Japanese beetle

Popillia japonica

QUICK FACTS

- Japanese beetle are native to Japan and were first documented in the U.S. in the early 1900's.
- Adults are large, 3/8-1/4 inch long.
- Japanese beetle feed on dozens of plant species.
- Japanese beetles aggregate to mate and feed, making reinfestation of treated sites a major challenge to management.
- No treatment threshold has been established.

Japanese beetle (Popillia japonica Newman) are native to Japan and were first documented on the East Coast of the United States in the early 1900's. Populations have slowly spread west and are now present in Canada and every state east of the Mississippi. Adults are 3/8 to 1/2 inch long with a metallic green thorax and copper-colored wing covers. Adults have twelve distinct tufts of white hairs on the abdomen, the legs and head are black. Japanese beetle larvae are white C-shaped grubs that live in the soil. The larvae vary in size from 1/8 inch when newly hatched to about 1 inch when fully grown.

Adult Japanese beetles aggregate, feed and mate in large groups after emergence, often causing severe and localized damage. They feed on the top surface of leaves, skeletonizing the tissue between the primary leaf veins. If populations are high, they can remove all of the green leaf material from entire plants. Japanese beetle may feed on other plants parts, including developing flowers, burrs and cones.

Japanese beetles overwinter as larvae in the soil where they feed on grass roots and pupate into adults in early summer. Adults emerge from 950-1250 degree days base 50, feeding and mating throughout the summer. Adults lay eggs on turf from summer to early fall. Larvae hatch from the eggs about 10 days later and feed on grass roots. If adequate moisture is available from rain or irrigation, the grubs will molt to second and then third instars by fall. As temperatures drop in the fall, larvae migrate deeper into the soil to avoid the frost, moving back up to feed on grass roots in spring.

Visually inspecting the hopyard for Japanese beetles should be standard scouting protocol for growers east of the Mississippi. Due to their aggregating behavior and substantial size, Japanese beetles are typically easy to detect but may be highly localized in the hopyard, requiring a thorough site inspection. Baited pheromone and floral traps are commercially available and may be useful to detecting emergence and severity. However, traps often attract adult Japanese beetles that may contribute to damage and are not considered a commercially viable control option.

At this time there is no established treatment threshold for Japanese beetles in hop. Growers should consider that established, unstressed and robust plants can likely tolerate a substantial amount of leaf feeding before any negative effects occur. Those managing hopyards with small, newly established, or stressed plants should take a more aggressive approach to Japanese beetle management, as plants with limited leaf area and those already under stress will be more susceptible to damage. It is also

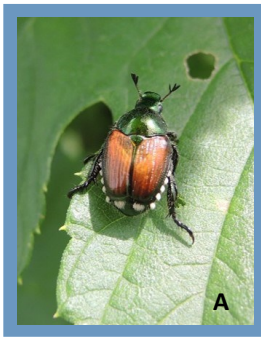

Figure A. Adult Japanese beetle. Figure B. Mating group of Japanese beetle. Figure C. Japanese beetle feeding damage on hop. Photo credits, Erin Lizotte, Michigan State University.

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important to carefully observe beetle behavior in the hopyard; if flowers, burrs or cones are present and being damaged, growers should consider more aggressive management as yield and quality are directly affected.

Management

Adult Japanese beetle feeds on hundreds of different plant species, making them well adapted to a variety of landscape types and more difficult to control due to their adaptability. When these generalist characteristics are coupled with their aggregating behavior, reinfestation of damaged sites becomes a constant and frustrating management challenge for growers. In the eastern United States, where Japanese beetles are prevalent, there are a number of registered pesticides available. Japanese beetles are difficult to control and are most effectively knocked back with broad-spectrum insecticides, including organophosphates and pyrethroids. Unfortunately, due to their toxicity to beneficial mite predators, use of these broad-spectrum insecticides, particularly in mid to late summer, can cause two-spotted spider mite outbreaks. Research in fruit crops has shown that pyrethroid insecticides that are registered on hop, including bifenthrin and beta-cyfluthrin, have good contact activity against adult beetles, and can provide 7-10 days of residual control. Malathion is an effective broad-spectrum organophosphate that is also registered for use on hop. Based on research in fruit crops, it can take up to 3 days for malathion to take effect; it provides 10-14 days of residual control.

Growers may also apply a registered neonicotinoid insecticide such as imidacloprid or thiamethoxam as applicable. Neonicitinoids are easier on beneficial predatory mites, but have been shown to contribute to increased pest mite populations by increasing female mite longevity and reproductive viability when they are exposed to sublethal doses. Neonicitonoids should provide contact toxicity for 2-5 days, and residual anti-feedant activity against Japanese beetle adults based on efficacy trials in fruit systems.

Pesticides with organic labels include neem-based products like azadirachtin which should provide 1-2 days of residual activity and good contact toxicity. Surround, a kaolin clay based particle film, has shown good efficacy against Japanese beetle in blueberry and grape plantings. Surround leaves a white, dusty film on the plant that acts as a physical barrier and irritant; therefore it requires excellent coverage to be effective.

To help mitigate the negative effects of insecticide applications on mite populations, growers should consider spot treatments to heavily infested areas. Refer to pesticide recommendations from your region and always read and follow the pesticide label.

Reference: Davis, T. and Smitley, D. 2007. Turf Tips, Japanese beetle. 2007. Michigan State University Extension Bulletin E0010TURF. East Lansing, MI.

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