LT 2

Management of European Chafer

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Scientific classification: Rhizotrogus majalis (Razoumowsky), Coleoptera (Scarabaeidae).

Origin and Distribution: The European chafer 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 York. At this time it has been reported from New York, New Jersey, Connecticut, Pennsylvania, Massachusetts, Rhode Island, Ohio, Michigan, Delaware, and southern Ontario.

Description: European chafer adults are 13-15 mm long. Males and females are a uniform fawn-brown color. The last abdominal segment protrudes beyond the hardened forewing. The antennae are club shaped and the club of males is twice as long as that of females. Larvae are typical C-shaped white grubs, reaching a maximum size of 6 mm wide and 23 mm long. They can be distinguished from other Scarabaeidae larvae by a Y-shaped anal slit, and a raster with two parallel rows of hairs that diverge gradually toward the posterior.

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 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. However, 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: 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 sometime between the middle of June and early July in Michigan. 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 2-4 inches below the soil surface. First instar grubs emerge from eggs in early August,

molting to second instar by the middle of August. By the first of September nearly all grubs are second instars (1/2 inch long), and by the first of October most grubs are third instars (3/4-1" long). They continue feeding on turf roots into November until the soil surface freezes. Overwintering third instars remain just below frozen soil. An average of 24% of the grubs do not survive the winter. They return to the surface as soon as the ground thaws and feed on grass roots again in late winter and spring. By the first of June almost all of the grubs move down to a depth of 2-10 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 have been released with little success; four species of flies (Tachinidae) and two wasp species (Tiphia femorata and T. morio). Natural enemies reported in the United States include two species of ground beetles (Carabidae) that feed on grubs and eggs, a protozoan (Adelina sp.), the milky spore bacterium (Bacillus popillae), and a rickettsia (Rickettsiella popillae).

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, 7-22% of the grubs at two study sites were infected with B. popillae. In Connecticut, however, not one European chafer grub was found to be infected, when in the same locations, 10% of all Japanese beetle grubs were infected with B. popillae. 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 Heterorhabditis heliothidis or Steinernema glaseri.