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White Grubs in Texas Turfgrass

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White grubs are the larval stage of insects commonly known as May or June beetles (or June bugs), which are in the genus *Phyllophaga*. Texas has over 100 species of these beetles, most of which do not cause significant economic damage to crops or horticultural plantings. However, a few species commonly damage turfgrass and other cultivated plants.

White grubs, sometimes called grubworms, injure turf by feeding on roots and other underground plant parts. Damaged areas within lawns lose vigor and turn brown (Figure 1). Severely damaged turf can be lifted by hand or rolled up from the ground like a carpet. Damage by white grubs is generally nondescript and indistinguishable from other insect damage, drought stress, or disease stress.

The most important turfgrass-infesting white grubs in Texas are the June beetle, *Phyllophaga crinita* (Figure 2), and the southern masked chafer, *Cyclocephala lurida*. Warm season grasses like bermudagrass, zoysiagrass, St. Augustinegrass, and buffalograss are attacked readily by both types of white grubs. Most of the lawn damage occurs during summer and fall months.

Figure 1. Golf course fairway damaged by white grubs.

Figure 2. Adult white grubs, often called May or June beetles, are commonly attracted to lights at night.

Cool season grasses such as fescues, bluegrass, and ryegrass are also susceptible to the June beetle and southern masked chafer. However, such grasses tend to be attacked more frequently by a May beetle, *Phyllophaga congrua*. Damage from June beetles often appears in the spring and early summer, before injury from other white grubs becomes evident. Other white grub species occasionally recorded as pests in Texas turfgrass include *Cyclocephala pasadenae* and *Phyllophaga submucida*.

Life Cycle

Turfgrass-feeding white grubs in Texas, such as the June beetle and southern masked chafer, require 1 year to complete their life cycle (a 2-year cycle is suspected in a portion of the grub populations in North Texas). The May beetle, *Phyllophaga congrua*, requires 2 years to develop. For simplicity, the following discussion will be limited to species with 1-year life cycles.

Once a year, in late spring through summer, adult beetles emerge from the soil to mate. Mated females

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then return to the soil to lay eggs. Within about 2 weeks, eggs hatch into small white grubs that feed on grass roots. The pupa, or intermediate stage between the larva and adult, occurs the following spring and is the last immature phase of the insect's development cycle. Adults subsequently emerge from the pupal stage when environmental conditions are favorable in early to mid-summer. Most damage from white grubs occurs during mid-summer to early fall when the larger larvae are actively feeding.

Adult. The adult stage of the various white grub species are heavy-bodied beetles; ½ to ⅝ inch long; brown; and with long, spindly legs (Figure 2). The June beetle and southern masked chafer emerge from the soil and fly at night, usually in greater numbers after significant rainfall or irrigation. Flight periods may last for several weeks, during which time mating and egg-laying occur. During flights, large numbers of adult beetles, primarily males, may be attracted to lighted windows or other lights at night. Females, being less active fliers, usually are less common around lighted areas than are males. However, turning off outdoor lights during adult flight periods may not substantially reduce subsequent white grub damage. Heavy white grub infestations often can be found in areas with little or no outdoor lighting.

After mating, female beetles dig 2 to 5 inches into the soil to lay eggs. Each female can lay up to 30 to 40 eggs, which hatch in approximately 2 weeks.

Larva. White grub larvae are creamy white and C-shaped, with three pairs of legs (Figure 3). After hatching, the white grub passes through three larval life-stages, or instars. These instars are similar in appearance, except for their size. First- and second-instars each require about 3 weeks to develop to the next life-stage. The third-instar actively feeds until cool weather arrives and are responsible for most turfgrass damage due to their large size (½ to 1 inch long) and voracious appetites. This generally occurs during July in Texas.

Figure 3. Turfgrass-infesting white grub larvae feeding on grass roots. Grubs are most damaging when they reach a length of ½ to 1 inch.

Feeding by large numbers of third-instar white grubs can quickly destroy turfgrass root systems, preventing efficient plant uptake of food and water. Damaged turf does not grow vigorously and is extremely susceptible to drying out, especially in hot weather.

