White Grub Pests on Turfgrass

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White grubs are the larvae of Scarab beetles. More than a dozen different species may damage turf in the Southeast. All are C-shaped, white to dirty white in color, with brownish head and legs and usually with a darker grey area at the tip of the abdomen. The adults are medium-sized beetles that feed on a variety of trees and shrubs. Some of them, such as Japanese beetles and Green June beetles, are serious pests of ornamentals and certain fruits including figs, peaches and grapes.

While the adults may be pests in their own right, it is the grubs that damage turfgrasses. Most grubs feed primarily or exclusively on grass roots, cutting the plants off from water and nutrients. Typical symptoms of white grub damage are yellowing or browning of the leaves, signs of drought stress even when moisture conditions are good and turf that is loose enough to pull easily from the soil. With heavy infestations, the ground becomes spongy to the step. Additional damage occurs when predators like moles, birds, skunks, raccoons, or armadillos root up the turf hunting for the grubs.

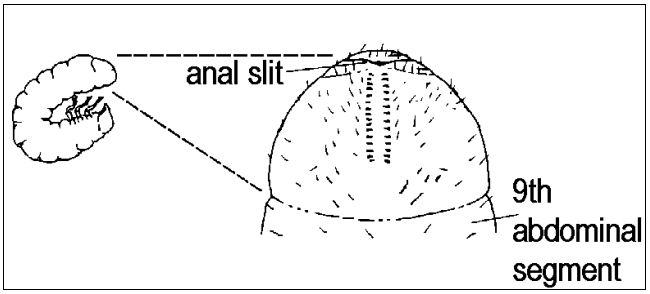

Figure 1. **Location of raster on grubs.**

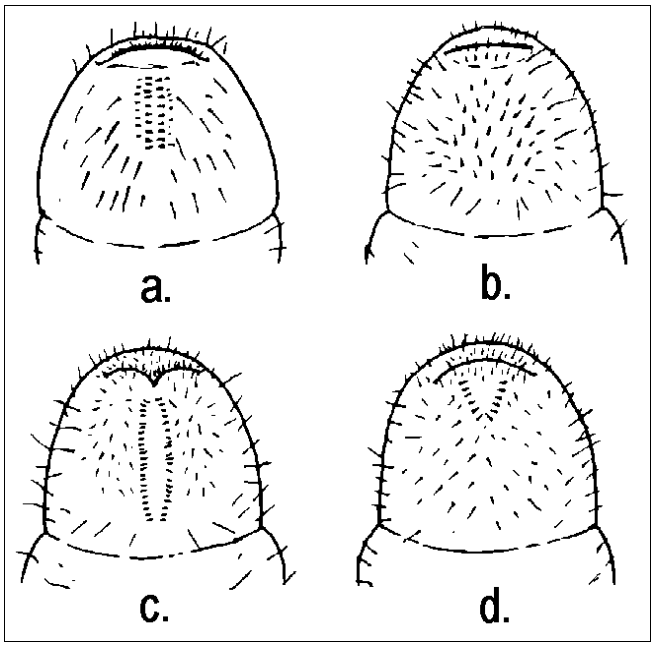

Figure 2. **Spines on rasters used for identification: a. Green June beetle; b. Northern-Southern masked chafer; c. May or June beetle; d. Japanese beetle.**

Because most white grubs never come to the soil surface until they emerge as adults, the usual methods of sampling for turf pests, such as soap flushes, will not work. The only way to find grubs is to dig them up. To minimize turf damage, use a shovel to cut three sides of a 1 foot square and roll the sod back like a carpet. If the soil is dry, irrigate thoroughly the day before you plan to examine the soil to move the grubs back near the surface. The grubs can be collected by sifting through the top 2 inches of soil once the sod is pulled back.

Effective control of white grubs requires some knowledge of the life cycle of the particular species or group involved. The first hurdle is identifying the insect. This often requires a magnifying glass or hand lens and a willingness to get close to the grub.

