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Japanese Beetle
(*Popillia japonica*)

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Do You Know?

- Japanese beetle was initially detected in Orem, Utah, in July 2006. Eradication efforts have been highly successful.
- Adults have a broad host range (over 300 plant species) and can cause significant damage.
- Grubs prefer to feed on turfgrass roots and spend about 10 months of the year under the soil surface.
- Homeowners can successfully manage Japanese beetle with proactive cultural practices, biological control, and reduced risk insecticides.

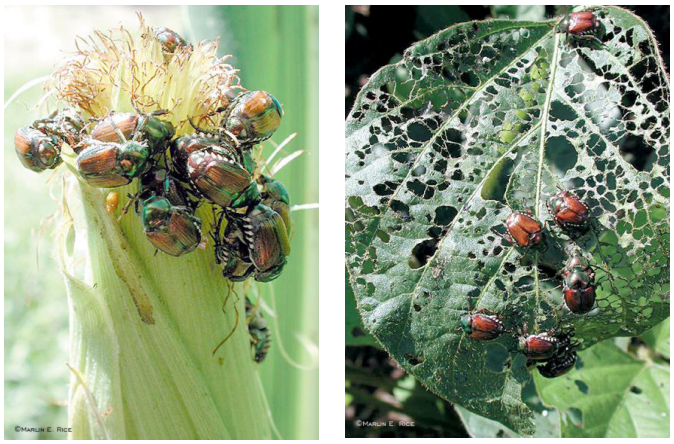


Fig. 1. Adult Japanese beetles feeding[2].

The Japanese beetle, Popillia japonica Newman, can be a highly destructive pest to ornamentals, trees, shrubs, turfgrass, and vegetables. First discovered in the eastern United States in 1916, the Japanese beetle has threatened agriculture and horticulture by slowly moving south and west. In 2006, a small population of adult Japanese beetles was detected in Orem, Utah. An aggressive eradication effort resulted in a 95% reduction of this population by 2010. The invasive pest is especially harmful because the adults and immatures (i.e., grubs) feed on plants and can cause significant damage when in high numbers. Together, the adults and grubs feed on several hundred plant species; some of the most susceptible plants are grown in Utah. Adult beetles feed on the upper leaf surface, removing leaf tissue and releasing a strong aggregation pheromone that attracts additional beetles to a potential food source (Fig. 1).

Damage Symptoms

Feeding damage by Japanese beetle adults is commonly seen as holes or skeletonized leaves (Fig. 1). Adults are highly attracted to rose, apple, stonefruits (peach, plum, cherry), basswood/linden, willow, elm, grape, birch, Japanese and Norway maples, pin oak, horse chestnut, and sycamore.

Without actively looking for grubs under the soil surface, grubs often go unnoticed until September, when large patches of turf are destroyed. Evidence of grub damage begins as localized discolored patches, but patches can enlarge and coalesce in just a few weeks. Heavily damaged turfgrass can feel spongy and be easily pulled away from the soil surface. Drought conditions can make turfgrass injury worse.

DESCRIPTION

Adults are oval, metallic green with bronze-colored wings, and are about ½" long (Fig. 2). Males are slightly smaller than females. Adults have six white tufts of hair along each side of the body (Fig. 2). Grubs are creamy white, C-shaped, and 1" long when fully grown (Fig. 2). Adults are found clustered together on plants and grubs can be clumped under the soil of turfgrass.



larva[1] adult[2]

Fig. 2. Japanese beetle life stages.