When cool weather arrives, white grubs become dormant until the following spring. During this dormant period, white grubs do little or no feeding and cause little damage. Occasionally, white grubs will be found in turfgrass areas that fail to green up in the spring. However, the damage is primarily the result of feeding that occurred the previous fall. Spring and winter treatments for white grubs with 1-year life cycles are ineffective in preventing turf damage. This is because grubs are not actively moving about in the soil and contacting pesticide residuals.

Pupa. The pupal stage follows the third-instar and is the life stage during which the white grub transforms, or metamorphoses, into an adult beetle. The pupal stage does not consume food or move through the soil. This life stage occurs during the spring and lasts approximately 3 weeks. Pupae can be found in small earthen cells 3 to 6 inches below the soil surface. White grub treatments applied during the pupal life stage are both ineffective and unnecessary.

Managing White Grubs

Knowing when you have a problem.

White grub damage may be detected by the presence of irregularly shaped areas of weakened or dying grass in the lawn. Less-severely damaged turf lacks vigor and is more vulnerable to invasion by weeds. Depending on location within the state, damage may appear any time between the months of June and October (damage occurs earlier in warmer parts of the state, and later in cooler areas). Turfgrass damaged by white grubs has a reduced root system and is easily pulled from the soil. Grubs should be readily found in the top few inches of soil, in the turfgrass root zone. It is important to note that white grubs that damage turf should only be found in turf.

Grubs found in compost, mulch, or raised beds are likely decomposers and beneficial. Keep in mind there are thousands of beetle species that produce larvae that resemble white grubs. The presence of turfgrass damage and grubs that are ½ to 1 inch in midsummer months are a good indication that white grubs are causing the damage. Turfgrass usually recovers from white grub damage by fall or the following spring.

Damage to turf should not immediately be assumed to be white grubs. Other insects, such as chinch bugs, can cause similar damage. Disease, such as take-all patch and others, drought stress, excessive heat, and other stressors can cause damage to turf that may look like white grub feeding.

Studies out of Cornell University suggest that up to 70 percent of white grub lawn treatments are not necessary. To confirm you have white grubs, use the quick decision guide below. To sample for white grubs, examine several soil sections at least 3 to 4 inches across and 4 inches deep (sample sandy soils to greater depths). Examine several soil plugs (up to 1 square foot per 1000 square feet of turf) from widely scattered parts of the lawn. Do not sample in bed areas. Take care to include areas at the edges of suspected grub damage. Finding more than five white grubs per square foot justifies treatment, although some lawns with even higher numbers of grubs may show no damage. If your lawn shows no damage even with white grubs present, treatment isn't necessary.

