

# Biology and Control of the Green June Beetle

Damage caused by green June beetle grubs, *Cotinis nitida* L., has been increasing in Alabama pastures, hayfields, landscapes, home lawns, and other established grassy areas. Although green June beetle grubs prefer to feed on decaying organic matter, occasionally they chew the tender roots of grass plants. Damage to turf and pasture is primarily mechanical because grub tunneling and movement in the soil uproot grass plants, which then dry out and die.

Green June beetle adults are velvet green with orange or rust stripes along the outer margins of the wing covers (Figure 1). Beetles may be ½ to nearly 1 inch long. Peak beetle flights begin during late June, thus the common southeastern name, June bug. The immature

insects, commonly called grub-worms, are also familiar sights (Figure 2). These large grubs are often found under hay bales left in the field, near manure piles, and in thick organic turf.



Figure 1. Green June beetle adult



Figure 2. Fully-grown green June beetle grubs

Green June beetle grubs are most abundant in sandy or sandy loam soil rich in organic matter. Green June beetle adults are attracted to the decaying organic matter that makes up a large part of the grub's diet. Broiler litter, cow manure, milorganite (composted

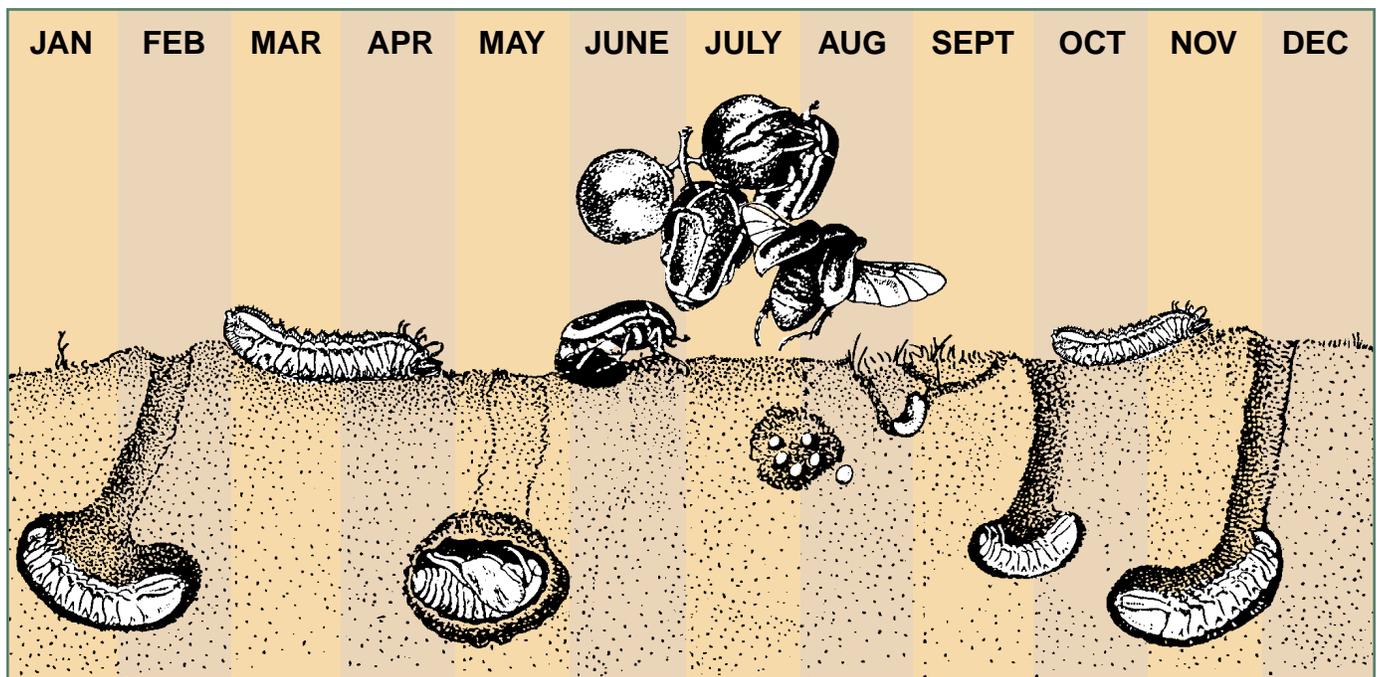


Figure 3. Life cycle of the green June beetle

sewage sludge), rotting hay, and stable manure all encourage green June beetle infestation.

