COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

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Plant Pathology Fact Sheet

Bacterial Wilt of Cucurbits

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Importance

Bacterial wilt is a common, often destructive, disease of cucurbits. This disease can cause nearly complete losses of a planting before the first harvest. Bacterial wilt primarily affects cucumber and muskmelon (cantaloupe). While squash and pumpkin are also susceptible, the damage to these hosts is usually less severe.

Symptoms and Signs

The term "wilt" perfectly describes this disease. Initially, individual leaves or groups of leaves wilt on vines, followed by rapid wilting of entire runners (Figure 1) or whole plants. Collapsed foliage may be dark-green in appearance and will later become necrotic. Finally, the leaves, vines, and even the fruit, shrivel and die. Cut stems may emit a sticky exudate, and a slight discoloration of xylem tissue may be seen – key diagnostic features for this disease. Field diagnosis of bacterial wilt can be confirmed using a simple "bacterial ooze test." With a sharp knife, cut through a wilted vine near the crown. Touch the edge of the knife to the surface of the cut end and then slowly pull the knife away from the stem. If the bacterial wilt organism is present, fine thread-like strands of a sticky bacterial slime can be drawn out of the cut end (Figure 2). The bacterial ooze test works well for cucumber and cantaloupe, but is less reliable for squash or pumpkin. For these crops, place pieces of stem into a glass of water. If this disease is present, bacterial ooze will flow into the water. Cucumber beetles, the vector of this disease, or evidence of their feeding, are often present on symptomatic vines and leaves.

Figure 1. Wilting due to Bacterial Wilt infection.

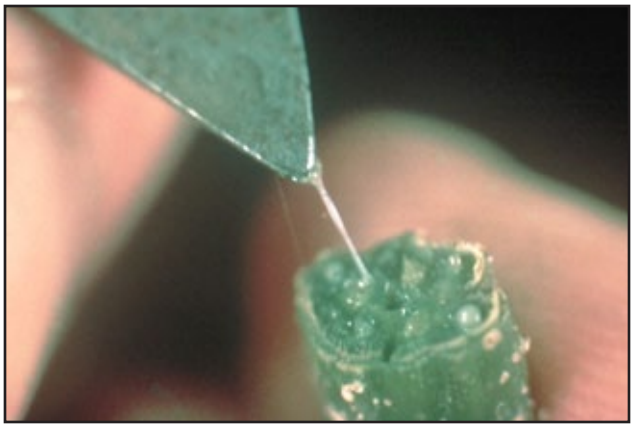

Figure 2. Thread-like strands of bacterial slime can be drawn from the cut end of a vine if it is infected with the Bacterial Wilt organism.

Be careful not to confuse bacterial wilt with a very different problem that may cause similar symptoms. Squash vine borer tunneling activity will also result in the wilting of cucurbit vines, generally single vines on otherwise healthy plants. The presence of a whitish caterpillar with a brown head inside the wilted vines is indicative of squash vine borer activity. Additionally, a tell-tale wet, sawdust-like material may be found along infested runners.

Cause and Disease Development

The bacterial wilt organism (*Erwinia tracheiphila*) is of special interest because it overwinters in the bodies of both the striped and spotted cucumber beetles (Figure 3). The adult striped cucumber beetle (*Acalymma vittatum*) is 1/5 inch long and is yellow-green with 3 black stripes down its back. The larvae, which are cream colored with a dark heads, feed on the plant root systems and can cause extensive damage. Spotted cucumber beetles (*Diabrotica undecimpunctata howardi*) are 1/4 inch long with 12 black spots on their back.

The beetles hibernate through the winter under leaf litter and in other protected sites, becoming active again once temperatures stay above 55° F in the spring. As soon as cucurbits begin to break through the ground, the beetles move in and feed on young leaves, cotyledons, and tender shoots. While feeding, the beetles deposit waste materials contaminated with the bacterial wilt organism; the bacteria can then invade feeding wounds to infect plant tissues.

Once the bacteria invade the plant's water conducting vessels (xylem), they can spread to other parts of the plant. The slime produced by the wilt bacterium is thought to obstruct water movement in the xylem vessels, thus causing the wilt symptoms. Further spread of the disease occurs when beetles feed on diseased plants and then feed on nearby healthy plants. Bacterial wilt tends to be less severe during rainy seasons since wet weather restricts beetle movement. The bacterium cannot survive in infected plant debris from one season to the next. In fact, the causal organism is completely dependent on the insect for survival.

Figure 3. Adult spotted and striped cucumber beetles are vectors of Bacterial Wilt.

Close to harvest a second generation of the striped cucumber beetle may appear that feed on the leaves, vines, flowers, and developing rinds of the fruit. While this generation is not very important in disease spread for the current year, these adults acquire the bacteria while feeding. They will overwinter with the live bacteria in their gut and possibly transmit the pathogen to young plants the next spring.

Disease Management

Prevention of bacterial wilt infections is dependent upon controlling the cucumber beetle vectors. Once it is evident that plants are infected, they should be removed and destroyed.

Chemical control

Start your insect control program early beginning as soon as seedlings emerge or immediately after transplanting. Doing so is critical to protecting very small plants from beetle feeding and, ultimately, from bacterial wilt.

Growers can use contact insecticides to protect plants from beetle feeding and, therefore, prevent transmission of the bacterial wilt organism. Applications of foliar insecticides may be required twice per week during peak beetle activity. A single post-transplant soil drench with the appropriate systemic insecticide can provide 3 to 5 weeks of control. Contact your county's Cooperative Extension office to see which insecticides are currently recommended in Kentucky.

Physical barriers

Small plantings can be protected from cucumber beetle activity by mechanical means. Row covers, screens, or cones over small plants are effective means of excluding cucumber beetles. These protective coverings must be removed prior to bloom to allow for pollination.

Additional Resources

Disease management and crop production advice can be found in the following University of Kentucky publications available at County Extension offices, as well as on the Internet.

- Cucumber Beetles (ENTFACT-311)
http://www.ca.uky.edu/entomology/entfacts/ef311.asp
- Home Vegetable Gardening in Kentucky, ID-128
http://www.ca.uky.edu/agc/pubs/id/id128/id128.pdf
- IPM Scouting Guide for Common Problems of Cucurbit Crops in Kentucky, ID-91 (2009)
http://www.ca.uky.edu/agc/pubs/id/id91/id91.pdf
- Vegetable Production Guide for Commercial Growers, ID-36
http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm

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Photos by John Hartman (Figures 1 &2) and Ric Bessin (Figure 3), University of Kentucky