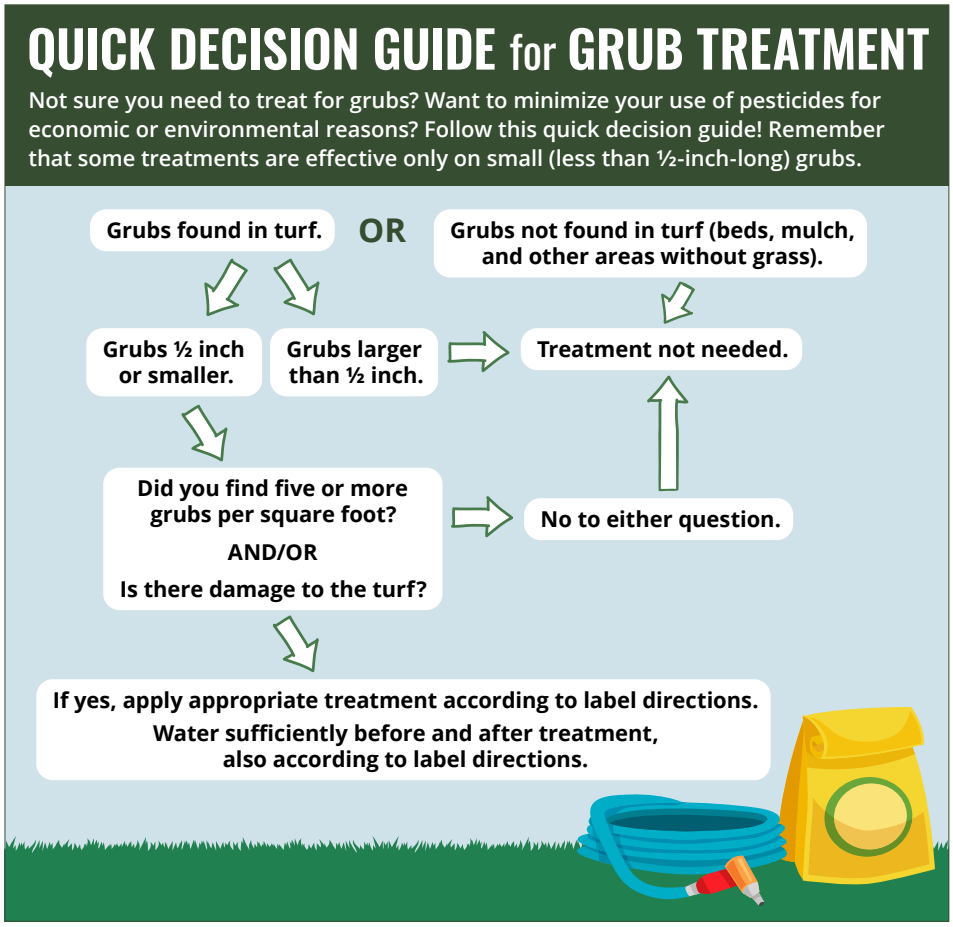
Nonchemical controls. Beneficial nematodes within the genera *Steinernema* and *Heterorhabditis* are tiny worms that attack white grubs and other soil-inhabiting insects. They must be supplied with adequate moisture to help them move down into the soil where grubs are feeding. At least ¼ inch of water should be applied before and just after nematodes are sprayed on the lawn. These worms pose no threat to humans or landscape plants.

One microbial pesticide, *Bacillus popilliae*, or milky spore disease, is often recommended for Japanese beetle grub control in other regions of the U.S. However, it has not been shown to be effective against Texas turf-infesting white grubs.

Soil aeration through spiked sandals or other tools may provide some success by damaging grub populations. According to one study, repeatedly walking over heavily infested turf with the spiked sandals may reduce grub populations up to 50 percent. However, this is a tedious task.

Chemical control. Proper timing and chemical application are critical to suppressing white grubs. Understanding the life cycle of the white grub and when they are more likely to encounter pesticides is key to proper management (Figure 4).

Preventive treatments for white grubs should be applied early spring through early summer, before grubs are larger than



½ inch. Active ingredients that provide preventive control include imidacloprid and chlorantraniliprole. These may also contain a second active ingredient that are usually synthetic pyrethroids, such as bifenthrin or beta-cyfluthrin. These products generally must be watered into the soil so the pesticide reaches the location of the white grubs.

Where grub damage is already evident in lawns and larger grubs are present, use products containing trichlorfon or carbaryl. Irrigate well before applying products to push grubs closer to the soil surface where they are more likely to encounter the pesticide.

Routine, annual, "preventative" insecticide applications to lawns for white grub control, without historical evidence of their presence, are not recommended and may cause more problems than they solve.

Remove heavy thatch with dethatching machines or aeration before applying pesticides. Thatch is the accumulation of dead plant material, between the soil surface and turfgrass foliage. Recent research has shown that many pesticides bind to thatch, preventing them from reaching the soil and reducing their effectiveness. Excessive thatch buildup is more likely to occur with hybrid bermudagrasses, St. Augustinegrass, and some zoysiagrasses. Using mulching mowers to recycle grass clippings should not cause thatch buildup in regularly mowed lawns.

Avoid treating lawns just before heavy rain is expected. Recently applied pesticides may be washed out of lawns.

