

Beetles

Beetles are a large group of insects characterized by hardened forewings. Both adults and larvae have chewing mouthparts that cause plant damage. Leaf feeding beetles such as scarab beetles and lily leaf beetles may occur in herbaceous perennial production. Tortoise beetles are occasional pests of plants in the morning glory family. Various beetles may be found feeding in outdoor herbaceous perennial production and retail yards. The target audience of this factsheet is commercial greenhouse and nursery growers and retail garden centers.

Leaf feeding beetles

Lily leaf beetles

The lily leaf beetle (*Lilioceris lili*) is native to Eurasia and was first discovered in Canada in 1943 and found in the US in 1992 damaging native and cultivated lilies. Many gardeners have stopped growing lilies in areas where this beetle is widespread.

Adults are 1/4–3/8-inch-long, bright scarlet-red in color, with black legs, head, and antennae. Larvae are orange, brown, or yellow. They resemble a fragment of soil as they transport their excrement on their backs. Both adults and larvae primarily feed on *Lilium* and *Fritillaria*. They may also feed upon *Polygonatum*, *Nicotiana* and other plants but are not able to complete their life cycle on these hosts.



Figures 1 & 2: Lily leaf beetle adult (on left) and larvae covered with fecal material (on right). Photos by L. Pundt

Biology and Life Cycle

- Overwintering adult beetles emerge from the soil in early spring.
- Females lay from 250 to 450 eggs on the underside of lily leaves.
- Larvae, which feed for approximately two weeks before entering the soil to pupate, cause most of the damage to plants. They cover themselves with their fecal material.
- Larvae complete four instars and then pupate in the soil.

- Adults emerge from pupae in 3–4 weeks and feed on plants until fall.

Management

Insect growth regulators may be effective in killing the early instar larvae but must be applied before the larvae start covering themselves with their excrement.

University of Rhode Island (URI) Biological Control Laboratory has released several parasitoids of the lily leaf beetle in New England. A survey of lily growers in 2021 showed considerable decline in damage from lily leaf beetle in eastern MA and RI. These small parasitoids have been released throughout CT and URI researchers anticipate that these beneficial insects will gradually disperse naturally from release sites.

Tortoise Beetles

Golden tortoise beetle adults (*Charidotella sexpunctata*) are shiny, golden beetles, less than ¼” long, with thin margins that extend out from their body and a shield-like structure covering their head. They are also known as “gold bugs.” Both adults and larvae can feed upon members of the morning glory family (*Convolvulaceae*) such as ornamental sweetpotato vine (*Ipomoea sp.*) causing distinct round circular holes.



Figures 3 & 4: Golden Tortoise Beetle adult (on left) and their feeding damage to *Ipomoea* Marguerite (on right) Photos by L. Pundt

Biology and Life Cycle

- Tortoise beetles overwinter as adults.
- There is one generation a year.
- During late spring and early summer, adults lay their eggs on leaves.
- Eggs hatch into yellowish to oval brown, broad, spiny flattened larvae that use their rear spines to hold debris and excrement over their back.

Scarab beetles

Scarab beetles are large, brightly colored beetles with lamellated tips on their antennae. **Asiatic garden beetles, Oriental beetles** and **Japanese beetles** feed on herbaceous perennials, annuals, woody ornamentals, and vegetables. Their fleshy larvae, ‘white

grubs” develop on the roots of many different plants. The identification of the particular grub species is important because the effectiveness of chemical and biological controls varies according to specie. The pattern of hairs (raster) on the tip of the rear end of the grubs is used to identify the species.

Asiatic garden beetle adults (*Maladera formosae*) are about 3/8-inch-long and cinnamon-brown in color. Asiatic garden beetles feed at night on *Aquilegia*, *Aster*, *Chrysanthemum*, *Dahlia*, *Delphinium*, *Helianthus*, *Heuchera*, *Phlox*, *Physostegia*, *Rosa*, *Rudbeckia*, *Salvia* and *Zinnia*. They can also feed upon basil in the garden.

