

VEGETABLE PESTS

SPOTTED CUCUMBER BEETLE

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The spotted cucumber beetle, *Diabrotica undecimpunctata* (L.), is a widely distributed native species, occurring in most areas east of the Rocky Mountains, in southern Canada, and in Mexico. It is most abundant and destructive in the southern states. The beetle belongs to the family Chrysomelidae, or leaf beetles. The larval (i.e., immature) stage of spotted cucumber beetle is also known as the southern corn rootworm. Adult spotted cucumber beetles are generalists, feeding on more than 250 plant species, especially cucurbits. Some examples of potential host plants include, but are not limited to, corn, cucumber, pumpkin, squash, soybean, sweet potato, peanut and other legumes.

Damage

Both adults (Fig. 1A) and larvae (Figs. 1B, 2) are destructive to plants. Adults chew holes in foliage of host plants (Fig. 1A); they also will eat flowers, which may result in lower fruit yields, and occasionally feed on the fruit. Larvae feed on roots and tunnel through stems (Fig. 1B). Younger plants are more susceptible than more mature plants because of their smaller root system.

Adult beetles also may transmit the bacterium, *Erwinia tracheiphila* (Smith), which causes bacterial wilt. Bacterial wilt is a disease of the vascular tissue that affects members of the cucurbit family. Typical disease symptoms include wilting of individual leaves and ultimately shriveled, dead plants. The bacteria can survive in the gut of the adult and be transmitted via feces or through chewing with contaminated mouthparts. Spotted cucumber beetles also can vector other diseases, such as squash mosaic virus, cucumber mosaic virus, bean mosaic virus, maize chlorotic mottle and machlo virus.



Figure 1. A) Adult spotted cucumber beetle on soybean (photo courtesy of Scott Stewart, UT Extension) and B) Larvae of corn rootworm feeding in corn roots (photo courtesy of North Dakota State University).



Figure 2. Larva of southern corn rootworm (photo courtesy of Scott Stewart, UT Extension)

Description and Life Cycle

ADULT (Figs. 1A and 3): The spotted cucumber beetle is 6.4 mm long and yellow-green with 12 black spots on the forewings. The head and legs are black and they have beaded, black antennae.

EGG (Fig. 3): The eggs are yellow, oval-shaped and measure about 0.7 mm long and 0.5 mm wide. Eggs are laid in clusters in soil crevices at or near the base of the plant.

LARVA (Figs. 1B, 2 and 3): The larvae are wormlike and, when mature, almost 12 mm long. They have a slender, white body with three pairs of long, brown legs at the front of the body. The larva has a brown head capsule and a dark brown plate located on the dorsal side of the last body segment. Larvae are found in the soil, where they feed on roots.

PUPA (Fig. 3): The pupa (about 7.5 mm long and 4.5 mm wide) is white initially, but yellows with age. The pupa has a pair of stout spines at the tip of the body and smaller spines on the dorsal side of other abdominal segments. Pupae are found in the soil amongst the root system. Adults emerge six to 10 days following pupation.

LIFE CYCLE: Unmated adults overwinter under leaves and debris around woodlands and buildings. Adults become active in late spring, when temperatures reach 55-65 F. They will feed on alternative hosts until cucurbits are planted. Females oviposit from late April to early June. Larvae feed on roots and stems in the soil for two to four weeks before pupating. First-generation adult emergence occurs from late June to early July. Approximately six to nine weeks are required to complete one life cycle. The last generation of adults emerges between September and November and will feed until winter. The adults may become active during warm periods in the winter. Typically, the spotted cucumber beetle has two generations per year in Tennessee, but there may be as many as three generations in some years. Adult beetle numbers tend to be highest in early to mid-August.