WHITE GRUB KEY

1.	Grub with legs small relative to body size; crawls on its back with legs in the air; spines on raster forming several parallel rows (Fig 2a)	Green June Beetle
	Legs larger; crawls with legs on the ground	2
2.	Spines on raster scattered randomly (Fig 2b)	. . . . . .Chafers
	Spines on raster forming two distinct rows	 3
3	Spines on raster forming two parallel rows (Fig 2c)	May or June Beetles
	Spines on raster forming two convergent rows (Fig 2d)	Japanese Beetle

(Squeamish individuals can call on their county agents for assistance.) The pattern of spines on the raster, located on the underside of the tip of the abdomen, is used to identify individual species and groups. The illustrations provided will help sort this out. The White Grub Key identifies the major pest grubs found in Georgia. Contact your county extension agent for specific insecticide recommendations.

Green June Beetles

The Green June Beetle (GJB) is one of our most widespread Scarabs and is found throughout Georgia. Adults are very colorful, and their day-flying habits make them familiar insects. They are a velvet green color on top, with yellow-orange edges. The underside is shiny metallic bronze and green. They are often seen flying low over turf areas or congregating around fruit trees from mid-June through August.

Biology

The GJB has one generation per year. It spends the winter deep in the soil as a large grub. Grubs resume feeding in the spring, then pupate in cells in the ground in May and June. About three weeks after pupation, adults emerge. Eggs are laid in the soil during July and August and hatch in 10 to 15 days. Grubs feed actively during late summer and fall and may be active in warm periods throughout the winter.

GJB grubs are unusual among Georgia pest species in that their primary food is dead and decaying plant material, not live grass roots. The damage they inflict upon turfgrass is mechanical. They loosen the soil and damage roots as they tunnel and leave mounds of dirt on the surface when they emerge at night to feed. The grubs spend the daytime resting in vertical tunnels in the soil. These tunnels average 6-12 inches deep, but in sandy soils they may be more than 3 1/2 feet deep.

Identification

Green June Beetle grubs are easily distinguished from other white grub species by the size of their legs, which are very small for the size of the grub. The back of the thorax has three dis-tinct ridges per segment, covered with short stiff hairs. These ridges are used for crawling, and this is a great identification characteristic — only the GJB grub crawls on its back, with its legs up in the air.

Sampling and Control

Sample for GJB grubs as you would for other white grubs, by cutting three sides of a 1 foot square and laying the sod back. Because GJB grubs spend the days resting in burrows rather than feeding, you'll have to examine the top 4 inches of soil to get an accurate idea of your population. If an average of six to eight grubs per square foot is found, an insecticidal treatment will probably be needed.

While white grubs in general are among the most difficult turf pests to control, the GJB is one of the easiest. Because these grubs come to the surface at night, they come in contact with pesticides more readily than other species. Some widely available insecticides are very effective against GJB but generally provide poor control of species that remain below the surface.

Chafers

Although there are probably four or five species of chafers (genus *Cyclocephala*) in Georgia, the most important pests are the Northern Masked Chafer (NMC) and Southern Masked Chafer (SMC). Both are found throughout the state, although the SMC is generally more common. They are strongly attracted to lights and sometimes appear in great numbers at store fronts, porch lights and swimming pools.

Biology

All of our chafers have one-year life cycles, with adults emerging in early summer. The adults are quite active night fliers, but they do not feed and are not pests themselves. They return to the turf in the daytime to lay eggs. These eggs hatch in two to three weeks. Grubs feed on a mixture of plant roots and organic matter in the soil. They grow quickly, reaching full size by late August. Damage to turf is heaviest in September and October. Grubs overwinter deep in the soil, returning to the surface in the spring to feed for several weeks before pupating a few inches deep in the soil.

Identification

Georgia chafer grubs can be identified by size and by the pattern of spines on the raster. Full-grown grubs are about an inch long; the spines on the raster are scattered randomly, with no distinct rows formed.

Sampling and Control

Except for dry or cold periods, chafer grubs spend most of their time in the root zone, near the soil surface. Irrigate before sampling (or go out after a rain) and then cut three sides of a 1 foot square and peel the sod back. Chafer grubs should be in the top 2 to 3 inches of soil. Well-managed turf can support a surprising number of these grubs, and populations of 10 or more per square foot may not cause significant decline of the grass.

