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G74-108 Wilts of Cucurbits (Revised October 1994)

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Wilts of Cucurbits

Discussion covers the symptoms, disease cycles, and control measures for bacterial and Fusarium wilts of cucurbits, including cucumbers, cantaloupe, watermelons, squash, and pumpkins. Wilt caused by squash vine borer also is covered.

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Bacterial Wilt

The organism responsible for this disease, *Erwinia tracheiphila* (E.F. Sm.) Holland, attacks cucumbers, muskmelons, pumpkins and squash. In Nebraska, bacterial wilt occurs primarily on cucumbers and muskmelons.

Symptoms

Figure 1. Vines showing bacterial wilt symptoms.

The cucurbit family, which includes cucumbers, muskmelons (cantaloupes), watermelons, squash and pumpkins, is subject to attack by either of two microorganisms that cause diseases known as vascular wilts. These two organisms, one a bacterium and the other a fungus, live and multiply in the water-conducting vessels of the plant. When their numbers increase significantly, the vessels become "plugged," causing plants to wilt and eventually die.

The term "wilt" is a fitting description of the symptoms observed in infected plants (*Figure 1*). Initially, one or more leaves suddenly wilt and become dull green. The bacteria then spread within the vascular system of the leaf, petiole and stem, causing the entire plant to wilt and die. If an infected vine runner is cut, the sap sometimes appears milky and if touched with the finger, will string out to 1/2 inch or more. Less susceptible plants, such as squash and pumpkins, do not always exhibit severe wilt symptoms. However, these plants are likely to exhibit dwarfed growth which may be accompanied by excessive

blossoming and branching. Squash and pumpkin are also attacked by the squash vine borer. The wilting symptoms caused by vine borers may be confused with the initial wilting caused by disease organisms (*Figure 2*).

Figure 2. Wilt symptoms caused by squash vine borers.

Squash vine borers, *Melittia cucurbitae* (Harris), are white caterpillars which bore into stems (vines) of squash and pumpkins, causing plants to wilt and die (*Figure 3*). Yellow, sawdust-like excrement is pushed outside the tunnels and stem swellings or galls may be produced. This pest winters as pupae in the garden soil. Wasp-like red and blackish moths emerge from June through August to lay eggs on the underside of vines. Damage occurs from July to August. Contact your local Extension educator for current control recommendations.

Disease Cycle

The striped cucumber beetle [*Acalymma vittatum* (Fabricius)] and the spotted cucumber beetle or southern corn rootworm (*Diabrotica undecimpunctata howardi* Barber) are common insects that play an important role in the disease cycle of bacterial wilt. The bacteria may survive the winter in the digestive tracts of these insects which overwinter in the south, or possibly in alternate host plants. As the insects migrate north and become active the following spring, they feed and transmit the bacterium to cucurbit seedlings or transplants.

Figure 3. Squash vine borer inside of vine.

Both of these beetles are yellow and black, and roughly 1/4 inch long (*Figure 4*). The striped species has three black stripes on the wing covers; the spotted beetle has 12 black spots, six on each wing cover. Both species lay eggs in the soil, and the young larvae feed on the roots of the host plant (over 200 species of weeds, grasses and cultivated crops such as corn). The adults (beetles) can destroy young cucurbit plants by feeding on stems and leaves or by transmitting the wilt organism.

Striped cucumber beetle. **Spotted cucumber beetle.**

Figure 4.

As the season progresses, a second generation of beetles transmits the organism from diseased to healthy plants by feeding on leaves and often severely girdles stems and petioles (*Figure 5*). Transmission occurs when beetles chew on infected plants (which they prefer), and their mouth-parts become contaminated with bacteria. In addition to the possibility of transmission through direct feeding, their frequent habit of depositing feces containing the wilt bacteria near wounds also may spread the disease.

Control

The beetle and bacterium are so closely associated that controlling the insect usually reduces disease incidence. Young transplants should be dusted or sprayed with insecticide when they are set in the field, or as soon as they emerge from the soil. Continue spraying or dusting weekly thereafter until plants begin to set fruit. If dusting is preferred, use 5 percent carbaryl (Sevin), malathion or 5 percent methoxychlor. For spraying, mix 2 tablespoons of either 50 percent carbaryl (Sevin) or 50 percent methoxychlor wettable powder in one gallon of water.

CAUTION: Sevin may injure foliage, especially under conditions of high temperatures (above 80° F) and high humidity or moisture.