Green June beetle grubs are different from most grub species in the southeastern United States in that they come out of the ground at night and move from one place to another. Green June beetle grubs crawl on their backs with their legs in the air. This movement easily distinguishes them from most other grubs in the soil. When disturbed the grubs curl up into a C-shape, typical of the grubs in their family, the Scarab beetles. Grubs of some related beetles, called *Euphoria*, or bumble flower beetles, also crawl on their backs. They might occasionally be confused with green June beetle grubs; however, bumble flower beetles are not known to cause extensive damage to turfgrass or pastures.

Green June beetles have one generation each year (Figure 3). The grubs overwinter in the soil. They may become active during warm winter days. Fresh mounds of trails of pulverized soil indicate fresh grub activity. Grub activity increases as the spring weather becomes consistently warmer.

Grubs pupate in cells in the soil during late April and May and remain in the pupal stage for 2 or 3 weeks. Newly emerged adults remain in the soil for an additional week or two. In most years, green June beetles leave the soil beginning in late May and continue through early August. Peak flights usually occur from June through July.

As adults, green June beetles feed on fruits such as apples, peaches, and figs. Usually, they prefer to eat over-ripe or decaying fruit. Occasionally, adult green June beetles feed excessively and cause economic damage to grapes and small fruits.

Female beetles fly over the grass surface early in the morning and settle into the grass just after daybreak. Male beetles fly during mid to late morning. Female beetles produce substances that attract the

males to them. After mating, the female green June beetle flies close to the turf or grass surface, selects a site (preferably moist, organic soil), and digs several inches into the soil. The female beetle constructs a walnut-sized ball of soil in which she lays 10 to 30 eggs. Eggs are nearly round, about  $\frac{1}{16}$  inch in diameter. Each female may lay as many as 75 eggs during a 2-week period. Eggs hatch in about 2 weeks. Newly hatched grubs are about  $\frac{3}{8}$  inch long. Young grubs begin to tunnel through the soil in search of food (organic matter). They typically come to the surface to feed.

In turf, the grubs usually leave small mounds of soil around the mouth of each tunnel. By August, grubs are large enough for mounds to be seen on short mowed turf and by mid-September on taller grass. In pastures, grubs leave trails of pulverized soil as they tunnel near the surface.

A small amount of green June beetle tunneling can help aerate the soil and be beneficial; however, extensive tunneling can be harmful. Tunneling loosens the soil and creates a spongy layer about 2 inches deep in heavy infestations (Figure 4). Tunneling disrupts the contact between the plant roots and the soil. This interferes with water uptake causing the plants to die.

Grubs are capable of pruning the roots of plants, particularly when the grubs occur in high numbers. Grazing cattle easily pull the plants growing in the loosened soil out of the ground. Weeds quickly colonize the bare patches created where a plant dies or is pulled out. Birds, armadillos, and skunks dig grubs out of turf and pastures, often causing even greater damage in the process.

A large, dark-colored wasp, *Scolia dubia*, is often seen flying low over grassy areas infested with green June beetle grubs. The insect, sometimes called the bluewinged wasp, attacks green June beetle grubs, and is, therefore, beneficial. This wasp is blue-black in color, slightly longer than an inch. The rear half of the abdomen is brown and fuzzy, with two large yellow spots. The female wasp goes down into the soil to find green June beetle grubs. When she finds one, she stings it, causing it to be paralyzed, then lays her eggs. The wasp larvae hatch and consume the green June beetle grub. In Alabama, wasp adults are most prevalent in August and September. Under some circumstances, this insect, and some microbial pathogens, will control a green June beetle infestation.



