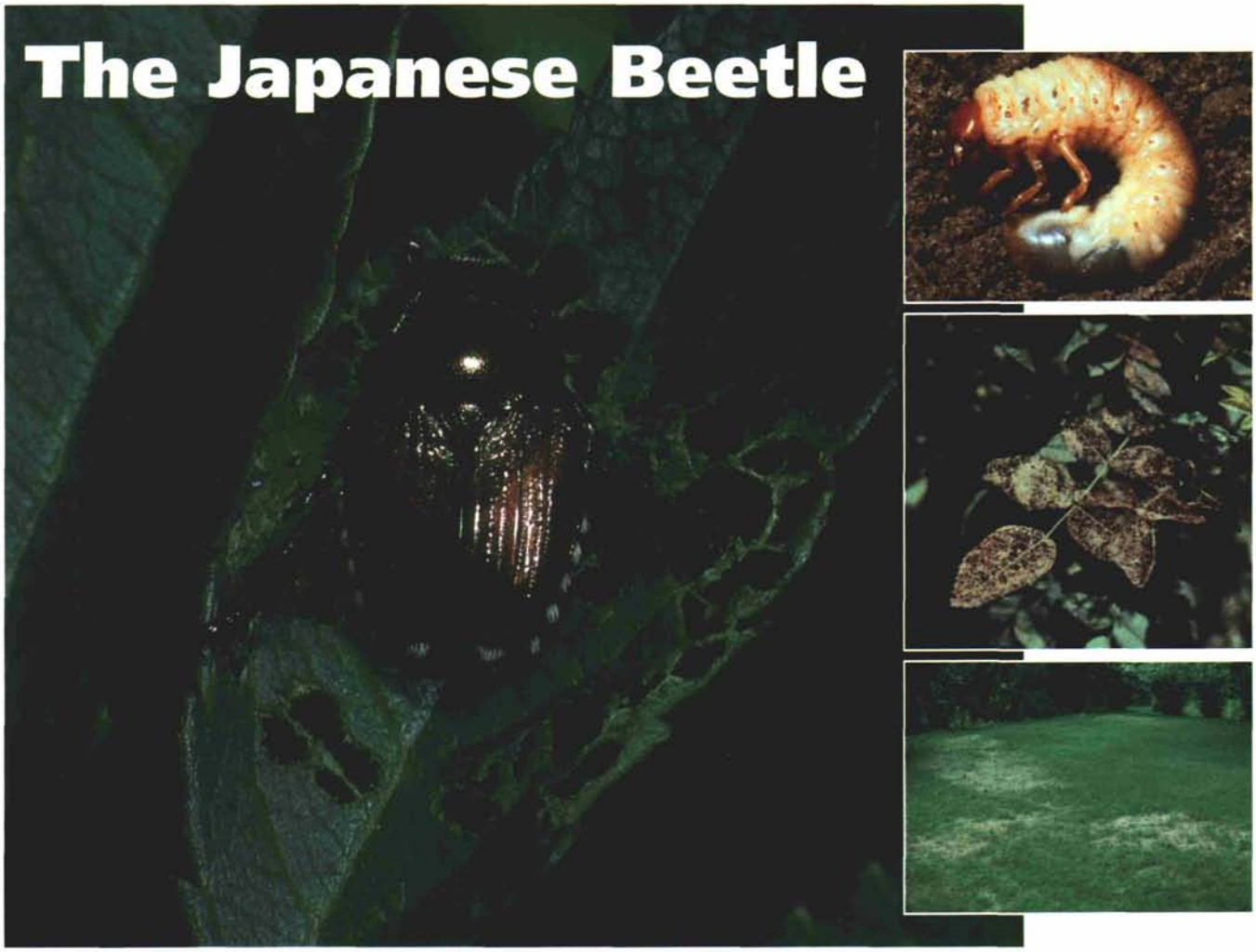
The Japanese Beetle



The Japanese beetle and larvae, commonly known as a grub, display some of the damage it can cause.

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Since its first arrival into the United States in 1916 near Riverton, New Jersey, the Japanese beetle has spread throughout the eastern United States and is now commonly found as far west as Iowa, Wisconsin, Missouri, Illinois, and Indiana. The beetle has even been found in northern and southern California.

The spread of the beetle has been dramatic in spite of quarantines established as early as 1920. In 1916, approximately one-half of a square mile comprised the known area of infestation. Ten years later, the infested area had grown to 3,850 square miles; and by 1952, Japanese beetles were estimated to have infested over 76,000 square miles of the United States. Attempts at eradicating the beetles from areas east of the Mississippi have been unsuccessful. Eradication efforts in California have met with some success probably due to the help of unfavorable arid climate.

Feeding Habits

The Japanese beetle, native to Japan, causes extensive damage to nearly 300 different species of plants. About 47 species are highly preferred and are extensively damaged, including woody plants such as maples, birch, roses, crabapples, willows, lindens, elms, and grapes. Plants of the *Rosaceae* (rose) family are highly susceptible to feeding by the beetle. More than 75 other plant families have some degree of feeding preference.

