



# JAPANESE BEETLES

## *In the Urban Landscape*

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The Japanese beetle is probably the most devastating pest of urban landscape plants in the eastern United States. Japanese beetles were first found in this country in 1916, after being accidentally introduced into New Jersey. Until that time, this insect was known to occur only in Japan where it is not a major pest.

The eastern US provided a favorable climate, large areas of turf and pasture grass for developing grubs, hundreds of species of plants on which adults could feed, and no effective natural enemies. The beetle thrived under these conditions and has steadily expanded its geographic range north to Ontario and Michigan, west to the Mississippi River, and south to Georgia and Alabama.

The first Japanese beetles discovered in Kentucky were found on the southern outskirts of Louisville in 1937. Isolated infestations were treated with insecticides to delay spread of the beetle. During the 1950s and 1960s, beetle populations increased dramatically and spread in Kentucky and surrounding states. Today, the Japanese beetle infests most, if not all, of the counties in Kentucky.

### **Description and Habits**

Adult Japanese beetles are 7/16-inch long metallic green beetles with copper-brown wing covers. A row of white tufts (spots) of hair project from under the wing covers on each side of the body (*Figure 1*).

Adults emerge from the ground and begin feeding on plants in June. Activity is most intense over a 4 to 6 week period beginning in late June, after which the beetles gradually die off. Individual beetles live about 30 to 45 days.

Japanese beetles feed on about 300 species of plants, devouring leaves, flowers, and overripe or wounded fruit. They usually feed in groups, starting at the top of a plant and working downward. The beetles are most active on warm, sunny days, and prefer plants that are in direct sunlight. A single beetle does not eat much; it is group feeding by many beetles that results in severe damage.

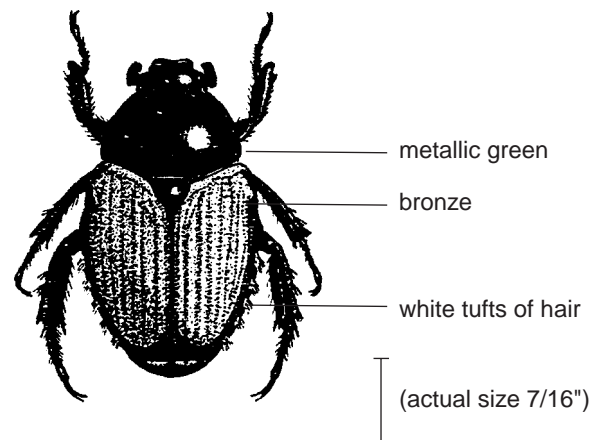
Adults feed on the upper surface of foliage, chewing out tissue between the veins. This gives the leaf a lacelike or

skeletonized appearance (*Figure 2*). Trees that have been severely injured appear to have been scorched by fire. Japanese beetles may completely consume rose petals and leaves with delicate veins. Odors emitted from beetle-damaged leaves seem to be an important factor in the aggregation of beetles on particular food plants.

Adult Japanese beetles are extremely mobile and can infest new areas from as far away as 5 miles. Usually, however, they make only short flights as they move about to feed or lay eggs.

### **Life Cycle**

Egg laying begins soon after the adults emerge from the ground and mate. Females leave plants in the afternoon, burrow 2 to 4 inches into the soil in a suitable area, and lay their eggs—a total of 40 to 60 during their life. The developing beetles spend the next 10 months in the soil as white grubs (*Figure 3*). The grubs grow quickly and by late August are almost full-sized (about 1 inch long). Grubs feed on the roots of turfgrasses and vegetable seedlings, doing best in good quality turf in home lawns, golf courses, parks, and cemeteries. However, they can survive in almost any soil in which plants can live.



*Figure 1. Adult Japanese beetle.*



Figure 2. Leaves damaged by Japanese beetles.

Mid-summer rainfall and adequate soil moisture are needed to keep eggs and newly-hatched grubs from drying out. During dry periods, females lay their eggs in low, poorly-drained areas. Older grubs are relatively drought resistant and will move deeper into the soil if conditions become very dry. Japanese beetle grubs also can withstand high soil moisture, so excessive rainfall or heavy watering of lawns does not bother them.

