

COMMON DEFOLIATING BEETLES IN SOYBEAN

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JAPANESE BEETLE

Classification and Description

The Japanese beetle, *Popillia japonica*, is a scarab beetle commonly found in Tennessee. This beetle can be a pest of gardens, trees, shrubs, turfgrass and agricultural fields. Adults have a bright metallic green head and thorax with copper-colored elytra (hardened wings) and a row of five spots of white hairs on each side of the abdomen below the wings. They are oval shaped and vary in length from 8 to 11 millimeters and a width of 5 to 7 millimeters. Larvae or “white grubs” are found in the soil and vary in color from white to light gray and have a brown head. Japanese beetle white grubs have three pairs of legs. The body is covered with short brown hair (setae) and blunt brown spines. These white grubs lie in a “C” shape when resting. Recently laid eggs are ellipsoidal, measuring about 1.5 millimeters in diameter and are shiny and milky white in color. Eggs become more spherical in shape as they absorb water and develop prior to hatching.

Hosts, Life History, Distribution

Japanese beetles are an invasive pest originating from the Japanese archipelago. First discovered in the United States in New Jersey in 1916, they now can be found in most of the country east of the Mississippi River. These polyphagous beetles feed on a variety of plant hosts (300-plus) including fruits, vegetables, ornamentals and agricultural crops.

Japanese beetles have one generation per year in most climates. These beetles overwinter as third instar grubs in the soil. Adults typically emerge from late May through late July and tend to aggregate and feed in clusters. Mating often occurs on the foliage where they feed. Females burrow 2-5 inches into the soil to lay eggs. A female Japanese beetle can deposit up to 60 eggs in her lifespan. Larvae

typically emerge from eggs in less than two weeks and then feed on grass roots. The larvae go through three instars, becoming fully grown by nine weeks after hatch. Full-grown, third instar white grubs tunnel down in the soil to overwinter. After winter, white grubs crawl back up in the root zone to continue feeding until they enter a prepupal stage for roughly 10 days. Adults emerge after an 8-20 day pupation period, depending on weather conditions.

Pest Status and Injury

Japanese beetles primarily feed on the upper foliage of plants or on blooms, consuming leaf tissue between veins leaving a lace-like skeleton. Although not a common problem, Japanese beetles may cause significant defoliation of soybean in Tennessee.



BEAN LEAF BEETLE

Classification and Description

The bean leaf beetle, *Cerotoma trifurcate*, is a commonly found chrysomelid beetle in soybean fields. Adults are about 6 millimeters in length and sometimes have pairs of black spots on their wings. The color of bean leaf beetles varies, but they are usually reddish, yellowish or tannish. A key identifying characteristic of bean leaf beetles is a black triangle on the top of the wings behind the base of the thorax. The small larvae are roughly 13 millimeters in length when fully grown and inhabit the soil. They have whitish bodies with a brown head and a brown posterior end and are sometimes confused with corn rootworm larvae. Eggs are orange in color and lemon shaped. They can typically be found in clusters in the soil near the base of soybean stems.

Hosts, Life History, Distribution

Bean leaf beetles feed on a variety of host plants including clover, corn, peanut and soybean. They typically have two or three generations per year in the Southeast. Adults overwinter in leaf litter. Upon emergence, new beetles move onto weedy hosts or cultivated plants. Bean leaf beetles migrate to soybean fields as soon as plants begin to emerge. First generation beetles feed on the leaves of seedling plants and lay eggs in the upper 2 inches of the soil. An adult female can lay up to 250 eggs in her lifetime. Depending on temperature, eggs hatch between 4 and 14 days. The larvae develop through three instars in roughly three weeks, and the pupal stage lasts about one week.

Pest Status and Injury

Adult bean leaf beetles typically damage soybean plants by chewing holes in leaves, but they occasionally feed on pods. Holes in leaves are roughly spherical in shape. Heavy feeding by first generation bean leaf beetles on seedling plants can lead to stand loss in severe cases, but most economic damage is caused by defoliation of larger soybeans from later generations. Although damage is rarely economical, larvae can feed on roots and nodules of soybean plants. Bean leaf beetle is also a vector of bean pod mottle virus. Soybean plants infected with bean pod mottle virus can show a variety of symptoms from chlorotic leaf mottling, puckering and necrosis. This virus may also cause “green stem syndrome,” a disorder where the soybean stem stays green even after the plant has matured, making harvest more difficult. Although there is potential for economic loss from bean pod mottle virus, it is rarely a major concern in Tennessee.



