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College of Agricultural, Consumer and Environmental Sciences

report on
PLANT
DISEASE

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FUSARIUM WILT OF WATERMELON AND MUSKMELON

Fusarium wilt of watermelon is caused by the fungus *Fusarium oxysporum* f. sp. *niveum*; and muskmelon wilt by the fungus *Fusarium oxysporum* f. sp. *melonis.* Both fungi are widely distributed in Illinois soils. The watermelon form attacks only watermelon, citron, and summer squash. The muskmelon form infects only *Cucumis melo* which includes muskmelon, cantaloupe, crenshaw melon, and honeydew melon. Several distinct races of both fungi have been identified. Before resistant varieties were developed, it was not unusual for growers to lose up to 100 percent of a watermelon or muskmelon crop where the soil was thoroughly infested with the Fusarium wilt fungus.

Figure 1. Late stage of Fusarium wilt of watermelon. All leaves have wilted except a few in the center of the vine.

SYMPTOMS

Watermelons and muskmelons are attacked at all stages of growth. Seeds may decay in the soil. Seedlings often wilt, collapse (damp-off), and die before or after emergence. Older plants wilt, wither, and die any time during the growing season (Figure 1). If fruit forms, it is usually small and unmarketable. Necrotic lesions are often formed on the roots at sites of penetration.

Wilting of runners usually progresses slowly, showing at first only during the heat of midday. Such plants recover at night, but after a few days they wilt permanently and die. Plant wilting is promoted by a high air temperature combined with high light intensity, a high rate of evaporation, and a low relative humidity. Before death the leaf margins may appear scorched. The water-conducting tissue (xylem) within the main stem is often discolored yellow to dark brown.

In muskmelon wilt, narrow streaks of dead tissue, beginning at or near the soil line, may extend for some distance along a runner. The streaks are water-soaked at first, turning a yellowish tan to dark brown. In wet weather, a white or salmon-pink growth of the *Fusarium* fungus develops on the surface of dead watermelon and muskmelon stems. Resistant watermelon plants can become infected, grow slowly, and appear stunted or dwarfed. Affected older plants often first show a severe stunting or yellowing of the leaves on one or more vines. The roots appear normal at first, but later turn reddish brown and finally die. Muskmelon fruit on systemically infected plants may develop sunken, irregular rot lesions due in part to the entrance of secondary fungi and bacteria.

For further information contact Mohammad Babadoost, Extension Specialist in Fruit and Vegetable Pathology, Department of Crop Sciences, University of Illinois at Urbana-Champaign. (Phone: 217-333-1523; email: babadoos@uiuc.edu).

DISEASE CYCLE

The two wilt fungi may survive on seed for 2 years or longer, live from season to season in old infected vines, and are able to remain alive indefinitely in wilt-infested soil. The watermelon form is an aggressive saprophyte capable of colonizing and reproducing on most soil organic matter and the roots and stems of a number of living plants, including peanut, rice, sorghum, tomato, and several weeds. High populations of the muskmelon form are usually associated specifically with susceptible melon tissue that is decaying. Both fungi are commonly spread from one field or garden to another by infested soil, compost and manure adhering to machinery, tools, and the feet of humans and animals; surface-drainage water; and infected seeds.

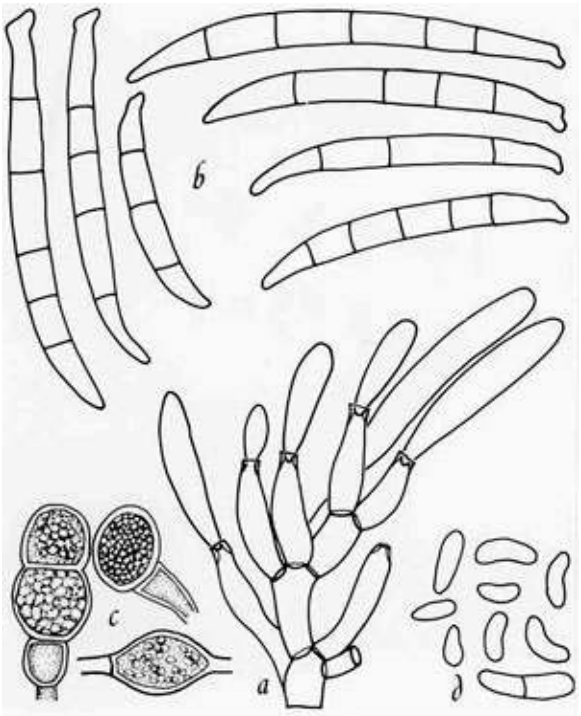

Figure 2. Fusarium oxysporum, the fungus that causes Fusarium wilt of watermelon and muskmelon, as it would be seen under a high-power laboratory microscope: (a) conidiophores, many bearing macroconidia; (b) macroconidia; ©) microconidia; (d) thick-walled chlamydospores (drawing by Lenore Gray).

The *Fusarium* fungi grow in soil at any degree of moisture favorable for their host crops. The watermelon form causes infection between 60° and 95°F (15° to 35°C) with an optimum of 75° to 83°F (23° to 28°C). For the muskmelon form, the optimum infection temperature is about 70°F (21°C). Muskmelon wilt symptoms, however, are most severe at 65° to 77°F (18 °to 25°C). The greatest damage to both watermelon and muskmelon may occur below 80°F (26°C). Here the temperature slows down the growth of the plants and apparently increases their susceptibility more than it reduces the activity of the fungus. The fungi enter the root tips and older roots through natural wounds, nematode feeding punctures, and other wounds. After penetration, the fungi grow into the water-conducting vessels (xylem tissue), invade other parts of the plant, plug up the vessels, and produce typical wilt symptoms in the foliage. Disease development is favored by high nitrogen, low calcium, and low potassium levels in the soil.

After infected plants wilt, the *Fusarium* fungi produce masses of microscopic spores on and in dead vines. Three types of spores are formed: small, colorless, one-celled, oval to elliptical microconidia; larger, slightly curved, septate macroconidia; and rounded, thick-walled chlamydospores (Figure 2) which can survive long periods in the soil being resistant to unfavorable environmental conditions. The conidia may be splashed and blown from diseased vines resulting in expansion of areas infested by the fungi.

CONTROL

1. The only practical control in wilt-infested soil is to grow wilt-resistant varieties. A number of watermelon and muskmelon varieties are available that are resistant and well adapted to Illinois. For information on recommended varieties, refer to Midwest Vegetable Production Guide for Commercial Growers (C1373) available at your nearest Extension office or ITCS, University of Illinois P345, 1917 S. Wright St. Ext., Champaign, IL 61820.

2. Sow best quality, disease-free seed from a reputable seed company.

3. Keep plants growing vigorously by means of a good fertility program based on a soil test.

4. Grow seed for transplanting in soil that has been disinfested by steam or a soil fumigant.

5. In fields and gardens where the disease has not appeared, extreme caution is needed to exclude the wilt fungi. Purchase only certified, disease-free seed or transplant of resistant varieties. Keep the fungi out of wilt-free fields and gardens by preventing the spread of infested soil carried on equipment, tools, feet, and running water. Do not put melon vines in compost or manure piles.