Control of chafer grubs is somewhat more difficult than Green June Beetle control, because the chafers do not come to the surface to feed. Irrigate prior to treating if the soil is dry. After treating apply ½ inch of water to move the insecticide down into the soil.

Japanese Beetles

Japanese beetles were introduced into the United States around 1916 and have since spread to infest much of the East Coast from Maine to northern Georgia and inland as far as Indiana and eastern Kentucky. In Georgia, these pests are found as far south as Macon and are often abundant in and around the Atlanta area. Because the adults feed heavily on foliage of a wide range of ornamental plants, fruit trees, vegetable plants, and shade trees, they are very serious pests independent of the damage done to turf by the grubs. They are striking insects, colored a brilliant metallic green with coppery brown forewings that do not quite reach the tip of the abdomen. There is a row of five white spots along the side of the abdomen and a pair of white spots on the top of the last abdominal segment that distinguish this beetle from similar species such as the Green June Beetle.

Biology

Japanese beetles have a single generation each year. Adults appear in late May and may be active into July. Adults live four to six weeks and females lay eggs during most of their lives. Eggs hatch in about two weeks. Maturing in the fall, the grubs overwinter in the soil and resume feeding in the spring. After two to four weeks, the grubs mature and pupate in cells in the soil. Adults emerge three to four weeks later and remain in the cells for several days before digging to the surface. Adults are active during the day, returning to the turf in late afternoon.

Identification

Japanese beetle grubs have two distinct rows of spines on the raster that converge to form a "V." These rows are much shorter than the rows on the rasters of May or June beetles (see Fig. 2d). Full-grown grubs are about an inch long.

Sampling and Control

Japanese beetle grubs spend most of their time near the surface unless dry soil conditions drive them deeper. Large grubs will usually be found at the soil/thatch interface if moisture is adequate. They are easily exposed by laying the sod back and looking in the top 1 to 2 inches of soil and in the roots of the grass. Irrigate thoroughly several hours prior to sampling if the soil is dry.

Irrigation is also needed before application of control materials under dry conditions. Apply ½ inch of water after treating to move the insecticide down into the soil.

In addition to conventional insecticides, Japanese beetles are controlled by a bacterial disease called milky disease (or milky spore disease). The disease is caused by the bacterium *Bacillus popilliae.* The blood of infected grubs turns white as the bacterium multiplies and sporulates.

May or June Beetles

Beetles in the genus *Phyllophaga,* several dozen species of which are found in Georgia, are known collectively as May beetles or June beetles (MJB). They are found throughout the state. The adult beetles are very common; they often fly in great numbers to lights. They are generally brownish, sometimes with a mottled pattern, with long spindly legs. They range in size from just over ½ inch to almost 1 inch long. The beetles feed on a variety of trees and shrubs, including many ornamental and shade trees. Most prefer deciduous plants but some attack various pines. In addition to turf injury, the grubs may also damage ornamental plants (both in the landscape and in nurseries), pine seedlings, pastures and other crops.

Biology

In Georgia, most MJB take two years to complete their life cycles. Some take only one year, especially in the south, while others take three years to become adults. Depending on the species, adults emerge from the soil in the spring or early summer (March-July). They are active at night, when they feed and mate, and then return to the soil in the daytime. Eggs are laid in the soil near the preferred host and hatch in three to four weeks. Grubs feed on roots and overwinter in the soil as second or third instars. They resume feeding in the spring and either continue to feed and grow through the summer (two-year cycles) or pupate in the soil and emerge as adults later that season.

Identification

MJB grubs have two distinct longitudinal rows of spines on the raster. The rows are parallel rather than converging like those on Japanese beetle grubs.

Sampling and Control

Sample for MJB grubs by laying the sod back and sifting through the top 3 to 4 inches of soil. These grubs tend to move up and down in the soil more than the other groups and are often found at greater depths. Good soil moisture is a necessity for sampling and effective control. Irrigate thoroughly before treating with insecticides and water after treatment to move the chemicals down off the grass and into the soil.

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Leaflet 428 **Reprinted January, 2002**

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, The University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture cooperating.

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