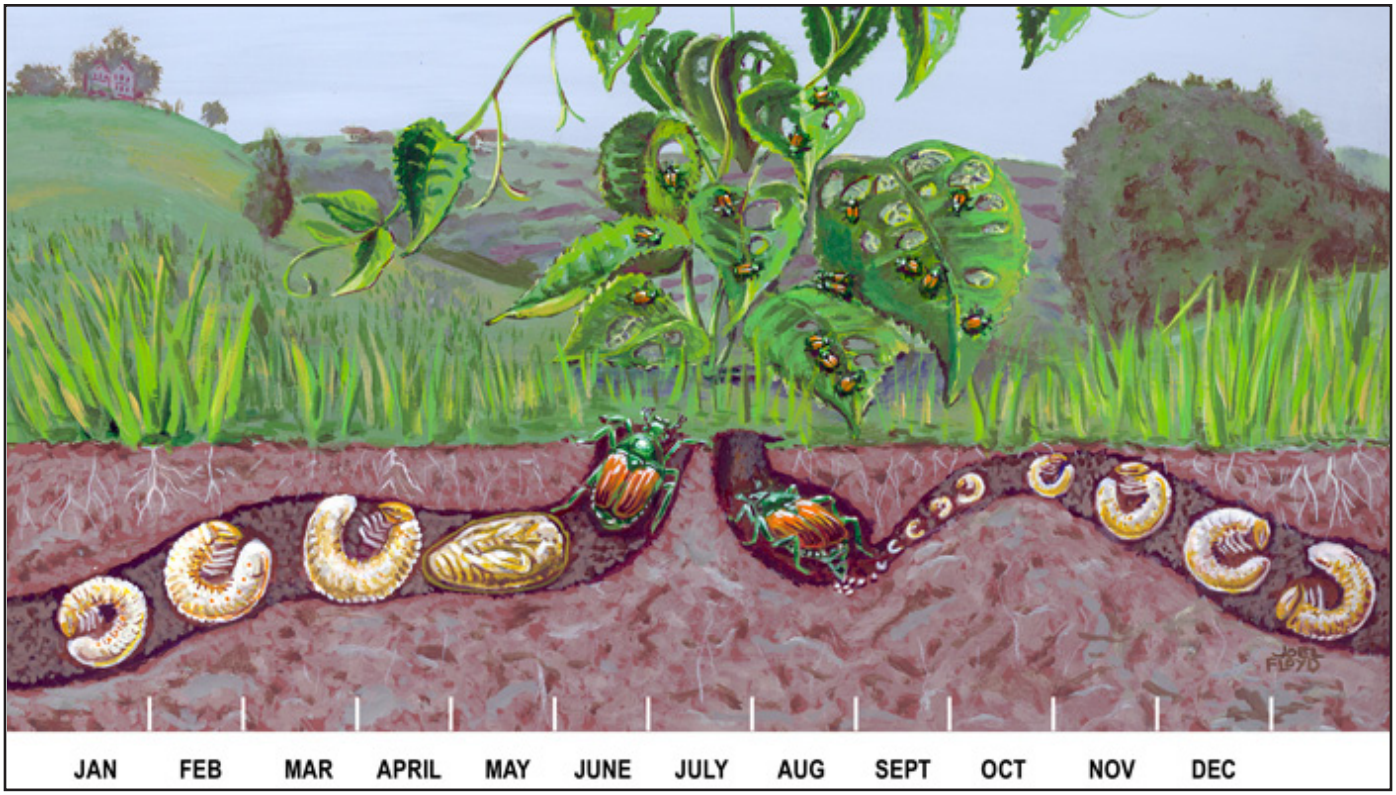


Fig. 3. Illustration of Japanese beetle life cycle[3].

LIFE CYCLE

Japanese beetles have one generation per year and grubs spend about 10 months under the soil surface (Fig. 3). Adults emerge from turfgrass in late June and immediately begin to feed on low-lying plants such as roses and shrubs. Adults eventually move up on tree foliage to feed and mate. Mated females move back to turfgrass to lay small egg masses in soil cavities. Females prefer to lay eggs in healthy, vigorous turfgrass and will avoid stressed lawns. Most eggs (Fig. 2) are laid between mid-July and early September. The eggs hatch into small grubs that feed on roots underground until late September when the temperature cools. The almost fully-grown grubs burrow 4 - 8" down in the soil and remain inactive all winter. In the early spring, grubs become active again and feed until turning into resting pupae (Fig. 3). The pupae hatch into adults and emerge from the soil. See Figure 3 for a complete life cycle diagram.

