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UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

# JAPANESE BEETLES

Lee Townsend, Extension Entomologist

**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**

Egglaying 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 Japanesebeetle 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**

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 males and females. This combination 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 if 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).

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

| Scientific name | Common name |
|---|---|
| *Acer palmatum* | Japanese Maple |
| *Acer plananoides* | Norway Maple |
| *Aesculus hippocastanum* | Horse chestnut |
| *Atlhaea rosea* | Hollyhock |
| *Betula populifolia* | Gray birch |
| *Castanea dentata* | American chestnut |
| *Nibiscus syriacus* | Rose-of-Sharon, 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* | Table Grapes |

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).

**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* | Euomymus (all species) |
| *Fraxinus americana* | White ash |
| *Fraxinus Pensylvanica* | Green ash |
| *Ilex species* | Holly (all species) |
| *Juglans cinerea y* | Butternut* |
| *Lirodendron 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* | Rhododendron |
| *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. | |

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.

**Chemical Control**

The insecticides in Table 3 may be used to control Japanese beetles along with those listed in other publications (e.g., orchard spray schedules, vegetable garden recommendations). Repeated applications may be necessary because of the relatively short residual effect of the products. Also, a significant rainfall shortly after an application may reduce the insecticide deposit below effective levels.

| Table 3. Insecticides to Control Japanese Beetle Adults on Trees, Shrubs, and Ornamental Plantings | | | |
|---|---|---|---|
| **Insecticide** | **Amount to Mix with 1 Gallon Water** | **Amount to Mix with 10 Gallons Water** | **Comments** |
| Cythion 57% EC (malathion) | 1 teaspoon | 1-1/2 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 (methoxyclor + diazinon) | 6 teaspoon | 1/2 pint | none |
| Marlate 50% WP (methoxychlor) | 3 tablespoons | 5 fl oz | none |
| Marlate 25% WP (methoxychlor) | 6 tablespoons | 9 fl oz | none |
| Orthene 75 S (acephate) | 4 teaspoons | 2 fl oz | Repeat applications of two week intervals as necessary |
| Sevin 50% WP | 1-1/2 tablespoons | 3 fl 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 fl oz/100 gal water | | COMMERCIAL APPLICATORS ONLY. |

Plants which grow rapidly and are especially attractive to the beetles are most difficult to protect. Roses unfold quickly and are especially attractive to beetles. When beetles are abundant, nip buds and spray to protect the leaves or cover the roses with netting to keep beetles out.

Be sure the insecticide you use is registered for use on the crop you spray, especially if it is a food crop. Observe waiting days from last application to harvest.

**Honey Bee Protection**

The following practices will help to reduce dangers to honey bees when using insecticides against Japanese beetles and other insect pests.

1. Use insecticides only when needed and at the recommended rates.

2. If possible, select an insecticide that is least hazardous to bees. Of those in Table 1, methoxychlor is the least harmful.

3. Use the least hazardous method of application. Sprays drift less than dusts and are less likely to kill bees in nearby areas. Once dry, spray deposits are less harmful than dust formulations.

4. Do not treat when honey bees are active on the crop. Applications in the late afternoon are least likely to damage bees.

5. Avoid treating blooming plants.