



# Extension FactSheet

Entomology, 1991 Kenny Road, Columbus, OH 43210-1000

## Control of Japanese Beetle Adults and Grubs in Home Lawns

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The Japanese beetle, *Popillia japonica* Newman, is the most abundant and important landscape pest in Ohio. This pest was detected in New Jersey in 1916, having been introduced from Japan. It is common for this pest to be abundant in one part of a town and not others. The adult beetles eat the leaves and flowers of over 300 plants by eating the tissue between the veins, a type of feeding called skeletonizing. The larvae, called white grubs, feed on plant roots and organic matter in the soil, especially under turfgrass. This feeding may result in dead patches of turf that can be picked up like a loose carpet.

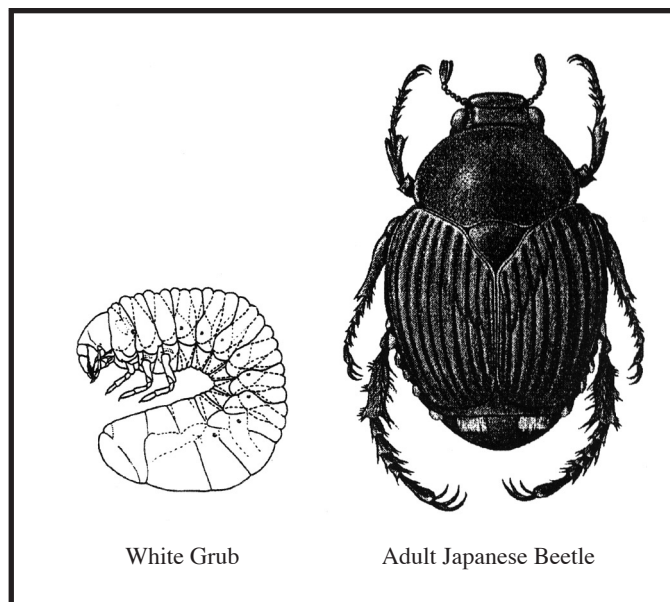
### Description of the Beetle and Its Larva

The adults are a brilliant metallic green, generally oval in outline, 3/8 inch (8 to 11 mm) long and 1/4 inch (5 to 7 mm) wide. The wing covers are a coppery color and the abdomen has a row of five tufts of white hairs on each side that are diagnostic.

The larvae are typical white grubs that are C-shaped when disturbed. First instar larvae are about 1/16 inch (1.5 mm) long while the mature third instars are about 1-1/4 inch (32 mm) long.

### Life Cycle and Habits

The adult beetles normally emerge during the last week of June through July. The first beetles out of the ground seek out suitable food plants and begin to feed. These early arrivals begin to release an aggregation pheromone (odor) that attracts additional adults. Newly emerged females also release a sex pheromone that attracts males. After feeding and mating for a day or two, the females burrow into the soil to lay eggs at a depth of 2 to 4 inches. Females lay 1 to 5 eggs before returning to plants to feed and mate. This cycle of feeding, mating and egg laying continues until the female has laid 40 to 60 eggs. Most of the eggs are laid by mid-August though adults may be found until the first frost. The eggs hatch in 8 to 14 days and the first instar larvae dig to the soil surface to feed on roots and organic material. The first instars shed their skin (molt) in 17 to 25 days. The second instars take 18 to 45 days to mature and molt again. Most of the grubs are in the third instar by late September and by October



White Grub

Adult Japanese Beetle

they dig deeper into the soil to overwinter. The grubs return to the surface in the spring as the soil temperature warms, usually in mid-April. The grubs continue their development and form a pupa in an earthen cell 1 to 3 inches in the soil.

### Control Strategies

#### Adult Control

##### Option 1: Cultural Control - Hand Picking

By noticing when the first adults arrive on a property, you can pick off and destroy these scouts that attract additional pests. The adults are less active in the early morning or late evening. They can be destroyed by dropping into a container of soapy water.

##### Option 2: Cultural Control - Plant Non Attractive Plants

The adults do not like to feed on ageratum, arborvitae, ash, baby's breath, garden balsam, begonia, bleeding heart, boxwood, buttercups, caladium, carnations, Chinese lantern plant, cockscomb, columbine, coralbells, coralberry, coreopsis, cornflower,

daisies, dogwood (flowering), dusty-miller, euonymus, false cypresses, firs, forget-me-not, forsythia, foxglove, hemlock, hollies, hydrangeas, junipers, kale (ornamental), lilacs, lilies, magnolias, maple (red or silver only), mulberry, nasturtium, oaks (red and white only), pines, poppies, snapdragon, snowberry, speedwell, sweet pea, sweet-William, tuliptree, violets and pansy, or yews (taxus).