SAMPLING PROTOCOL

Begin scouting after adult emergence to look for eggs or small instars to decide if treatment is warranted. Take at least four evenly spaced turfgrass samples for the area. Cut a 6" x 6" square on three sides with a hand trowel to examine the upper 2" of the root zone (Fig. 4). If the turf is dying and grubs are absent, examine the soil for other causes of injury, such as disease, excessive thatch, moisture stress, heat damage or other insect feeding. After looking through the soil sample, replace the soil and return the turf. During the summer, look for adults on



Fig. 4. Core soil sample and turfgrass root zone[5].

ornamental plants, trees and shrubs. Scout susceptible plants at least once per week, especially if adults were active the previous year. Adults are especially attracted to ripening fruits and rose buds.

CONTROL OPTIONS

Once Japanese beetle becomes established, eradication is very difficult and complete control is unlikely. Parasitic wasps, flies, and birds can be very effective biological control agents. Using broad spectrum insecticides for low densities of Japanese beetle is unnecessary and will reduce biological control. Using natural enemies and other integrated pest management (IPM) strategies can reduce adults and grubs to tolerable levels in most situations. Here is a list of cultural control methods homeowners can use to reduce the impact of Japanese beetle damage:

- Keep plants healthy by following a recommended irrigation and fertilization schedule. Encourage natural enemies by planting a diversity of flowering plants that produce pollen and nectar.

- Include a mix of plants that adult beetles avoid, such as lilac, forsythia, dogwood, magnolia, and American holly, to discourage large numbers of adults on ornamentals[4].
- Start monitoring for grubs in the early spring by taking a few soil samples, and scout for adults in the summer by inspecting susceptible plants, such as rose, apple, stonefruits, basswood/linden, crabapple, asparagus, and birch.
- If adult feeding damage becomes noticeable, simply remove the beetles during the warmest part of day (when they are most active) by hand and drop into a jar of soapy water.

In certain situations where persistent Japanese beetle damage is documented over multiple years, a more aggressive control program can be initiated. Set up a sex pheromone/floral lure trap (Fig. 5) to help estimate initial and peak adult emergence. The trap should catch about 75% of the beetles in that area; but be sure to place the trap on the edge of the property or away from susceptible plants (see product ordering information below).



Fig. 5. Japanese beetle trap[5].

Japanese beetle "Xpando Trap" order information:

Contech Enterprises Inc.
Unit 115-19 Dallas Road
Victoria, BC V8V 5A6
Canada

Phone: 800-767-8658
Fax: 800-876-1666
http://www.contech-inc.com

The treatment threshold for Japanese beetle grubs in turfgrass is 8-10 per ft^2 or 2-3 per 6" x 6" square with obvious visible damage. The threshold could be increased to up to 15 per ft^2 in a healthy lawn. Chemical control should be considered only when cultural methods are not effective. In mid to late June, use a long-lasting "reduced risk" insecticide, such as imidacloprid (Merit®) or chlorantraniliprole (Acelepryn®), to target eggs before they hatch intro grubs. Other reduced risk pesticides are available (Concern®, Pyganic®, and Surround®) but do not have a long residual. Highly infested turf may need an additional treatment of trichlorfon (Dylox®) in July to kill grubs. Here are some guidelines for effective chemical control in turfgrass:

- If the thatch layer exceeds ½", use a light aerification to enhance soil penetration.
- Apply ½" of water 48 hours before chemical application to bring feeding grubs closer to the soil surface.
- Immediately apply ½ - ¾" of water after application to push the chemical down to the root zone.
- Repeat irrigation every 4 or 5 days to continue chemical movement in the soil.

Adults are above ground for only a short time (Fig. 3) and are very mobile. Applying foliar insecticides to trees, shrubs and other ornamentals is not recomended because the chemicals are expensive and generally not effective. In extreme situations, traditional insecticides, including carbaryl (Sevin®) and malathion can be used.

[1]Image courtesy of David Cappaert, Michigan State University (www.insectimages.org).

[2]Images courtesy of Marlin Rice, Iowa State University Department of Entomology (http://www.ent.iastate.edu/).

[3]Images courtesy of USDA-APHIS (http://www.pueblo.gsa.gov/cic_text/housing/japanese-beetle/jbeetle.html).

[4]For a more detailed list of susceptible and resistent plant material to Japanese beetle, go to http://msucares.com/pubs/publications/p2333.pdf.

[5]Images courtesy of Erin Hodgson, Utah State University Department of Biology (www.utahpests.usu.edu/photogallery).

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