UNIVERSITY OF KENTUCKY

COLLEGE OF AGRICULTURE ● DEPARTMENT OF ENTOMOLOGY

ENTFACT-409

JAPANESE BEETLES

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Description and Habits

Adult Japanese beetles are 3/8-inch long metallic green beetles with copper-brown wing covers. Five small white tufts project from under the wing covers on each side, and a sixth pair at the tip of the abdomen, distinguish them from similar beetles.

Adults emerge from the ground and begin feeding on plants in June. Individual beetles live about 30 to 45 days. Activity is concentrated over a four to six week period, beginning in July, after which the beetles gradually die.

Japanese beetles can feed on about 300 species of plants ranging from roses to poison ivy. Odor seems to be a very important factor in the selection of a suitable food plant.

They usually feed in groups, starting at the top of a plant and working downward, and prefer plants exposed to direct sunlight. A single beetle does not eat much; it is group feeding by many beetles that causes the severe damage. Adults feed on the upper surface of foliage, chewing out tissue between the veins. This gives the leaf a characteristic skeletonized appearance. They tend to do little feeding on thick, tough leaves. The spread of the Japanese beetle infestation is primarily the result of flight by the adults. They can fly as far as 5 miles but 1 to 2 miles is more likely. Usually, they make only short flights as they move about to feed. Local infestations spread as beetles move to favored food and suitable sites for egg laying.

Life Cycle

Egg laying begins soon after 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. Females lay 1 to 4 egg every 3 to 4 days for several weeks - a total of 40 to 60 during their life. The grub or larval stage hatches from the egg.

The Japanese beetle spends about 10 months of the year in the soil as a white grub. The grubs grow quickly and by late August are almost full-sized (about 1 inch long). Grubs feed on the roots of living plants, doing best in warm, slightly moist soil that has plenty of organic matter and tender grasses. However, they can survive in almost any soil in which plants can live.

Late summer rainfall is needed to keep eggs and newly-hatched grubs from drying out. During dry summers, females lay their eggs in low, poorly drained areas. The 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. Grubs usually move less than 30 inches in sod or turf; however, measurements have shown that grubs can move as much as 16 feet in fallow soil. Generally, they will not move far unless food becomes scarce or soil conditions become unfavorable.

As white 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 5 to 20 feet in diameter develop in the grub-invested areas. The sod on these dead patches 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 state, 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 and survival is good under Kentucky conditions. 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 though 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 again. Following a short feeding period, the grubs pupate in an earthen cell and remain there prior to emerging as adults.

Natural Controls

Animals

Many kinds of birds such as bobwhites, eastern kingbirds, crows, European starlings, redwinged

blackbirds, catbirds, songsparrows, robins and grackles eat Japanese beetles. European starlings, common grackles and crows eat large numbers of grubs in heavily infested areas. When grubs are close to the surface, flocks of starlings may be seen on lawns and pastures digging up grubs with their long, pointed bills. Crows frequently pull up small pieces of turf and scatter them over a lawn as they dig. Moles, shrews and skunks also feed on white grubs. These animals can damage lawns as they search for grubs.

Predaceous insects such as wheel bugs, robber flies and praying mantids occasionally feed on adult beetles. A few native wasps and flies also feed on beetle adults or grubs, but they appear to play only a minor part in beetle control. Several parasitic wasps, flies and beetles have been imported from the Orient in an attempt to control the beetle in the United States with only limited success.

Milky Spore Disease

Milky spore disease is a bacterial disease that kills Japanese beetle grubs. Spores of this bacterium are produced commercially and sold under the names of Doom,, Japidemic, and Milky Spore. The application of milky spore may reduce the numbers of Japanese beetle grubs in lawns but beetles will fly in from other areas to damage plants and crops. Research trials using this approach to reduce grub numbers in turf have given very erratic results.

The disease does not kill other types of grubs that damage turf. See ENT-10, Controlling White Grubs, for additional information.

Collecting Beetles

Hand collecting obviously is not the most effective method of control but can be used to protect valuable plants when beetle activity is relatively low. The presence of beetles on a plant attracts more beetles. When you remove beetles daily by hand from a plant, only about half as many are attracted to that plant compared to those on which beetles are allowed to accumulate. One of the easiest ways to remove beetles from small plants is to shake the plants early in the morning (about 7 a.m.) when temperatures are low and the beetles sluggish. The beetles may be killed by shaking them into a bucket of soapy water.

Trapping Beetles

In recent years commercial or homemade traps have become a popular means of trying to reduce beetle numbers. 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 food and sex is such a powerful and effective attractant that traps can draw in thousands of beetles in a day. Only a portion of the beetles attracted to traps are caught in them. Small number of traps in a home landscape can actually increase Japanese beetle problems rather than reduce them. Other control measures such as insecticide sprays and dusts may be needed to protect plants that are particularly attractive to the beetles.

Traps may be effective in reducing Japanese beetle problems of used throughout a neighborhood or in open areas well away from valuable plantings or vulnerable crops. In most home landscape situations, using 1 or 2 traps probably will do more harm than good.

Plant Selection

Careful selection of plant species when replacing or adding to your landscape is the key to avoiding an annual battle with Japanese beetles. Certain common landscape plants are inevitably attacked and may be poor choices where this insect is abundant (Table 1). Many common trees and shrubs are relatively less attractive to the beetles and using them can reduce the annual frustrations of the beetle season (Table 2).

Beetles are fond of certain weeds and non-economic plants such as bracken, elder, multiflora rose, Indian mallow, sassafras, poison ivy, smartweed, wild fox grape and wild summer grape. Elimination of these plants whenever practical destroys these continuous sources of infestation.

Table 1. Landscape plants nearly always severely attacked by adult Japanese beetles.

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

Table 2. Landscape plants relatively free of feeding by adult Japanese beetles.

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

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

*Unmarked species undergo little or no feeding. Species marked with an asterisk may suffer occasional light feeding.

Table 3. Insecticides to Control Japanese Beetle Adults on Trees, Shrubs, and Ornamental Plantings

Insecticide	_Amount to mix with__ l gal	l0 gal	
Cythion 57% EC (malathion)	1 tsp	1½ fl oz	Do not use on Boston fern, maidenhair fern, Crassula, violets, Saint paulia petunias, gloxinia, some red carnations or maple or hickory under stress. Highly toxic to bees.
Dymet (20/10) EC (methoxychor +diazinon)	6 tsp	½ pt	
Marlate 50% WP (methoxychlor) 25% EC	3 Tblsp 6 tsp	5 oz 9 fl oz	
Orthene 75S (acephate)	4 tsp	2 oz	Repeat applications at 2 wk intervals as necessary
Sevin 50% WP (carbaryl)	1½ Tblsp	3 oz	Mites and aphids sometimes become a problem after carbaryl sprays. Carbaryl is highly toxic to bees. Do not use on Boston ivy.
Tempo 20 WP (cyfluthrin)	1.9 oz/100 gal water		Commercial applicators only