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). 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 $\frac{1}{2}$″ 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.

**Damage Symptoms**

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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.

**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.
Japanese beetle “Xpando Trap” order information:

Contech Enterprises Inc.  Phone: 800-767-8658
Unit 115-19 Dallas Road  Fax: 800-876-1666
Victoria, BC  V8V 5A6  http://www.contech-inc.com
Canada

Fig. 5. Japanese beetle trap.

The treatment threshold for Japanese beetle grubs in turfgrass is 8-10 per ft² or 2-3 per 6” x 6” square with obvious visible damage. The threshold could be increased to up to 15 per ft² 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 into 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 recommended because the chemicals are expensive and generally not effective. In extreme situations, traditional insecticides, including carbaryl (Sevin®) and malathion can be used.

1Image courtesy of David Cappaert, Michigan State University (www.insectimages.org).
2Images courtesy of Marlin Rice, Iowa State University Department of Entomology [http://www.ent.iastate.edu/].
4For a more detailed list of susceptible and resistant plant material to Japanese beetle, go to http://msucares.com/pubs/publications/p2333.pdf.
5Images courtesy of Erin Hodgson, Utah State University Department of Biology [www.utahpests.usu.edu/photography].

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