Always read and follow label directions. Apply only the labeled rates on labeled sites. Avoid pesticide-use near streams, ponds, and irrigation treatments.

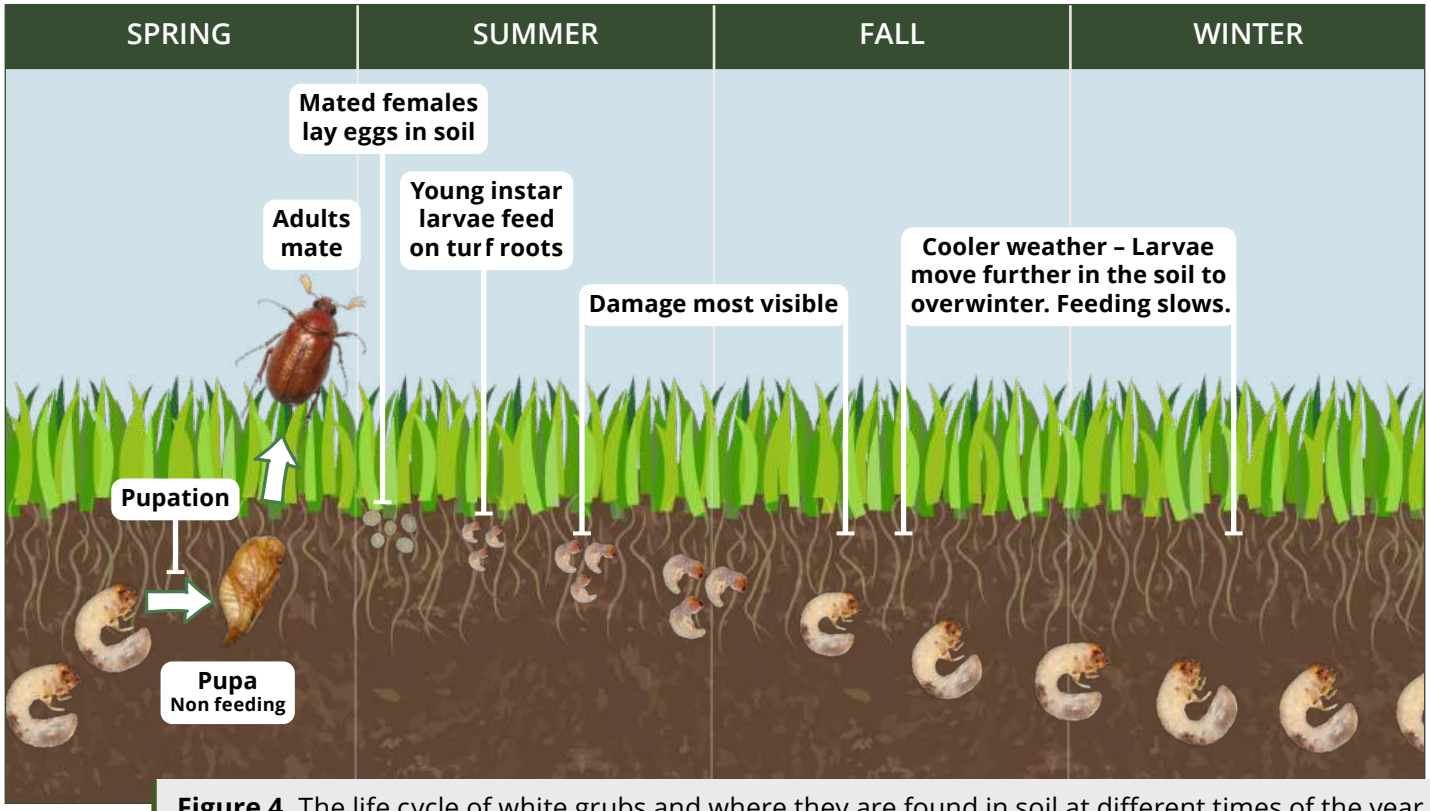


Figure 4. The life cycle of white grubs and where they are found in soil at different times of the year.

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