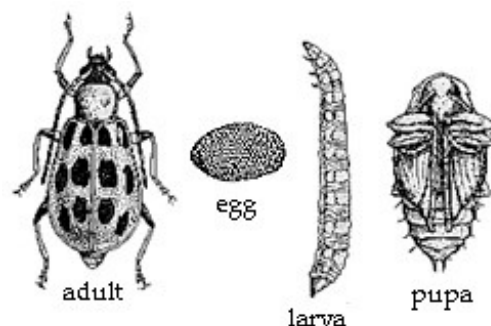


Figure 3. Life stages of spotted cucumber beetle (image courtesy of Virginia Polytechnic and State University).

Sampling and Control

Both nonchemical and chemical controls may be used to manage populations of spotted cucumber beetle. It is important to monitor and scout your field before determining if a chemical control is necessary. An example of a monitoring plan is to monitor five to 10 plants at several locations throughout the field and calculate the average number of adult beetles per plant. Alternatively, you may choose to use sweep-net sampling and make 10 sweeps at several locations in the field. In some cases, treatment may be based on the amount of feeding injury. Suggested treatment thresholds vary depending on the crop and stage of crop development. Foliar insecticide application will not control larval stages.

Nonchemical Controls

To avoid developing resistance to insecticides, nonchemical controls can often be used to manage this pest effectively. Early plowing and/or disking at least 30 days before planting removes vegetation and discourages egg-laying. However, this method is not an option in no-tillage planting systems. Another tactic is to avoid planting preferred hosts next to each other. Small-scale plantings can effectively use floating row covers to prevent adults from moving into the crop and laying eggs. Row covers should be removed at onset of bloom (Diver and Hinman, 2008). If row covers are used, mulches should also be used to suppress weed germination, while the use of various mulches alone can discourage beetles from laying eggs (Diver and Hinman, 2008).

Trap crops may also be a useful management technique. The beetles are attracted to the chemical cucurbitacin, which is given off by cucurbits. Planting a trap crop of a more attractive plant from this family will help attract the beetles away from the crop that is being grown for sale. Beetle preference rankings for cucurbits can be used to determine what trap crops to use depending on your crop grown for sale (Diver and Hinman, 2008; Foster et al., 1995).

Biological control agents, such as tachinid flies (*Celatoria diabroticae* Shimer), fungi (*Beauveria* spp.), and a nematode (*Howardula benigna* Cobb), are natural enemies of spotted cucumber beetles. Mortality caused by these and other naturally occurring natural enemies (spiders, ground beetles, braconid wasps, etc.) can be increased by maintaining cover crops during winter or other fallow periods.

Chemical Controls

Commercial growers may use insecticide seed treatments, soil drenches or chemigation to reduce injury caused by larvae feeding on roots and adults feeding off the foliage of small plants. Foliar-applied insecticides may be directed at adults earlier in the season to prevent major foliar damage to young plants and transmission of bacteria and other pathogens. High populations should be treated in late season to prevent rind feeding on muskmelon, watermelon, pumpkins and possibly other crops (Foster et al., 1995). When applying an insecticide to a specific crop, always follow the pre-harvest interval (PHI) on the insecticide label. The PHI states when the last insecticide application can be made prior to harvest. If possible, it is best to apply chemical insecticides in early evening when bees are less active to minimize toxic effects to bees.

The availability of chemical pesticides changes regularly. Always consult your local county Extension agent for a list of currently approved and recommended chemical insecticides for your area. Commercial vegetable growers have access to more chemical control options than homeowners. The following links provide access to listings of recommended chemical control options for homeowners and commercial production growers:

- UT Extension “PB 1690 Insect and Plant Disease Control Manual (Redbook)” (vegetables, home garden insects): extension.tennessee.edu/publications/Documents/PB1690.pdf
- “Southeastern U.S. Vegetable Crop Handbook” (commercial growers): growingproduce.com/southeasternvegetablecrophandbook

The above online recommendations are updated annually. Be sure that you refer to the most recent recommendations. Always use pesticides according to the label; also use protective clothing and dispose of remaining pesticide in a properly approved manner.

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DISCLAIMER

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

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