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Research and Extension

Striped and Spotted Cucumber Beetle

Insect Pests of Vegetable Gardens

The striped cucumber beetle, *Acalymma vittatum*, and spotted cucumber beetle, *Diabrotica undecimpunctata howardi*, are insect pests of vegetable gardens that feed on plants in the Curcurbitaceae (cucurbit) family including: cantaloupe, cucumber, muskmelon, pumpkin, squash, watermelon, and zucchini. This publication provides information on the biology and damage associated with striped and spotted cucumber beetles, and the management strategies that can be used to prevent plant damage caused by striped and spotted cucumber beetles.

Biology

Striped and spotted cucumber adults are approximately ¼ inches (6.3 mm) long and yellow-green. A striped cucumber beetle adult has three black stripes that extend lengthwise on the abdomen (Figure 1), which is black on the underside, and has pale legs with black "knee" joints. The spotted cucumber beetle adult has 12 black spots on the wing covers (Figure 2), and the underside of the abdomen is yellow.

Figure 1. Striped cucumber beetle adult. (Photo: Raymond Cloyd)

In spring when the ambient air temperature is greater than 54˚F (12˚C), striped cucumber beetle adults move into vegetable gardens from border areas or overwintering sites. Adults feed on cucurbit plants, and then the females and males mate (Figure 3). Striped cucumber beetle adult females lay 200 to 1,200 eggs in the soil at the base of cucurbit plants. Larvae emerge (eclose) from eggs and feed on plant roots for two to three weeks and then pupate in the soil. Striped cucumber beetle adults emerge in late summer to start a second generation. Spotted cucumber beetle adults are present later in the growing season. Both striped and spotted cucumber beetle adults are attracted to the yellow flower color and the plant volatiles (odors) emitted by the leaves and flowers of cucurbit plants.

The life cycle, from egg to adult, is completed in four to six weeks depending on soil temperature. For example, the life cycle can be completed in approximately 50 days when the soil temperature is 70˚F (20.9˚C) and 25 days when the soil temperature is 86˚F (29.7˚C). Striped cucumber beetle overwinters as an adult in the upper 0.78 to 1.2 inches (2 to 3 cm) of the soil or in debris or residues from previous cucurbit crops. Spotted cucumber beetle adults do not overwinter in northern areas but instead migrate from southern states each year. In addition, spotted cucumber

Figure 2. Spotted cucumber beetle adult. (Photo: Raymond Cloyd)

Figure 3. Striped cucumber beetle adults mating. (Photo: Raymond Cloyd)

beetle adult females lay eggs in the soil among corn and grasses, so larvae do not feed on the roots of cucurbit plants. There can be two or more generations during the growing season.

Damage

Striped cucumber beetle larvae feed on the roots of cucurbit plants, which reduces growth, stunts plants, and/or kills young seedlings or transplants, especially when populations are extensive. For example, striped cucumber beetle larvae feeding on the roots of pumpkin and squash plants can stunt growth and delay fruit development and maturity. Spotted cucumber beetle larvae do not feed on the roots of cucurbit plants.

Striped cucumber beetle adults emerge from the soil in the spring and feed on the leaves of cucurbit plants that were started from seeds or transplanted into the garden (Figure 4). Pumpkin and squash are highly susceptible to striped cucumber beetle feeding, which begins immediately after plants have emerged from the soil. Extensive feeding by adults early in the growing season can kill seedlings and/or transplants. Striped cucumber beetle adult feeding that occurs later in the season causes plant stunting and reduced fruit set, especially when adults feed on flowers. In late summer, striped cucumber beetle adults can damage the rind of pumpkins, squash, and melons.

Striped cucumber beetle adults feed on more different types of cucurbit crops than spotted cucumber beetle adults. Striped cucumber beetle adults feed on leaves, stems, flowers, and fruit. Feeding by adults creates holes in leaves (Figure 5) and small openings (cavities) in plant stems.

Spotted cucumber beetle adults feed primarily on the leaves and flowers of cucurbit plants (Figure 6). Feeding damage to flowers can reduce fruit set and yields. Only striped cucumber beetle adults feed on watermelon, muskmelon, and pumpkin rinds, which may result in scarring later in the growing season (Figure 7). Mature cucurbit plants are less attractive to cucumber beetle adults because they produce lower levels of cucurbitacin, a volatile chemical compound or odor emitted by the leaves and flowers of cucurbit plants. Cucurbitacin attracts cucumber beetle adults, which allows them to find plants later in the growing season.

Striped and spotted cucumber beetle adults can transmit the disease; bacterial wilt of cucurbits, *Erwinia tracheiphila*. Striped cucumber beetle adults can transmit the disease early in the growing season. Young plants are more susceptible to the bacterial wilt disease than plants that mature later in the growing season. Newly emerged striped cucumber beetle adults acquire the bacteria by feeding on infected plants causing their mouthparts to become

Figure 4. Striped cucumber beetle adults feeding on plant leaves. (Photo: Raymond Cloyd)

Figure 6. Spotted cucumber beetle adults feeding on cucurbit flower. (Photo: Raymond Cloyd)

Figure 5. Feeding by striped cucumber beetle adults creates holes in leaves. (Photo: Raymond Cloyd)

Figure 7. Scarring on rind of pumpkin caused by striped cucumber beetle adult feeding. (Photo: Raymond Cloyd)

contaminated. Later in the growing season, spotted cucumber beetle adults can transmit the bacteria to other plants by creating feeding wounds that allow the bacteria to enter. Infection also can occur when cucumber beetle adults deposit excrement or frass containing the bacteria onto fresh feeding wounds on the leaves and flowers.