Carbaryl (Sevin) is also highly hazardous to honeybees, which are effective pollinators of cucurbits. The dust formulation is particularly toxic and is best avoided on flowering plants. Spraying in late evening after bees have returned to hives will reduce injury to pollinators. Methoxychlor and malathion are not as hazardous to bees. Rotenone is also registered for beetle control and is relatively safe to bees, but it is much less effective in preventing beetle feeding.

Unfortunately, a rigorous insect control program does not insure complete protection. In home garden situations, infected plants must be removed and discarded (buried or thoroughly composted) as soon as they are discovered. Weakened or dead plants provide a source of inoculum and attract beetles. Pruning diseased vines on individual plants is not an effective control measure because it does not eliminate infection from the diseased plant and may spread the disease.

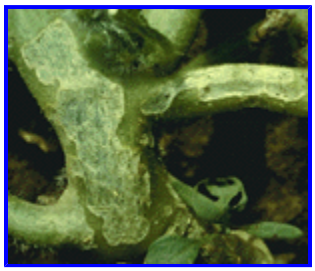

Figure 5. Beetle feeding damage on stem and branches.

Resistance to wilt has only been seen in one cucumber line, County Fair '87, which has not appeared in the market. American varieties of cucumbers, including many of the pickling strains, are somewhat less susceptible than similar varieties originating in Europe. However, National Pickling, Ohio MR 17 National Pickling and other picklers have been shown to be susceptible in Nebraska. Hybrid Victory, an excellent slicer, is also susceptible but has shown a lower incidence of the disease in our tests. However, no varieties offer significant resistance for commercial production.

Watermelons are immune and certain types of winter squash are resistant to this disease. These include Butternut, Table Queen, Ebony, Acorn, and Buttercup. All of the Hubbards, Golden Delicious and Banana types are susceptible.

Nebraska experimental data have demonstrated that all specialty melons including Crenshaw, Ogen (Israel), Earlidew (and other honeydews), and Ambrosia are highly susceptible to bacterial wilt, and the disease may be a limiting factor in attempting to grow these varieties.

While not resistant to bacterial wilt, several cantaloupe varieties are likely to produce some crop even under conditions of moderate to severe wilt incidence. These include Earlisweet, Early Sugar Midget, Burpee Hybrid, Supermarket, Super Hybrid, Saticoy, Early Delicious, Dixie Jumbo and Roadside.

Fusarium Wilt

Some species of Fusarium, a fungus, can attack most cucurbits. In many instances, however, the fungus is very specific to the hosts. For example, the Fusarium that infects watermelon [*Fusarium oxysporum f. niveum* (E.F. Sm.) Snyder and Hanson] is incapable of attacking muskmelon, cucumber or squash.

Symptoms

Although Fusarium wilt appears to be most serious on watermelons, symptoms can occur on all hosts. If plants are infected at an early stage, they will rot (or damp-off) at the soil line and eventually die. Older plants exhibit a temporary wilt which appears repeatedly in the middle of the day. As the disease progresses, the leaves show some tip-browning and the plant eventually dies. A light brown discoloration of the internal tissue is often evident if the stem is cut near the base. During periods of wet weather, a pink-white mold may be visible on the outside of infected stems.

Disease Cycle

This organism lives from season to season in plant debris or in soil. The fungus enters the growing plant through root tips, natural openings, or wounds and grows in the water-conducting tissue. Eventually, water movement is reduced, producing a wilt symptom.

Plants infected early in their development suffer greater injury than those infected later in the season. Both the incidence and severity of the disease increase during warm, dry weather.

Control

This disease is difficult to control because of the variability and survival of the pathogen. Use of resistant varieties can minimize risk of Fusarium wilt. Rotating the site of the bed and removing and destroying all plant debris at the end of each growing season also may reduce the incidence of Fusarium wilt. For watermelon a minimum eight-year rotation is recommended. For cantaloupe, a three to four year rotation is preferred.

Several watermelon varieties are resistant to the Fusarium wilt pathogen known to occur in Nebraska. Those varieties adapted to Nebraska's growing conditions include Charleston Gray, Royal Charleston, Kleckley Sweet No. 6, Stone Mountain, Dixie Hybrid, Crimson Sweet, Petite Sweet, Allsweet, Dixie Queen and Jubilee. New Hampshire Midget and Black Diamond are susceptible to Fusarium wilt, but Verona, a variety very similar to Black Diamond, is resistant.

Although the incidence of Fusarium wilt of muskmelons has not been high in Nebraska, the disease has occasionally become a problem. Honeydew varieties such as Earlidew and muskmelon varieties such as Saticoy are resistant. Limited information is available regarding the resistance of other melons, cucumbers, or squash to Fusarium wilt. The grower is advised to pay particular attention to the catalog description of melon varieties and their reaction to Fusarium and select those with resistance.

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