### Option 3: Cultural Control - Trapping

Several traps using a floral lure and sex attractant are available. These traps are not recommended for general use unless special conditions can be met. The traps have been demonstrated to be effective in reducing damage and populations only when landscapes are isolated from other Japanese beetle breeding areas or when mass trapping (everyone in the neighborhood) is used. In most urban areas, traps tend to attract more beetles into the area than would normally be present. In this situation, adult feeding and resultant grub populations are not reduced.

### Option 4: Chemical Control - Insecticide Spraying

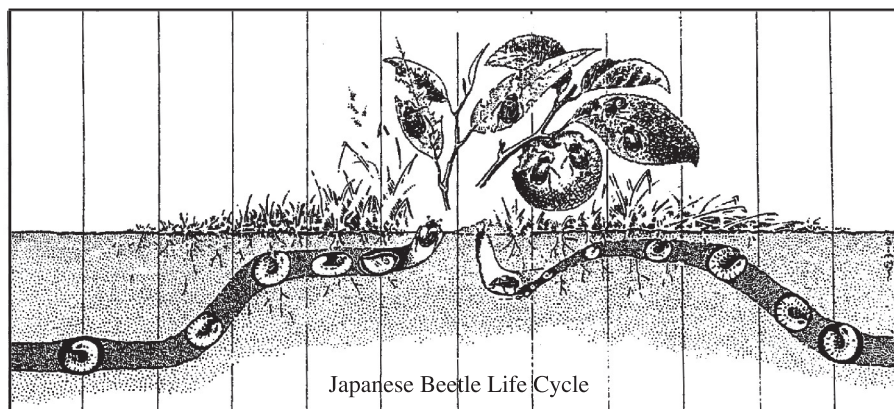
The adults can be controlled by spraying susceptible plants with insecticides. Over-the-counter pesticides available for this include: acephate (Orthene), carbaryl (Sevin), and several pyrethroids - bifenthrin, cyfluthrin, deltamethrin, lambda-cyhalothrin, permethrin, and others. Applications of imidacloprid (=Bayer Advanced Tree & Shrub Concentrate) generally need to be made 20 days before anticipated Japanese beetle adult activity. During the heavy adult activity periods, sprays may be needed every 5 to 10 days.

### Grub Control

Control action is needed when grub populations are greater than 5 to 10 per square foot of turf. However, raccoons, skunks and moles may be active with fewer grubs in an area.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author, The Ohio State University and the Ohio Cooperative Extension Service assume no liability resulting from the use of these recommendations.

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



### Option 1: Biological Control - Bacterial Milky Disease

The bacterial milky diseases, *Bacillus popilliae* Dutky, has been quite effective at controlling the grubs in certain areas of the eastern United States. The spore count must build up for 2 to 3 years to be very effective and during this time you should not use an insecticide against the grubs that are needed to complete the bacterium cycle. In Ohio and Kentucky, test trials have not produced satisfactory results. Additional experiments are needed to determine the lack of efficacy of milky disease in these soils.

### Option 2: Biological Control - Entomopathogenic Nematodes

Insect parasitic nematodes have recently become commercially available. Products that contain strains of *Steinernema carpocapsae* (Biosafe, Biovector, Exhibit, Scanmask) have been marginally effective against white grubs in turf. Preparations containing *Heterorhabditis* spp. seem to be more effective. Apply the nematodes when the white grubs are small. Irrigate before *and* after applying the nematodes.

### Option 3: Chemical Controls - Insecticides

The grubs are best controlled when they are small and actively feeding near the soil surface, usually late July to mid-August. However, with the development of new grub control chemistry (e.g., imidacloprid [Merit] and halofenozide [MACH2]), applications in June and July have sufficient residual activity to kill the new grub populations as they come to the soil surface in late July through August. Control of grubs in late-fall or early-spring is difficult, at best, because the grubs are large and may not be feeding. Only trichlorfon (Dylox) and carbaryl (Sevin) formulations are available for such rescue treatments. The key to good control is to make an even application and water thoroughly.

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