

Turf Tips

For the Homeowner

European Chafer

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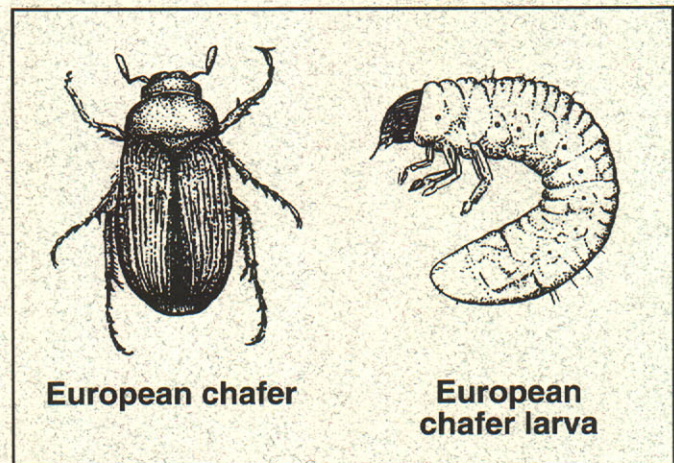
O **origin and Distribution:** The European chafer, *Rhizotrogus majalis*, is native to western and central Europe. It was discovered in the United States in 1940, when a grub was found in a nursery-growing area of Newark, New Jersey. At this time it has been reported from New York, New Jersey, Connecticut, Pennsylvania, Massachusetts, Rhode Island, Ohio, Michigan, Delaware and southern Ontario. In Michigan, the European chafer is most abundant in and around Detroit, Grand Rapids and Jackson.

Pest status: The European chafer may be the most serious grub pest of home lawns and low-maintenance turf. Although not as widespread as Japanese beetle, the European chafer grub is more damaging to turf in areas where both are found. The European chafer grub is slightly larger than the Japanese beetle grub. It feeds later into the fall and starts feeding again earlier in the spring.

Injury: European chafer grubs feed most heavily on grass roots from August to November and from April to June. Even during the winter months, grubs may resume feeding during warm spells. Turf damage caused by grub-feeding injury to roots is most severe under drought conditions when water-stressed grass plants cannot grow new roots to replace injured ones. In heavily infested areas, entire lawns may turn brown and die during prolonged periods of dry weather in the fall or spring.

Life History: European chafer adults are 1/2 inch long. Males and females are a uniform tan or light brown color. Larvae are typical C-shaped white grubs, reaching a maximum size of 1/4 inch wide and 1 inch long.

The European chafer has a one-year life cycle. A small proportion of the population (<1%) may require two years to complete development. Adult beetles emerge from the



European chafer

European chafer larva

soil between the middle of June and early July in Michigan and New York. Emergence may be three weeks earlier in Ohio, Pennsylvania and New Jersey. They fly on warm (>65 F) evenings for several hours after sunset. Adult activity peaks within two to three weeks of first emergence. Eggs are deposited two to four inches below the soil surface. First instar (or larval stage) grubs emerge from eggs in early August, and molt to second larval stage instars by the middle of August. By September 1, nearly all grubs are second instars (1/2 inch long), and by October 1 most grubs are third instars (3/4- to 1 inch long). They continue feeding on turf roots into November until the soil surface freezes. Overwintering grubs remain just below frozen soil.

An average of 24 percent of the grubs do not survive the winter. Those who survive return to the surface as soon as the ground thaws, feeding on grass roots again in late winter and spring. By June 1 almost all of the grubs move down a depth of two to ten inches to pupate. They remain as pupae for about two weeks before emerging as adults. Wet soil during pupation may cause high mortality.

Natural control of European chafer by predators, parasites and pathogens is excellent in Europe but poor in the United States. Several parasites, including four species of flies and two wasp species, have been released with little success. Natural enemies reported in the United States include two species of ground beetles that feed on grubs and eggs; a protozoan, the milky spore bacterium (*Bacillus popillae*); and rickettsia.

Management: Damage thresholds have been estimated at 5 to 10 grubs per square foot for low maintenance turf and 15 to 20 per square foot for daily irrigated turf. Frequent irrigation may be more effective than insecticides for preventing damage caused by grub injury. Insecticides are most effective when applied in August or early September, when grubs are less than 1/2 inch long. Liquid insecticide sprays should be followed immediately with 1/2 inch of irrigation to move the insecticide into the thatch and root zone. Granular formulations are more practical for low maintenance turf. European chafer grubs may not be as susceptible to insecticides as Japanese beetle grubs. In tests with both species, chlorpyrifos, isofenfos, and dycarb were more toxic to Japanese beetle than to European chafer. The reverse was true for diazinon.

Two pathogens, *Bacillus popillae* and *Steinernema carpocapsae*, have been developed into microbial control products with limited success so far. *B. popillae*, the bacterium that causes milky spore disease of some white grubs, will infect European chafer grubs in laboratory tests. In New York state, 7 to 22 percent of the grubs at two study sites were infected with *B. popillae* in field tests. At the time of this writing, the only nematode products available for control of grubs are made from cultures of *Steinernema carpocapsae* and *Steinernema glaseri*. Unfortunately, *S. carpocapsae* does not infect European chafer grubs as readily as *Steinernema glaseri*. Both nematodes are more effective in moist, sandy soil and less effective in dry, organic soil.



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