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European Chafer

The European chafer, *Rhizotrogus majalis* (Razoumowsky), is a beetle native to eastern and western Europe where it is a serious insect pest of turfgrass. It was discovered in the United States near Rochester, New York in 1940 at a plant nursery. The European chafer inhabits Connecticut, Delaware, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and southern Ontario. It has also been reported in Midwestern states including Ohio and the lower peninsula of Michigan. The first report of European chafer in Wisconsin was in Door County in 2016.

Plants attacked and damage caused

European chafer grubs (larvae) feed on the roots of cool-season turfgrasses and various grassy and broadleaf weed species which damages plant roots and causes turf decline and loss. Feeding grubs cause thinning, wilting, and irregular patches of turf that can easily be pulled back or rolled up from the soil. Severe grub damage can completely kill turf, resulting in bare patches of soil. Drought conditions can contribute to severe damage, as water-stressed plants cannot adequately recover. Turf damage can be accentuated by skunks or other animals digging to feed on the grubs.

Identification

Adults

European chafer adults are approximately ½ inch long. Both males and females are tan to light brown in color. European chafer adults are often mistaken for male May/June beetles (*Phyllophaga anxia*), however, May/June beetles tend to be darker in color with considerably larger females.

Larvae

European chafer larvae are typical C-shaped white grubs that are approximately one inch long and ¼ inch wide. They can be differentiated from other white grub species by their raster pattern (the arrangement of hairs located near the tip of the abdomen). Unlike other grub species,



Fall feeding damage accentuated by an animal scavenging for grubs

EUROPEAN CHAFER

they have two distinct, nearly parallel rows of dark, coarse hair that diverge outward at the tip of the abdomen, similar to a slightly open zipper. The raster pattern, in combination with a Y-shaped anal slit, distinguishes European chafer larvae from other turfgrass-infesting white grub species.

Life cycle

The European chafer typically completes its development in one year. Adults emerge from the soil from mid-June through early July. Adults fly a few hours before and after sunset when temperatures are above 65°F; peak adult activity occurs for 2 to 3 weeks. Female adults lay their eggs in the soil 2 to 4 inches below the turf. After 10 to 14 days, eggs hatch and grubs emerge to immediately begin feeding on turfgrass roots (around mid-July in Wisconsin).

Grubs feed from July until the soil freezes (typically in early November in Wisconsin) and overwinter in frozen soil. Surviving grubs return to the root zone to feed as soon as soil temperatures surpass 50°F for several weeks (typically late March through early May in Wisconsin). In late May, most grubs descend 2 to 10 inches down the soil profile to pupate (transform into an adult). After 10 to 14 days, European chafer adult beetles emerge from the turf, around mid-June.

Much like other white grub species, the European chafer has three larval stages (instars), and they grow and develop by a physiological process called molting. Grubs typically reach the second instar by early September and the third (and final) instar by early October. First instar grubs are approximately $\frac{3}{8}$ inch when elongated, or about the size of a #2 pencil eraser when in the C-shape position. Second instar larvae are nearly $\frac{3}{4}$ inch when elongated, or about the size of a dime when in the C-shape position. Third instar larvae are roughly one inch when elongated, or about the size of nickel when in the C-shape position.

Control

Current thresholds estimate that 5 to 10 European chafer grubs per one square foot of low maintenance turf is the point at which damage is noticeable and treatment may be necessary. This threshold is higher (15 to 20 grubs per square foot) in irrigated turf as watering helps the turf to recover from grub damage.

Chemical control

Currently, the optimal way to manage European chafer grubs is to apply a preventive insecticide prior to or near egg hatch (May to late July). Preventive insecticides include products that contain one of the following active ingredients: chlorantraniliprole, clothianidin, dinotefuran, imidacloprid, or thiamethoxam. While nearly all of these preventive insecticides are effective against newly emerged, young grubs, they do not work well on older, larger (second and third instar) grubs; clothianidin is the one exception. Products containing carbaryl, clothianidin, or trichlorfon can be used as a corrective or curative management approach. These products are most effective in August when the grubs are relatively young, since the effectiveness of these products tends to decline when they are applied to larger, older grubs in September, October, early November, or the following spring.



Following up with a corrective or curative product after using a preventive insecticide is often necessary for complete control. Both spray and granular (spreadable) formulations of preventive and curative insecticides are available. Regardless of the active ingredient or product formulation, all products must be watered-in with a sufficient amount of post-treatment irrigation or rainfall (at least ½ inch) to move the insecticide through the turf thatch and into the soil where the grubs are located. Granular formulations are often more appealing and practical for homeowners and lawn care operators, as they tend to be more stable in the turf environment until a sufficient rainfall event occurs. However, any insecticide treatment should be watered-in as soon as possible. Unlike most other white grub species (e.g., the Japanese beetle), European chafer grubs are overall less susceptible to insecticides. Treatments directed at controlling the adult beetle or applied while it is a pupa are not effective.

Biological control

Natural control (predators, pathogens, and parasites) of European chafer in Europe is excellent, however it is quite poor in the United States. There are several biological control agents including two species of wasps and four species of flies have been released in the United States with little success controlling European chafer. There are a few native natural enemies that have been reported in the United States, including two species of ground beetles that feed on eggs and grubs, a protozoan pathogen, and a rickettsia pathogen. So far these species have not been shown to have any impact on European chafer control.

Competing species

Where European chafer occurs, it is typically more damaging to turf than other common white grub species such as the Japanese beetle. European chafer grubs are slightly larger than Japanese beetle grubs; as a result they eat more and can be more destructive than equal numbers of Japanese beetle larvae. Additionally, European chafer grubs feed later into the fall and resume feeding earlier in the spring than Japanese beetle grubs. Unlike the Japanese beetle, however, European chafer grubs are often not a problem in irrigated turf, but they are most common on non-irrigated turf. Adult European chafer beetles emerge about two weeks before Japanese beetle adults emerge. European chafer adults will occasionally feed on tree leaves, but they rarely cause measurable damage, unlike adult Japanese beetles which can be quite destructive.



Adult European chafer (left) next to Japanese beetle adult



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