As Japanese beetle grubs chew off grass roots, they reduce the ability of grass to take up enough water to withstand the stresses of hot, dry weather. As a result, large dead patches develop in the grub-infested areas. The damaged sod is not well-anchored and can be rolled back like a carpet to expose the grubs. If the damage is allowed to develop to this stage, it may be too late to save the turf. Early recognition of the problem can prevent this destruction.

Japanese beetles overwinter in the grub stage. When the soil cools to about 60° F in the fall, the grubs begin to move deeper. Most pass the winter 2 to 6 inches below the surface, although some may go as deep as 8 to 10 inches. They become inactive when soil temperature falls to about 50° F.

When soil temperature climbs above 50° F in the spring, the grubs begin to move up into the root zone. Following a feeding period of 4-6 weeks, the grubs pupate in an earthen cell and remain there until emerging as adults.

### Control

From a management standpoint, it is important to recognize that both the adults and grubs can cause damage. Moreover, since Japanese beetle adults are capable of flying in from other areas, controlling one life stage will not preclude potential problems with the other. Options for protecting trees, shrubs, and flowers from adult Japanese beetles are presented below. Control of the grub stage requires properly timed applications of a soil insecticide to infested turf. Diagnosis and control of white grubs in turf is discussed in a companion publication, Kentucky Cooperative Extension Service ENT-10, "Controlling White Grubs."

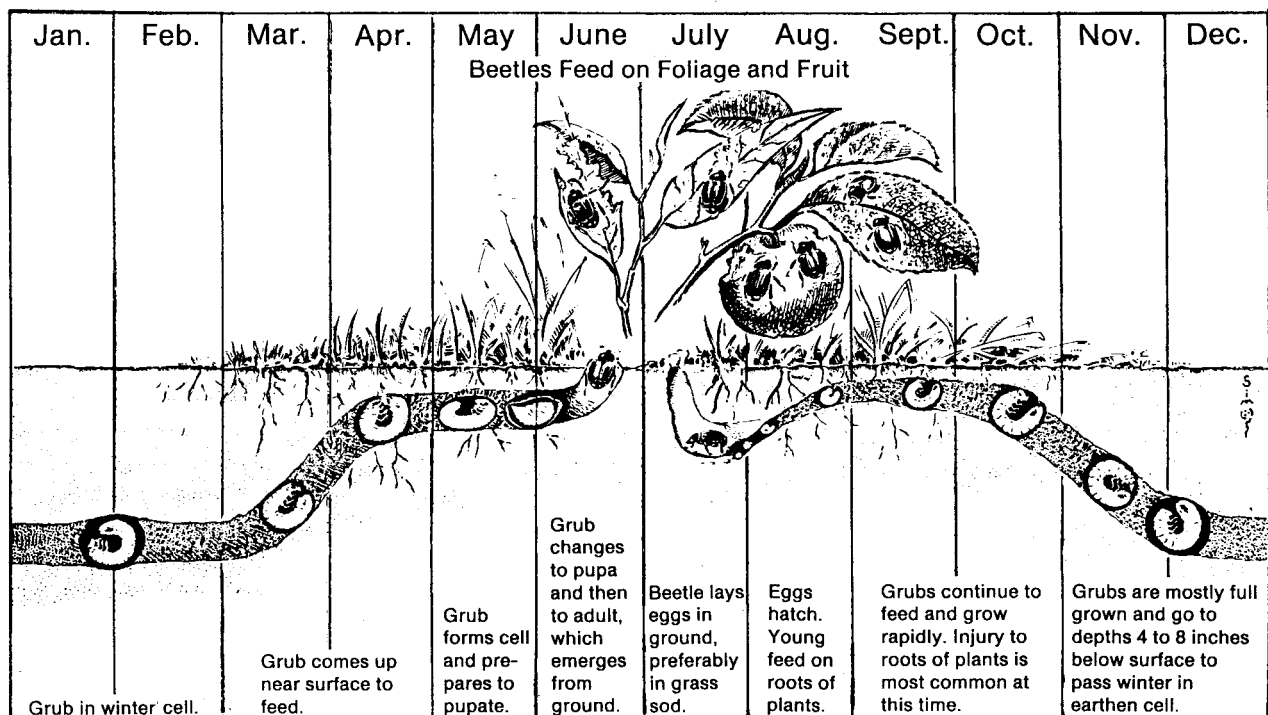


Figure 3. Seasonal life cycle of the Japanese beetle.

