence is more apt to be found in the northern half of Iowa. It also causes wilt in a wider variety of plants than fusarium, including eggplant, pepper, potato, small fruits such as brambles and strawberry and also a great variety of woody ornamentals and trees.

Control

Plant only certified, disease-free seed and transplants in well-drained, wilt-free soil.

Seedlings should be produced only in wilt-free soil. Disinfect greenhouse and seedbed soil with steam or a soil fumigant (chloropicrin, formaldehyde, methyl bromide, etc.) that is effective against soil-borne fungi.

Rotate the planting area—tomatoes should be grown no more often than once every 4 years. Too frequent cropping of tomatoes increases the risk of introducing the fungus and increasing the infestation.

Where soil is already infested, plant only resistant varieties (see table). In such situations, rotation is very important since too frequent cropping may cause lightly infested soils to become heavily infested and overpower the resistance of some tomato cultivars.

Commercially available tomato varieties resistant to common races of fusarium wilt fungus.¹ (All varieties are red-fruited unless otherwise specified.)

	Season of maturity ²	Principal use ³	Comments
Avalanche (hybrid)	E	M	Staking ⁴
*Beefmaster VFN (Hybrid)	M-L	H	
*Better Boy VFN (Hybrid)	M	H,M	
**Bonus VFN (Hybrid)	M	H,M	
*Burpee VF (Hybrid)	M	H,M	Staking
Campbell (*17, *19, 28, *1327)	M	H,M,C	
*Centennial	E-M	C	Mechanical harvesting
Chico III	M	C	Mechanical harvesting
Dorchester	M-L	C	Mechanical harvesting
Harvester	M-L	C	Mechanical harvesting
Heinz (*1350, 1370, *1439, 1409)	M	H,M,C	
Homestead 24	M	H,M	Staking
*Jet Star (Hybrid)	M	H,M	Staking
Jubilee	M	H	Staking, yellow fruit
Manalucie	L	H,M,C	Staking, good leaf disease resistance
Manapal	M	H,M,C	Staking, good leaf disease resistance
*Market King (Hybrid)	M	H,M	
Michigan-Ohio Hybrid	F,S	G	
Napoli	M	C	Mechanical harvesting
Ohio-Indiana	F,S	G	Pink Fruit
Ohio W-R 7	F,S	G	Pink Fruit
Ohio W-R 25 and 29	F,S	G	Pink Fruit
Patio (Hybrid)	E-M	H	Dwarf, container-grown
Ramapo Hybrid	M-L	H,M	Staking
*Roma VF	M-L	C,P	Mechanical harvesting
*Rushmore (Hybrid)	E	H	Early home garden
*Rutgers Hybrid	M-L	H,M	Staking
*Setmore (Hybrid)	E-M	H,M	
September Dawn	L	H,M	Staking
**Small Fry VFN	M	H	Dwarf
*Spring Giant (Hybrid)	E-M	H,M	
*Springset VF (Hybrid)	E	M	
Sun-up (Hybrid)	E	H,M	First early
Sunray	M	H	Staking, yellow fruit
*Supersonic (Hybrid)	M-L	H,M	Staking

(Continued on next page.)

opt. down state, 7/25/78 cop. 1-

(Cont.)

	Season ² of maturity	Principal use ³	Comments
Surprise (Hybrid)	M	H,M	Staking
**Terrific VFN (Hybrid)	M	H,M	Staking
Tropic	L	H,M	
Tuckcross (Hybrid, K,O,W, 520, 533)	F,S	G	Tuckcross 0, 520 and 533 have largest fruit
Veegan	F,S	G	
Ventura	M	C	Mechanical harvesting
VF (8, *13L, *14, *36, *145, *145-B-7)	L	H,M	Staking
Walter	M	H,M	Also resistant to gray leaf spot
*Wonder Boy VF (Hybrid)	M-L	H,M	Staking

¹ Degree of resistance varies. Check seed catalog descriptions for relative resistance to fusarium wilt.

² E = early, M = midseason, L = late, F = fall, S = spring.

³ H = home garden, M = market garden, C = commercial processing, G = greenhouse, P = paste.

⁴ Suitable for staking and pruning, but may also be grown untrained on the ground.

* Also resistant to verticillium wilt.

** Also resistant to verticillium wilt and nematodes (primarily species of root-knot).

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Charles E. Donhove, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

... AND JUSTICE FOR ALL

Programs and activities of Cooperative Extension Service are available to all potential clientele without regard to race, color, sex or national origin. Anyone who feels discriminated against should send a complaint within 90 days to the Secretary of Agriculture, Washington, D.C. 20250.



STATE LIBRARY OF IOWA



3 1723 02032 8738