Their nighttime feeding causes c-shaped notches on the edges of leaves. During the day, adults burrow into mulch or soil or under pots. Immature white grubs feed on the roots of grasses and flowering plants.

Biology and Life Cycle

- Asiatic garden beetles overwinter as grubs in the soil
- Adults emerge the following summer (early July to mid-August).
- There is one generation a year.

Management

Apply contact insecticides against adults; however, repeat applications may be needed. Manage grubs in grassy areas.



Figure 5 & 6 & 7 Adult Asiatic garden beetle (far left) (M. Reding and B. Anderson) USDA ARS, bugwood.org) and their feeding damage to garden mums (in middle) and basil (on right). Photos by L. Pundt

Japanese beetle (*Popillia japonica*) adults are from 1/3 to 1/2 “long, metallic-green with copper-colored wing covers and white patches of hair near the end of the abdomen.

Japanese beetles are extremely mobile, and once feeding begins, the pests emit feeding or aggregation pheromones attracting other beetles to the same location. Look for feeding between the leaf veins (“skeletonization”) on favored hosts. Adults can feed during the day on up to 300 woody and herbaceous hosts. Plants in the *Rosa* family are preferred hosts. Some favored herbaceous perennial hosts include *Alcea*, *Clematis*, *Echinacea*, *Hibiscus*, *Malva*, *Oenothera* and *Rudbeckia*. Annuals such as dahlia, cleome, celosia (cockscomb) and zinnia are also widely fed upon.

Biology and Life Cycle

- Adults emerge from the soil in June and July and feed for about 30-45 days.
- Eggs are laid in the soil in grassy areas and hatch into white, c-shaped grubs that feed on turfgrass roots.
- Japanese beetles overwinter as grubs in the soil below the frost line.
- There is one generation per year.



Figures 8 & 9 & 10 Adult Japanese beetle (bugwood.org) (on left) and its feeding damage (in middle and on left). Photos by L. Pundt

Management

Contact insecticides can be applied as soon as the adult beetles are observed. However, many contact insecticides may be harmful to bees, beneficial parasitic wasps, and predatory mites.

Good weed control in and around production areas helps to eliminate potential food sources. Use shade cloth to exclude adults from nursery hoop houses. Japanese beetle traps are not recommended. Although they attract adult beetles, they only increase feeding damage on nearby plant hosts.

Apply grub control to larvae in grassy areas surrounding production areas. *Bacillus thuringiensis galleriae* (BTg) can be effective against grubs as long as it is applied while they are still actively feeding, as they must ingest the bacteria.

Beneficial nematodes (*Heterorhabditis* sp.) are commercially available for use against white grub larvae. Scarab beetle species vary in their susceptibility to infection and white grubs also have some defenses against nematode infection.

The beneficial nematodes, (*Heterorhabditis bacteriophora*) release a bacterium that kills the white grubs. Nematodes are very sensitive to ultra-violet light, so the nematodes need to be applied on cloudy, overcast days, at dawn or dusk or just before it rains. They also need at least one-half inch of irrigation or rain so they will be at a depth where they can contact the newly hatched grubs in the soil. Apply to young, small grubs in late summer or fall to protect turf.

The female winsome fly (*Istocheta aldrichi*) is a natural parasitoid of adult Japanese beetles. Look for distinct white eggs on the thorax of adult beetles. The spring Tiphia (*Tiphia vernalis*) and summer Tiphia (*Tiphia popilliavora*) are parasitoids that attack

Japanese beetle and Oriental beetle grubs. Surveys in Connecticut found that spring and summer *Tiphia* parasitoids are widely distributed. Surveys in Massachusetts and New Hampshire found these parasitoids in several counties as well.

Oriental beetle adults (*Anomala orientalis*) are about 1/2" long, straw-colored or dark-



brown with dark markings on their wing covers. Adults emerge from the soil in mid-June and are present until August. Adult beetles do very little foliage feeding. The white grubs feed on the roots of herbaceous perennials, turfgrass and woody ornamentals.

Figure 11: Oriental beetle adult. Photo by L. Pundt

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