**Figure 4.** Pulverized soil is a typical sign of green June beetles in pastures. Notice the broad-leaved weeds that have invaded the infested area.

# Management on Turf

On turf, green June beetle control is site specific. In some cases, the grubs do such a good job of aerification that control is considered to be undesirable. This is especially true on rapidly growing, well-established bermudagrass that is not closely mowed. However, green June beetle mounds are usually not tolerated on highly visible areas such as the slopes of golf greens. Sod producers need to guard against this pest because the tunneling weakens the structural strength of the sod.

The following are steps for successful control on turf:

**1. Be sure you have green June beetles.** Green June beetles are not the only animals that make mounds on turf. Mole crickets make mounds during the spring and fall on infested turf, primarily in the southern half of Alabama. Earthworms also make mounds, the particles of which are distinct pellets. To determine which animal is creating mounds in an area, use a mixture of 1 or 2 tablespoons of lemon-scented dish detergent in 1 gallon of water. Pour the solution over 1 or 2 square feet of the infested area. Wait a few minutes, and observe what comes out of the ground.

You can also verify the presence of green June beetle grubs by digging up with a shovel several samples at least 1 foot deep and 1 foot square. Sift through the soil to find any insects.

Watch for bird feeding in turf areas, especially starlings and robins. Bird activity is a good indicator of turf insect infestations. Also, watch where green June beetle adults fly during the summer.

**2. Decide whether turf damage is severe enough or unsightly enough to justify treatment.**

**3. Consider control options.** The insecticides recommended for grub control in Extension publica-

tion ANR-177, "Controlling White Grubs on Lawns and Turf," will control green June beetle grubs. Usually, smaller amounts are required. In addition, low rates of carbaryl such as Sevin and acephate such as Orthene Turf, Tree & Ornamental Spray (Orthene TT&O) effectively control green June beetle grubs but not other grub species.

Homeowner Use On Lawns	
Insecticide	Rate
carbaryl SEVIN 50W	3 oz/1000 sq. ft.
Other brands of carbaryl may be available.	See label for rate information
acephate ORTHENE TT&O	1.1 oz/1000 sq. ft. in at least 3 gal. of water

Commercial Turf Use	
Insecticide	Rate
carbaryl SEVIN SL	2 qt/A.
SEVIN 80WSP	2.5 lb/A.
acephate ORTHENE TT&O	3.4 lb/A.

Do not water after treatment. City water used for Orthene TT&O sprays may be too alkaline and must be buffered before Orthene TT&O is added in order to obtain maximum effectiveness. Use a pH meter or a swimming pool testing kit to determine acidity/alkalinity. Add a few drops of a commercial buffer to spray water and check with each addition until the scale registers just below neutral (5.5 to 6.0). Then make a slurry with Orthene TT&O and buffered water. Add slurry to spray tank slowly, mixing well.

**4. Be sure conditions are right for best control.** In most years, the best time for grub control is August through October. Treatments during early spring will probably give a lower percentage of control. Often, a second application is required.

If soil is dry, irrigate before treatment.

Make applications late in the day because grubs move to the surface during the evening.

Treat all infested areas. Otherwise, grubs may later move back into treated areas.

**5. Keep a history of the site.** Mark a landscape map with previously infested areas. This can help in locating new infestations.

**6. Remove dead grubs if necessary.** Following an insecticide application, grubs emerge from the ground the next evening and die on the turf or soil surface. Decaying grubs not only smell bad, but also may result in slick playing surfaces on athletic turf. Usually, you can remove dead grubs from athletic fields or other frequently trafficked areas with a turf sweeper such as the ones used on golf courses.