## Plant Selection

Careful selection of plant species when replacing or adding to your landscape is the key to avoiding annual battles with Japanese beetles. Some species and cultivars are highly preferred by the adults and should be avoided where the beetle is abundant. Plants that are especially prone to damage include roses, grapes, lindens, sassafras, “Crimson King” Norway maple, Japanese maple, purple-leaf plum, and others (*Table 1*). Many varieties of flowering crabapples are also severely attacked by the beetles, although some cultivars are resistant.

Fortunately, many common trees and shrubs are much less attractive to Japanese beetles (*Table 2*). These differences in susceptibility should be considered when selecting plant species and cultivars for use in Japanese beetle-infested areas.

Japanese beetles are also fond of certain weeds and non-cultivated plants such as bracken, elder, multiflora rose, Indian mallow, poison ivy, smartweed, and wild grape. Elimination of these plants whenever practical destroys these continuous sources of infestation.

Although plant selection is important, other approaches must obviously be used to protect susceptible plants that are already established in landscapes.

## Physical Removal and Exclusion

Removing beetles by hand may provide adequate protection for small plantings, especially when beetle numbers are low. The presence of beetles on a plant attracts more beetles. Thus, by not allowing beetles to accumulate, plants will be less attractive to other beetles.

One of the easiest ways to remove Japanese beetles from small plants is to shake them off early in the morning when the insects are sluggish. The beetles may be killed by shaking them into a bucket of soapy water. Highly valued plants such as roses can be protected by covering them with cheesecloth or other fine netting during the peak of beetle activity.

## Chemical Control

A number of insecticides are labeled for use against adult Japanese beetles (*Table 3*). Products containing Sevin<sup>®</sup> (carbaryl) are quite effective, and can be used by homeowners. Here are some helpful hints:

- Always follow label directions.
- Thoroughly treat foliage and flowers.
- Check to see if the application needs to be repeated at 7-10 day intervals to prevent reinfestation during the adult flight period, or after heavy rains.
- Use of a spreader/sticker in the spray mix can increase the duration of effectiveness.
- Avoid spraying under windy conditions or when honey bees are foraging.

Insecticidal soaps will control beetles that are hit by the spray, but they provide no residual protection. Botanical insecticides containing neem or pyrethrum are not very effective.

**Table 1. Landscape Plants Likely to be Attacked by Adult Japanese Beetles.**

Scientific name	Common name
<i>Acer palmatum</i>	Japanese maple
<i>Acer platanoides</i>	Norway maple
<i>Aesculus hippocastanum</i>	Horsechestnut
<i>Althaea rosea</i>	Hollyhock
<i>Betula populifolia</i>	Gray birch
<i>Castanea dentata</i>	American chestnut
<i>Hibiscus syriacus</i>	Rose-of-Sharon, Shrub Althea
<i>Juglans nigra</i>	Black walnut
<i>Malus</i> species	Flowering crabapple, <sup>1</sup> apple
<i>Platanus acerifolia</i>	London planetree
<i>Populus nigra italica</i>	Lombardy poplar
<i>Prunus</i> species	Cherry, black cherry, plum, peach, etc.
<i>Rosa</i> species	Roses
<i>Sassafras albidum</i>	Sassafras
<i>Sorbus americana</i>	American mountain ash
<i>Tilia americana</i>	American linden <sup>2</sup>
<i>Ulmus americana</i>	American elm
<i>Ulmus procera</i>	English elm
<i>Vitis</i> species	Grape

<sup>1</sup> *Some cultivars (e.g. Baccata v. jackii, Jewelberry, Harvest Gold, Louisa) are relatively resistant. See Kentucky Cooperative Extension Service publication ID-68, "The Flowering Crabapple," for more information.*

<sup>2</sup> *Tilia tomentosa 'Sterling' and Tilia americana 'Legend' are less susceptible than other lindens.*

