

# Bacterial Wilt of Cucurbits

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Bacterial wilt of cucurbits occurs throughout the United States. It affects cucurbits including cucumbers, muskmelons, squash, pumpkins, white gourds, wild gourds, wild cucurbits, and watermelon. The causal bacterium, *Erwinia tracheiphila*, is spread primarily by the striped cucumber beetle, *Acalymma vittata*, and the spotted cucumber beetle, *Diabrotica undecimpunctata howardi*.

## Symptoms

Less than one week after a deep feeding wound is made by a bacterially-infested cucumber beetle, dull green patches can appear on the damaged leaf. Entire leaves and petioles then wilt, sometimes so rapidly the initial dullness goes unnoticed. Wilt progresses through lateral shoots and eventually affects the entire plant (Figure 1). Fruits of an infected plant may be wilted, small, poorly shaped and poorly flavored. Cucumbers and muskmelons are affected most severely. The entire vine may wilt within two weeks after infection. Squash and pumpkins may not wilt rapidly but may be dwarfed with extensive blossoming and branching. Watermelons are rarely affected.

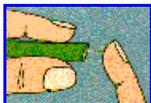


**Figure 1. Bacterial wilt of cucumber. Early symptoms on the left and advanced symptoms on the right.**



**Figure 1a. Bacterial wilt of muskmelon.**

Wilt is caused by a slimy ooze which plugs the entire water-conducting tissue of the plant. The wilted plant will not recover, even if water is adequate in the soil. Other pathogens cause wilt, but bacterial wilt may be distinguished by cutting a severely wilted stem at the base of a lateral branch or just above ground level and squeezing the cut end. Ooze will exude from the water-conducting tissue. By touching the ooze with your finger then slowly drawing your finger away, the milky, sticky ooze will string out into fine strands up to one-fourth inch long (Figure 2). This test works best for cucumbers and is less reliable for other cucurbits. A positive test is a strong diagnostic character, but a negative test does not mean that the plants do not have the disease. Another test is to place a freshly cut stem from a wilted part of the plant in a glass of water. If bacterial wilt is present, a milky exudate will appear at the cut ends. Both of these tests require patience, as the bacteria are in a sticky material and may not readily ooze from the cut stem.



**Figure 2. Bacterial wilt: fine strands of bacterial ooze.**

## Disease Spread

Only the striped cucumber beetle (Figure 3) is important in the spread of the disease in North Dakota. The adult striped

cucumber beetle is almost one-fourth inch long, yellow-green, with three black stripes lengthwise on the back (Figure 3). Bacteria overwinter within the beetle's gut, or the beetles may become contaminated by feeding on infected wild hosts. The feeding beetles spread the wilt pathogens from plant to plant on their mouthparts or in feces. Not all beetles carry the pathogen, and not all wounds cause infections even if the beetle is a carrier. Only deep feeding wounds which expose the water-conducting tissue will be infected. Cucumber beetles prefer to feed on wilted plants, which increases beetle contamination. The disease spreads rapidly under normal moisture conditions, but spread is slowed during rainy or drought periods. Beetles are less active in prolonged cool, rainy weather. In extremely dry weather there is no film of water through which the bacterium can penetrate the exposed vascular system. The pathogen can also enter plants through mechanical wounds that expose the water-conducting tissue.



**Figure 3. Striped cucumber beetle.**

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## Control

The most effective disease control is prompt elimination of cucumber beetles. The beetles can transmit squash mosaic virus as well as bacterial wilt and can cause severe damage by feeding on the leaves. Control should begin either when the first beetle is sighted or when the first cucurbit seedlings emerge. Some growers plant "catch crops" of cucurbits thickly over a small area a few days before they plant the main crop. Catch crops are meant to attract beetles which can be sprayed with insecticide. Unfortunately, catch crops may increase beetle populations, if not sprayed properly.

Small plantings can be protected from the cucumber beetle by screening. Cheesecloth can be used if the edges are weighted to prevent beetles from crawling under the covering and feeding. In larger plantings, chemical control is necessary. Fast killing methoxychlor, diazinon, and carbaryl are the currently recommended insecticides. Cucurbits are easily injured by insecticides, so only light applications should be made. Details on recommended strengths and formulations can be found in Extension Circular E-331, "Garden Insect Control Guide." Be sure to follow label instructions.

Remove or destroy any infected vines. Wilted plants cannot be saved. In large plantings infected vines are pulled and allowed to dry where they lay. If an infected vine is entangled with a healthy vine in the garden, don't try to separate them. Rather than risk breaking the healthy vine, pull the infected vine and allow it to dry in place. In the fall remove and destroy all crop refuse to reduce other cucurbit diseases and to reduce sites for beetle hibernation.

Variation occurs in the pathogen. Strains are more or less vigorous on different cucurbits. Resistant cultivars are the hybrids which have less of the "bitterness" factor in their lines. Apparently cucurbitacin B and cucurbitacin C, which are attractive to the beetles, are the compounds which cause the bitterness factor in cucumbers. With that in mind, it might be a good idea to select those cultivars which historically have little or no record of bitterness developing in the fruit. These would include: Improved Long Green, Eversweet, Ashley, Sunnybrook, Saticoy Hybrid, and Lemon. Some seed catalogs promote varieties or cultivars which are not bitter. These varieties will most likely be least susceptible to cucumber wilt.

Other general control measures for bacterial wilt of cucurbits include: controlling all weeds in or near the cucurbit patch, avoiding damage to cucurbits when the plants are wet, not planting cucurbits near weedy woods or brush where the cucumber beetles may overwinter, and storing squash only from healthy vines.

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