Due to its wide host range, the beetle is a major pest of golf courses, parks, home landscapes, corporate parks, nurseries, and forest preserves.

Pest Identification and Plant Damage

The adult beetle is a brilliant metallic green with coppery brown wing covers that do not

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entirely cover the abdomen. On each side of the abdomen is a row of five lateral brushes of white hairs and a pair of these brushes on the dorsal surface of the last segment of the abdomen. Adult beetles vary in length from one-fourth to one-half inch and one-eighth to one-fourth inch in width. The female of the species is usually larger than the male.

Adult beetles feed on the upper leaf surface eating all of the leaf tissue except the veins (skeletonization). Defoliated leaves turn brown and may drop from the plant. Excessive feeding by the beetle can result in a lack of plant growth and vigor, stress, loss of aesthetic value, and potential invasion by secondary organisms such as wood-boring insects and plant pathogens. Adults may also feed on the fleshy tissues of fruit and chew their way into buds.

Larvae, otherwise known as "grubs," are particularly destructive to turfgrass found on golf courses and lawns. The grubs have a characteristic C-shape, creamy white with a dark brown head. Young larvae are about one-sixteenth inch long but reach a length of one inch when mature. Japanese beetle grubs have a V-shaped arrangement of hairs (raster pattern) on the tail end of their bodies which makes for easy positive identification. Kentucky bluegrass is the favored host of the grub, but it may also feed on other grasses, roots and underground stems.

Life Cycle of the Japanese Beetle

The Japanese beetle has an annual life cycle similar to other grub species. After overwintering in the soil as a partially grown grub, pupation occurs in the spring with adult emergence from June through August depending on local climatic conditions. Upon emerging, the adults seek out host plants for feeding and mating. Beetles tend to feed in groups at the top of the plant and then work their way downward. Plants in full sunlight are preferred. In late afternoon, they return to the soil for the night. Their activity is greatly reduced on cold, wet days. The female lays her eggs two to four inches deep in the soil. Upon egg hatch, the young grubs feed until cold weather and then overwinter. The following spring, they mature and eventually develop into an adult. Irrigated areas and poorly drained sites with loose soil are prime egg-laying sites. Soil moisture and lack of or presence of snow cover can greatly affect grub survival.

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Japanese Beetle Pest Management

Considerable effort has been expended in finding reliable control measures for adult Japanese beetles. Unfortunately, none of these efforts have been totally effective.

Plant Selection

One way to avoid Japanese beetle problems is to select plants that the beetles will not feed on. Examples of plants that are less susceptible include white and green ash, holly (all species), tuliptree, magnolia, white and red oak, rhododendron, common lilac, junipers, arborvitae, hemlock, and flowering dogwood, just to mention a few.

Chemical Insecticides

As for chemical control, only a few organophosphate (i.e., malathion) and carbarmate (Sevin) insecticides have shown to be effective against adult beetles. Usually, weekly applications may be necessary due to the short residuals of these materials. Highly preferred, rapidly growing plants will be hard to protect. Protecting these plants with netting during peak feeding activity may be helpful. Even though local grub populations may be controlled, the adult beetles are capable of flying several miles resulting in beetles flying in from adjacent areas.

Chemical control of the grub stage is usually quite effective. Soil insecticides should be applied in early to mid August (Illinois) or when grub densities exceed 10 to 12 grubs per square foot. In order to insure effective control, thoroughly drench the material into the root zone and thatch layers. Usually one application is sufficient.

Trapping of Adults

The use of traps to protect susceptible plants has been shown to only be marginally effective at best. Unless the traps can be placed considerable distances away from the vulnerable plant, more damage may occur than if nothing was done. In most home landscapes, using traps will probably be more harmful than beneficial.

Future of the Japanese Beetle

The Japanese beetle is here to stay and will probably continue to spread into suitable areas. Current estimates state that initial infestations spread at a rate of 10 to 15 miles per year. However, with the extensive movement of plant material throughout the country, the rate of spread may be greatly increased. Climatic factors such as temperature and moisture will also play a role in the spread of infestations. The beetle is adapted to regions where the mean summer soil temperature is between 64°F and 82°F and winter soil temperature is above 15°F.

Summer precipitation levels of at least ten inches are critical for egg hatch and larval development. Because of these factors, northern limits of the beetle appear to be elevated areas of the northeastern U.S., extreme northern Michigan, and west of the Great Lakes to the Missouri River. Semiarid regions of the western U.S. will be spared as well as areas of the Gulf Coast and Florida.

Managers should always carefully inspect incoming shipments of plant material, particularly those coming from known Japanese beetle infestation areas. Beetles can be hand-picked or sprayed with an insecticide before the plants are shipped to other areas to avoid infesting existing inventories.

Remember! Prevention and exclusion are key. Once an infestation is present, eradication can very difficult to obtain. ■