MEXICAN BEAN BEETLE

Classification and Description

The Mexican bean beetle, *Epilachna varivestis*, is an invasive beetle found in Tennessee. This insect is interesting because it is a leaf-feeding beetle in the family Coccinellidae, in which predaceous lady-bird beetles or ladybugs are predominant. The predaceous species in this family are beneficial insects that feed on soft-bodied insects such as aphids. Adult Mexican bean beetles measure 6-7 millimeters in length, are orange to copper colored, and shaped like most ladybird beetles. These beetles have 16 black spots on their wing covers in a 6-6-4 pattern. Larvae are pale yellow to orange colored with six dorsal rows of branched longitudinal spines, causing them to look “fuzzy.” Eggs are oblong, oval, bright yellow and laid in clusters on the bottom of leaves. These eggs are roughly 1 millimeter in diameter and 4 millimeters in length.

Hosts, Life History, Distribution

Mexican bean beetle can be found on several host plants, including legumes, cowpea and soybean. Three to four generations can be produced each year in the Southeast. Adults overwinter in plant debris and wooded areas and do not emerge until early spring. Upon emergence, females begin laying eggs in clusters of 40-60 eggs on the underside of host plant leaves. Larvae hatch in 5-12 days. The larvae mature, pupate and emerge as adults about 32 days after hatching.

Pest Status and Injury

Adult and larval Mexican bean beetles feed on the underside of soybean leaves between the leaf veins. In doing so, they leave a characteristic lacy appearance that is somewhat distinct from that caused by Japanese beetles. This is because they may feed only on the surface of leaves, leaving a window-paned effect. Only on rare occasions will Mexican bean beetle populations reach levels high enough to cause economic damage, and this primarily occurs in the eastern and more northern counties of Tennessee.



Photographs courtesy of Ric Bessin, University of Kentucky Extension.

BLISTER BEETLES

Classification and Description

Blister beetles, *Epicauta spp.*, are somewhat common meloid beetles found on soybean in Tennessee. When disturbed, these beetles secrete cantharidin from the joints of their legs. Cantharidin can cause burning and blistering of the skin, giving blister beetles their name. Adults are soft-bodied beetles. Their appearance varies based on species, but adults are roughly 2 centimeters in length. The striped blister beetle has alternating dark brown and yellow stripes along the length of the body. The margined blister beetle is black with a gray border along the margins of its wing covers. The prothorax of blister beetles, the area between the head and the wings, is narrower than the head and the wings. Larvae are grub-like and found in the soil.

Hosts, Life History, Distribution

Blister beetles can be found on a variety of host plants including tomato, pepper, sweetpotato and soybean. They also are commonly observed feeding on Palmer amaranth. Most blister beetles have one generation per year in Tennessee. They overwinter as pseudopupae in the soil. Pupation occurs in the spring when the soil temperature and moisture reach a threshold level, and the adult emerges about two weeks later. Females lay egg masses in clusters of 50-300 eggs in the soil or under rocks. Eggs will typically hatch within two weeks. The larval stages are predatory, feeding upon grasshopper eggs.

Pest Status and Injury

Adult blister beetles feed in clusters and skeletonize soybean leaves, often making large and irregular

holes. Insecticide treatment for blister beetles is seldom needed. Some soybean varieties are more preferred by blister beetles than others. When blister beetles are present, feeding is typically local-

ized to a few small areas of the field, and oftentimes blister beetles will leave a soybean field as quickly as they arrived.



MANAGEMENT CONSIDERATIONS AND THRESHOLDS

Sweep-net sampling and visual scouting can be used to determine which insects are causing defoliation in soybean fields, and this may include defoliating caterpillars and other insects not described in this publication. Treatment thresholds for defoliating beetles are primarily based on percent defoliation and crop growth stage. It is common that multiple species are contributing to defoliation. Soybean plants are most sensitive to defoliation during bloom and pod-filling stages (R1-R6), and treatment is recommended during this window if defoliation levels reach or exceed 20-25 percent. Currently recommended insecticides and thresholds can be found in UT Extension publication PB 1768, "Tennessee Insect Control Guide Recommendations for Field Crops" (extension.tennessee.edu/publications/Documents/PB1768.pdf).

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