
European Chafer

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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.

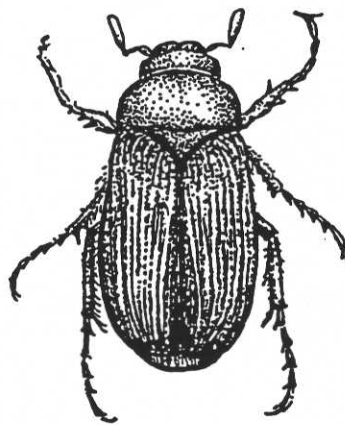
Life History: European chafer adults are 1/2 inch long (Figure 1). Males and females are a uniform tan or light brown color. Larvae are typical C-shaped white grubs, reaching a maximum size of 6 mm wide and 23 mm long (Figure 2). The European chafer has a one-year life cycle. A small proportion of the population (< 1%) may require two years to complete development. Adult beetles emerge from the 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 grubs emerge from eggs in early August, molt and become second instars by the middle of August. By the first of September nearly all grubs are second instars (1/2 inch long), and by the 1st of October 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 the first of June 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 Turcam were more toxic to Japanese beetle than to European chafer. The reverse was true for diazinon.

Two pathogens, *Bacillus popilliae* and *Steinernema carpocapsae*, have been developed into microbial control products with limited success so far. *B. popilliae*, the bacterium that causes milky spore disease of some white grubs, will infect European chafer grubs in laboratory tests. In New York state, 7-22 percent of the grubs at two study sites were infected with *B. popilliae* 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*. Unfortunately, *S. carpocapsae* does not infect European chafer grubs as readily as nematodes such as *Heterorhabditis heliothidis* or *Steinernema glaseri*.



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Table 13. Insecticide Recommendations. From Michigan State University Extension Bulletin E2178.

Insect	Insecticide	Amount per		Signal word	Timing and remarks
		1,000 sq ft	acre		
Annual grubs (European chafer, Japanese beetle)	Crusade 5G	1.8 lb	80.0 lb	Warning	Apply insecticide if enough grubs are present to cause damage (>20 per sq ft for high maintenance turf, and > 10 per sq ft for low maintenance turf). Apply insecticide in 4 gal water per 1,000 sq ft. Use 1/2 inch of irrigation to soak insecticide into soil.
	Diazinon 4E/AG500*	4.0 oz	5.5 qt	Warning	
	Dylox 80 SP	3.7 oz	10.2 lb	Danger	
	Dylox 6.2 G	3.0 lb	131.0 lb	Caution	
	Mainstay 2G	4.6 lb	200.0 lb	Caution	
	Mocap 10G**	1.15 lb	50.0 lb	Warning	
	Oftanol 5G	0.9 lb	40.0 lb	Caution	
	Oftanol 2I	3.0 oz	4.0 qt	Warning	
	Oftanol 1.5G	3.0 lb	131.0 lb	Caution	
	Proxol 80 SP	3.7 oz	10.2 lb	Danger	
	Sevimol	6.0 oz	8.0 qt	Caution	
	Sevin SL	6.0 oz	8.0 qt	Caution	
	Sevin 80 WSP	4.0 oz	10.9 lb	Caution	
	Sevin 6.3G	3.0 lb	131.0 lb	Caution	
	Triumph 4E***	1.5 oz	2.0 qt	Warning	
	Turcam 76 WP	1.25 oz	3.4 lb	Warning	
	Turcam 2.5 G	2.4 lb	105.0 lb	Warning	

* Do not use diazinon on golf courses or sod farms.

** Do not exceed 100 lb/acre of Mocap to turfgrass cut to a height of less than .375 inches. Bentgrass and ryegrass are more susceptible to injury. Do not apply within the dripline of Chinese elm as it has shown sensitivity.

*** Do not use Triumph on golf course fairways.

New Product: Merit 75 WP 0.4 (6.4 oz) per acre. For lawn care, golf course and other turf maintenance professionals. Merit should be applied between May 1 and August 15 for control of European chafer and Japanese beetle grubs. Merit will also control Ataenius, Aphodius, and Bluegrass billbug larvae if applied during the egg-laying period.