NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

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Bacterial Wilt of Cucurbits

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This NebGuide covers the management and prevention of bacterial wilt of cucurbits, which affects cucumber, squash, muskmelon, pumpkin, and gourds.

The vascular wilt disease caused by the bacterium *Erwinia tracheiphila* affects members of the cucurbit family, including cucumber, squash, muskmelon, pumpkin, and gourd. Watermelon, however, is resistant to this disease and certain varieties of cucumber and squash show varying degrees of resistance. You can recognize the disease by the severe wilting of individual leaves during hot, sunny days, and within a week or two, the entire plant wilting with no recovery.

Symptoms

Bacterial wilt symptoms characteristically begin with the wilting of individual leaves or vines *(Figure 1)* during the heat of the day. Wilted leaves are dull green in appearance. Wilting symptoms spread along the runner (vine) and sometimes appear as a recurring wilt during hot, dry days. Eventually the leaves and runners will turn brown and die.

The entire plant can shrivel and die *(Figure 2)*, because the bacterium can spread through the xylem vessels of infected runners to the main stem. Plants less susceptible to infection may be stunted prior to the wilt symptoms becoming apparent.

Figure 1. Wilting of leaves and vines of a muskmelon infected with bacterial wilt. Photo credit: James R. Steadman.

The fruit can also show symptoms with small water-soaked patches forming on the surface. Eventually these patches turn into shiny spots of dead tissue.

There are other causes for runners wilting that are observed in the garden, including squash vine borers and soil-borne fungal pathogens. A characteristic symptom of bacterial wilt is the occasional creamy-white bacterial ooze that can be observed in the xylem vascular bundles of an infected stem.

To observe the ooze, cut the stem crosswise near the ground and squeeze it. When the finger is pressed firmly against the cut surface, and then slowly pulled away about half an inch, the bacterial ooze will string out, forming fine, shiny threads.

Figure 2. Wilting and browning of leaves and vines of a muskmelon infected with bacterial wilt. Photo credit: James. R. Steadman.

Figure 3. Feeding injury caused by the spotted cucumber beetle

Figure 4. Spotted cucumber beetle

Figure 5. Striped cucumber beetle

Figure 6. Feeding injury on cucumber roots caused by the striped cucumber beetle

Another option is to cut two stem ends and touch them together, squeeze, then separate the ends to look for those shiny strands of bacteria. This technique may not always work; thus, contact your local extension educator for positive identification.

Disease Cycle

The bacterium causing this disease overwinters in the digestive system of the striped cucumber beetle and the spotted cucumber beetle. Plant pathologists now also believe that the bacterium resides in alternate perennial host plants over the winter.

When beetles feed on cucurbit stems and leaves, they introduce the bacterium into the plant. This bacterial pathogen can only enter the plant through wounds produced by the beetle during feeding, rather than through the natural plant openings (stomates and hydathodes), the more common way for many bacterial pathogens to enter.

Once infection occurs, the bacterium reproduces in the xylem of the plant and causes a gumming of the vessels, preventing the movement of water in the plant. The beetles and bacteria are linked for disease dispersal and development. When the beetles feed on infected plant material, their mouthparts become contaminated with the bacteria. Thus, when the beetle moves to feed *(Figure 3)* on another plant, it transports the bacterium and introduces it to a new plant. Beetles are attracted to and thus more likely to feed on plants infected with bacterial wilt than healthy plants.

Insect Life Cycle

Cucumber beetles overwinter in ground litter far south of Nebraska and migrate into the region on southerly winds in early July. They feed on alternate host plants, including wild curcurbits, until cucurbit plants become available. Beetles arrive either infected with the wilt bacterium, or they acquire it locally when feeding on infected host curcurbit plants. Adult females deposit eggs in the soil, and the larvae, known as rootwooms, feed on roots of host plants. Spotted cucumber beetles *(Figure 4)* and larvae feed on a wide variety of host plants. The striped cucumber beetle *(Figure 5)* also has a varied diet, but its larvae feed only on roots of cucurbits *(Figure 6)*. One to three generations of cucumber beetles are produced each growing season. Populations of cucumber beetles are quite high in late summer and fall, but they perish with winter freezes.

Management

Once a plant is infected with bacterial wilt, there is no effective control method. The infected plant should be removed and discarded in the trash. The infected plant material should not be placed in a compost pile because beetles will be attracted to it, feed on the material, and transport the bacterium back to the garden.

The only management option is controlling the cucumber beetles and preventing them from feeding on plants. This can be done with more success earlier in the growing season than later, when beetle populations are high. Here are some suggestions to manage cucumber beetles in cucurbit crops:

Select resistant varieties. While no truly resistant varieties have been developed, those which are less attractive to cucumber beetles or more tolerant of bacterial wilt yield much better than susceptible varieties. The varieties County Fair 83 and Saladin are more tolerant to bacterial wilt. Varieties less attractive to beetles include Ashley, Chipper, Eversweet, Gemini, Improved Long Green, Sunnybrook, and Saticoy Hybrid.

Plant more than you need. Always plant more plants than you need to offset the plant loss due to beetle feeding or bacterial wilt.

Cover plants with row covers until bloom. A floating row cover is a lightweight, fine-meshed netting that is suspended by wire cages over plantings and secured with soil at the edges. It prevents beetles from feeding on young plants and must be removed at flowering to allow for cross-pollination by bees. Research has shown that protection, even for this brief period, can significantly increase yield.

Cover soil below plants with reflective mulching. Reflective aluminum wire-mesh or aluminum-coated plastic mulch fabric prevents beetles from laying eggs in the soil and is less attractive to beetles than organic mulches.

Monitor beetles with yellow sticky traps. Installing yellow sticky traps on tall sticks among cucumber plants helps to detect when beetles first arrive. Good record keeping also aids in monitoring populations over the growing season. These practices help growers to make informed decisions and implement more timely control measures.

Trap beetles with trap crops and destroy them. Plant varieties of dark zucchini squash that are highly attractive to cucumber beetles to draw them away from other cucumber, squash, or melon crops. Then spray aggregations of beetles with an insecticide. Trap crops are normally planted a week or two earlier than the intended cucurbit crops along the perimeter of the field or garden area. Remove and destroy older trap crops and replant through the season. Varieties of zucchini appropriate for trap crops include Black Jack, Dark Green, Green Eclipse, Seneca, Super Select, and Embassy Dark Green.

Selectively control beetles with insecticides. Fast-acting insecticides fit well into an integrated pest management program when used with care in conjunction with other practices. Because cucurbits rely on honey bees and other insect pollinators for fruit production, select insecticides with low persistence and treat crops when pollinators are not active, such as in the early morning or late evening.

Neem oil — or products containing its active ingredient, azadirachtin — acts both as an anti-feedant and insecticide. Surround® WP is a kaolin clay-based crop protectant that is applied as a slurry to coat leaves and suppress cucumber beetle attraction for feeding. Contact insecticides that generally do not persist long and have short preharvest intervals include carbaryl, bifenthrin (premixed spray), esfenvalerate, permethrin, and pyrethrins.

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