# Management in Pastures and Hayfields

Green June beetles are most likely to cause damage in fields where broiler litter or other organic matter has been applied. Green June beetles cause a general loss of productivity and allow less desirable grasses such as crabgrass and common bermudagrass to invade. In heavy infestations, a pasture can be almost completely destroyed (Figure 5).

Good weed control can lessen the impact of this pest. Green June beetles tend to congregate on broad-leaved weeds such as spiny amaranth and jimsonweed. Females look for open patches of ground where they can burrow into the soil and lay eggs. Usually, there is a small patch of open ground at the base stems of broad-leaved weeds.

Bare patches from previous green June beetle feeding also make it easier for green June beetle females to get into the soil to lay eggs. In a heavy infestation, the entire field may be damaged.

More frequently, the grub infestations are patchy. Edges of terraces, sunny slopes, slopes down from barns, and cattle feeding sites are all likely to be infested.

Bunch grasses, such as tall fescue, are less likely to recover from grub injury than are species with a creeping or spreading growth habit, such as bermudagrass. Seedling fescue and seedling small grains and ryegrass planted as winter forage are particularly at risk for damage. Their root systems are small when the larvae are actively tunneling and feeding in the fall.

The following are steps to successful grub control in pastures:

**1. Be sure you have green June beetles.** Scout pastures and hayfields for green June beetle grubs in late summer and early fall. Scouting is particularly important if you are planting winter annual forage seeds. By late August, most green June beetle grubs will have hatched from their eggs. Check fields for signs of infestation, such as trails of pulverized soil and bare patches. If large numbers of green June beetle adults were observed in certain parts of a field, start by checking those areas first. Pay close attention to edges of terraces, sunny slopes, slopes down from barns, and cattle feeding sites.

Other animals can leave tunneling trails and mounds of soil. Check to see how many grubs are present.

With a shovel, carefully dig 1 square foot area down to about 1 foot deep. Count the number of green June beetle grubs in the soil. Repeat this in at least 5 areas of the field.

**2. Decide whether an insecticide is needed.** Infested areas with populations of 4 or more grubs per square foot probably should be treated with an insecticide. Treatment of populations as low as 1 grub per square foot may be warranted in fields where a winter forage will be overseeded in the fall.

Pasture and Hayfield Use	
Insecticide	Rate
carbaryl	
SEVIN XLR	1.5 qt./A.
SEVIN 80S	1-7/8 lb/A.
Other brands of carbaryl may be available.	Follow label directions, using 1.5 lb active ingredient per acre.

If carbaryl is applied by ground equipment, be sure to use at least 25 gallons of water per acre. Observe a 14-day grazing interval before reintroducing cattle. If applied by air, use as much water as possible.

**3. Be sure conditions are right for best control.** In most years, the best time for grub control is late August through October, before the green June beetle grubs have caused extensive damage.

Mow or closely graze pastures before spraying. It is important that the grubs come in contact with the insecticide. Make applications late in the day since grubs move to the surface during the evening. Applying the insecticide a few hours before a moderate rain may increase the efficacy of the application. Heavy infestations may require a second application 10 days to 2 weeks after the first application.

Treatments during winter or early spring will be too late to prevent most green June beetle grub damage and will probably give a lower percentage of control. Grubs are larger by this time and are harder to kill. Also, when temperatures are cool, control efficacy declines because grubs are less likely to come to the surface and come in contact with the insecticide.

If it is absolutely necessary to treat for green June beetles during winter, wait for a warm spell when the daytime air temperatures are 60 degrees or higher for several days. Under these warm conditions, grubs resume feeding and are likely to come to the surface and in contact with the insecticide.

Treat all infested areas; otherwise, grubs may later move back into treated areas.

**Kathy L. Flanders**, *Extension Entomologist*, Associate Professor, and **Patricia P. Cobb**, Professor Emeritus, both in Entomology and Plant Pathology at Auburn University

Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

**For more information**, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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**Figure 5.** Differences on green June beetle damage in a pasture treated with broiler litter (foreground) or inorganic fertilizer (background).