Once inside the plant, the bacteria reproduces within the water-conducting tissues (xylem) of plants, and then blocks the vascular system causing leaves to wilt (Figure 8). Plants wilt seven to 21 days after being infected by the bacterial wilt disease. Cucumber beetle adults acquire the bacteria by feeding on an infected plant and then can transmit to a healthy plant when feeding. The blend of volatiles (odors) emitted by wilting plants attract cucumber beetle adults, thus facilitating spread of the disease. The bacteria overwinters in the digestive tract of striped cucumber beetle adults. Cucumber, muskmelon, squash, and pumpkin are susceptible to the bacterial wilt disease, whereas watermelon is resistant.

Management

The management of striped and spotted cucumber beetle adults is important to reduce plant damage and transmission of the bacterial wilt disease. Because nothing can be done to save cucurbit plants that are infected with the bacterial wilt disease, they should be disposed of immediately. The only way to keep cucurbit plants from being infected with the bacterial wilt disease is to prevent cucumber beetle adults from feeding.

Figure 8. Plant displaying symptoms of bacterial wilt of cucurbits. (Photo: Raymond Cloyd)

Scouting

Look for striped cucumber beetle adults when seedlings emerge or after transplants have been planted into the garden. Continue scouting for both striped and spotted cucumber beetle adults later in the growing season. Scout the vegetable garden three to four times a week during the growing season as early detection of infestations can mitigate plant damage and transmission of the bacterial wilt disease by cucumber beetle adults.

Cultural

Use transplants rather than sowing seeds directly into the garden soil. Transplants can withstand cucumber beetle adult feeding better than seedlings and small plants, which are highly susceptible to feeding and to the bacterial wilt disease. Place straw mulch around plants (Figure 9) to provide shelter or refuge for wolf spiders (lycosids) and other predators such as ground beetles (carabids) that feed on cucumber beetle larvae.

Sanitation, Physical Removal, and Sticky Traps

Sanitation practices such as the removal of crop debris or residues will help reduce populations of overwintering striped cucumber beetle adults. In addition, weeds within and around the vegetable garden should be removed because they may serve as a source for the bacterial wilt disease. Remove cucumber beetle adults by hand three to four times a week to reduce plant damage. Place yellow sticky cards among cucurbit crops to capture cucumber beetle adults. This will assist in timing insecticide applications to coincide with the presence of cucumber beetle adults.

Figure 9. Straw mulch placed around plants provides shelter for beneficial insects. (Photo: Raymond Cloyd)

Figure 10. Floating row cover protects plants from cucumber beetle adult feeding. (Photo: Raymond Cloyd)

Protective Coverings

Place floating row covers over cucurbit plants (Figure 10) to prevent cucumber beetle adults from feeding and transmitting the bacterial wilt disease. Floating row covers allow rain and sunlight to enter but have to be removed to allow bees (e.g., honey bees and bumble bees) to pollinate cucurbit crops. The edges of floating row covers should be firmly secured to prevent cucumber beetle adults from crawling underneath. Reflective, aluminum-coated coverings (Figure 11) are effective in repelling cucumber beetle adults, which can reduce feeding damage and transmission of the bacterial wilt disease. Placing black plastic coverings (Figure 12) on the soil surface to increase the soil temperature may result in reducing striped cucumber beetle larval populations.

Trap Plants

Another strategy to prevent crop damage is to place plants known to attract cucumber beetle adults around the perimeter of the vegetable garden. These so-called trap plants deter cucumber beetle adults from feeding and protect the main crop from damage. For example, 'Blue Hubbard' squash produces high levels cucurbitacin, which stimulates feeding by cucumber beetle adults, and the yellow flowers are attractive to cucumber beetle adults. Trap plants should be placed around the vegetable garden before the main cucurbit crop is planted. Allow time for trap plants to attract cucumber beetle adults that can then be killed with an insecticide application before they have a chance to move onto the main crop.

Insecticides

Insecticides should be applied when overwintering striped cucumber beetle adults are present in the spring. This reduces feeding, prevents mating and egg-laying by females, and mitigates transmission of the bacterial wilt disease. During peak striped cucumber beetle adult activity, contact insecticides should be applied twice a week to prevent transmission of the bacterial wilt disease. Effective management of the first generation of cucumber beetle adults reduces adult populations in the second generation. Thorough spray coverage of leaves and stems is important in preventing feeding by cucumber beetle adults. Read the product label to ensure that the insecticide is registered for use against cucumber beetle adults.

Beneficial Insects and Spiders

Several beneficial insects and spiders feed on cucumber beetle eggs in the soil. However, their numbers may not be sufficient to effectively regulate cucumber beetle larval populations and prevent plant damage.

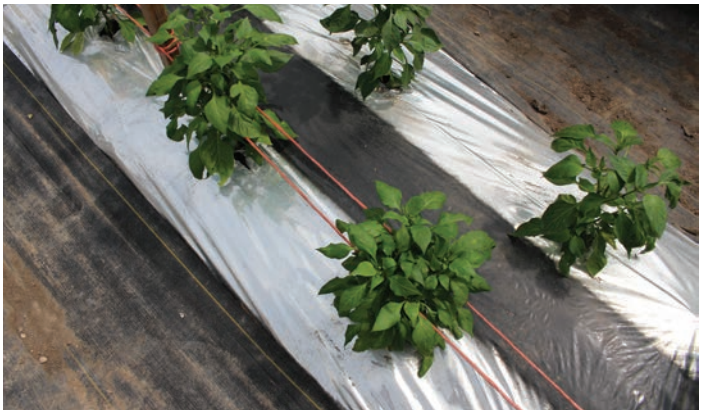

Figure 11. Aluminum-coated reflective covering. (Photo: Raymond Cloyd)

Figure 12. Black plastic covering. (Photo: Raymond Cloyd)

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