**Table 2. Landscape Plants Seldom Damaged by Adult Japanese Beetles.**

Scientific name	Common name
<i>Acer negundo</i>	Boxelder*
<i>Acer rubrum</i>	Red maple
<i>Acer saccharinum</i>	Silver maple
<i>Buxus sempervirens</i>	Boxwood
<i>Carya ovata</i>	Shagbark hickory*
<i>Cornus florida</i>	Flowering dogwood
<i>Diospyros virginiana</i>	Persimmon*
<i>Euonymus</i> species	Euonymus (all species)
<i>Fraxinus americana</i>	White ash
<i>Fraxinus pennsylvanica</i>	Green ash
<i>Ilex</i> species	Holly (all species)
<i>Juglans cinerea</i>	Butternut*
<i>Liriodendron tulipifera</i>	Tuliptree
<i>Liquidamar styraciflua</i>	American sweetgum*
<i>Magnolia</i> species	Magnolia (all species)
<i>Morus rubra</i>	Red Mulberry
<i>Populus alba</i>	White poplar
<i>Pyrus communis</i>	Common pear*
<i>Quercus alba</i>	White oak*
<i>Quercus coccinea</i>	Scarlet oak*
<i>Quercus rubra</i>	Red oak*
<i>Quercus velutina</i>	Black oak*
<i>Sambucus canadensis</i>	American elder*
<i>Syringa vulgaris</i>	Common lilac

*Most evergreen ornamentals, including Abies (fir), Juniperus, Taxus, Thuja (arbor vitae), Rhododendron, Picea (spruce), Pinus (pine) and Tsuga (hemlock) are not attacked.*

*\*Species marked with an asterisk may suffer occasional light feeding.*

Be sure the insecticide is registered for use on the plant or crop you intend to spray. If it is a food crop, note the minimum number of days that must be observed between the date of the last application and the date of harvest.

Because the beetles are attracted to favored host plants from a considerable distance, controlling grubs in the lawn will not protect landscape plants from adult feeding. Sprays made from ground-up beetles, interplanting with supposedly repellent plants, and other home remedies have not been shown to be effective.

### Japanese Beetle Traps

Japanese beetle traps are sold in many garden centers. Commercially available traps attract the beetles with two types of baits. One mimics the scent of virgin female beetles

and is highly attractive to males. The other bait is a sweet-smelling food-type lure that attracts both sexes. This combination of ingredients is such a powerful attractant that traps can draw in thousands of beetles in a day.

Unfortunately, research conducted at the University of Kentucky showed that the traps attract many more beetles than are actually caught. Consequently, susceptible plants along the flight path of the beetles and in the vicinity of traps are likely to suffer much more damage than if no traps are used at all.

In most landscape situations, use of Japanese beetle traps probably will do more harm than good. If you experiment with traps, be sure to place them well away from gardens and landscape plants.

**Table 3. Insecticides Labeled for Control of Japanese Beetle Adults on Ornamentals.**

Common name	Brand name(s)	Amount to add to:	
		1 gal Water	100 gal Water
Acephate	Orthene 75 SP	4 tsp	1 1/4 lb
	Orthene 9.4% EC		6 1/4 qt
Bendiocarb	Dycarb 76% WP	1 1/4 Tbsp	3/4 - 1 1/4 lb
	Ficam 76% WP	1 tsp	3/4 lb
	Turcam 76% WP	1 tsp	3/4 lb
Carbaryl	Sevin SL	2 tsp	1 qt
	Sevin 50% WP	2 Tbsp	2 lb
	Sevimol	2 tsp	1 qt
	Sevin 5 D	(refer to label)	
	Sevin 10 D	(refer to label)	
Chlorpyrifos	Dursban Turf 4EC	1/6 - 1/3 fl oz	1 pt - 1 qt
	Pageant DF	1/6 - 1/3 oz	1 - 2 lb
Cyfluthrin	Decathlon 20 WP	0.02 oz	1.9 oz
	Tempo 20 WP	0.02 oz	1.9 oz
	Tempo 2 EC	0.01 oz	1 - 1 1/2 fl oz
Insecticidal soap (fatty acid salts)	M-Pede	(refer to label)	
Lambda-cyhalothrin	Scimitar WP	—	1.2 - 4.8 oz
Malathion	Malathion 57% EC	2 tsp	1.5 pt
	Cythion 8 EC	1 1/3 tsp	1 pt
Methoxychlor	Methoxychlor 50% WP	3 Tbsp	3 lb
	Methoxychlor 2 EC	4 - 6 tsp	2 - 3 qt
Rotenone + Pyrethrum		(refer to label)	
Bifenthrin	Talstar T&O	—	20 - 40 oz
	Talstar 10 WP	—	16 - 32 oz

*Formulations and use rates are listed as guidelines only. Consult label for detailed directions on mixing and proper application.*

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