



HOME & GARDEN

Billbugs and white grubs

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Quick Facts...

Billbugs and white grubs are insects that damage turf grasses by feeding on the roots.

Heavy infestations of billbugs and white grubs may kill grass or attract mammals, such as skunks, that damage grass when feeding on grubs.

Healthy lawns tolerate injury better than lawns in poor condition.

Time insecticide applications for billbug control when the adult weevils are present.

White grubs are controlled best when a maximum number of young grubs are present in the upper root zone.

Billbugs and white grubs are serious pests of turfgrass in parts of Colorado. Both groups of insects feed below ground and damage roots or the growing crown area of the plant. Infestations also may attract predators, such as skunks and raccoons, that dig and damage lawns in search of the insects.

Billbugs

Billbugs are a type of weevil or “snout beetle”. The adult weevils can be seen crossing sidewalks and driveways during late summer or spring. In spring and summer, adults cause minor injuries to grasses as the females cut small holes in the stems of plants and insert their eggs. The young billbug “grubs” are the primary damaging stage. Billbug grubs are legless, generally white or cream, with a brown head. They may reach 1/3 to 1/2 inch in length when full-grown. Young grubs feed within the crown area of the plant and kill the plant. The stems of infested plants are easily detached at the soil surface. The ends appear sawed-off, often with a sawdust-like material present. Older billbug larvae feed in the lower crown and plant root zone. Small piles of light sawdust-like material is produced during the feeding of larger billbug grubs. Billbug injury is most common on new lawns, particularly those established with sod. Within lawns, most damage occurs near evergreen shrubbery or other protective sites. Billbug injury appears as wilting and occasional death of grass, often in small scattered patches. Extensive areas of a lawn may be killed during severe infestations.

Bluegrass billbug. At least two species of billbugs may be found in Colorado lawns. The bluegrass billbug (*Sphenophorus parvulus*) overwinters as an adult in protected areas, such as under debris near building foundations or at the interface of turf and sidewalk. Eggs are produced and laid in late May, June and early July. Larvae develop over the course of several months with peak larval injury in late June and July. When full-grown, the larvae pupate a few inches deep in the soil. The adults emerge in two to three weeks, feed briefly and seek overwintering shelter. There is one generation per year.

Denver billbug. The “Denver” billbug (*Sphenophorus cicastratus*) is far more common throughout Colorado. The life cycle of this insect is more complicated than the bluegrass billbug. Some of the insects overwinter as adults, but most remain in the larval stage and feed throughout spring. Egg-laying occurs throughout most of the growing season, peaking in June and July.

Billbug control

Different varieties of bluegrass exhibit a range in resistance to bluegrass billbug. The “common-type” varieties tend to be more resistant. Billbug resistance also occurs in many perennial ryegrass cultivars, particularly those that contain endophytic fungi. Biological controls include predation by birds and hunting



Figure 1: Denver billbug adult.



Figure 2: Denver billbug larvae.

wasps, fungal diseases, and parasites. Also, insect parasitic nematodes (*Steinernema* species, *Heterorhabditis* species) are effective against both larvae and adult stages of billbugs and may be used as an applied biological control. (Insect parasitic nematodes are discussed in fact sheet 5.573, *Insect parasitic nematodes*. The nematodes are available from many mail order suppliers and several nurseries. Controlling billbugs with insecticides is difficult when they are in the larval (“grub”) stage. Young larvae are protected within the plant and older larvae occur in the root zone where insecticides fail to penetrate. Best control for the bluegrass billbug occurs when sprays are applied in early May to kill adult insects prior to egg laying. Current information on the Denver billbug indicates that a slightly later timing, in early June, is more appropriate. Apply adult sprays so insecticide residues remain as long as possible on foliage and in the crown area of the plant. This may be achieved better with liquid sprays than with granular formulations. Insecticides recommended for billbug control are summarized in Table 1.

White Grubs

White grubs are the most damaging insects in Colorado lawns along the Western Slope, Arkansas Valley, and through much of the Eastern Plains. The larval, or “grub”, stage feeds on grass roots. Severe feeding injuries result in wilting and often death of infested areas of grass. Since white grubs also are a favorite food of skunks and raccoons, damage by these mammals in search of food may exceed that caused by white grubs. White grubs are found in the soil, often in the top inch of the root zone during warm months. White grubs generally are creamy-white with three pairs of legs. They typically curve their bodies into a distinctive “C-shape.” Grubs of the larger Colorado species may reach a length of 1 to 1-1/2 inches. Grubs move down deep in the soil and remain below the frost line during winter. Adult stages of white grubs are known as scarab beetles. May beetles, June beetles, chafers and dung beetles are other scarab species found in the state. Most scarab beetles in Colorado are beneficial and help recycle nutrients in organic matter, such as dung. A few species, however, are important turf pests.

Masked chafers (*Cyclocephala* spp.). These are white grubs that commonly damage turf in the Pueblo and Western Slope areas. Sometimes known as annual white grubs, masked chafers require only one year to complete their life cycle (Figure 4). Flights of egg-laying adult beetles occur in June and continue for about one and a half months.

Larvae feed on grass roots for several months and peak injury occurs in late summer and early fall. They overwinter in the soil, below the frost line, and resume feeding in spring. Favorable growing conditions in spring usually allow grass to outgrow visible damage during that time. On drought stressed turf, populations of nine or more grubs per square foot can produce visible injury. Higher grub populations can be tolerated on more vigorously growing turfgrass.

May and June beetles (*Phyllophaga* spp., *Polyphylla* spp.). These are the largest of the white grubs. Most injury by these insects occurs along the Eastern Plains, particularly in the southeast area of the state. Most May and June beetles have a three-year life cycle (Figure 5). Adult beetles emerge during May and June and lay eggs in the soil. Grubs that hatch from the eggs feed during the summer and move deep in the soil to overwinter. Grubs return to the root zone and feed throughout the following summer. May and June beetle grubs cause most injury during this second season of their life cycle. During spring and early summer of the next year, the grubs complete development, cease feeding, and turn into pupae and adults that remain inactive in the soil. Adult beetles emerge next season. Because of their large size, lawn injury by May or June beetle grubs can occur from populations of five or fewer grubs per square foot. Problems can result from a rarely seen small species of white grub, the black



Figure 3: White grub larva.

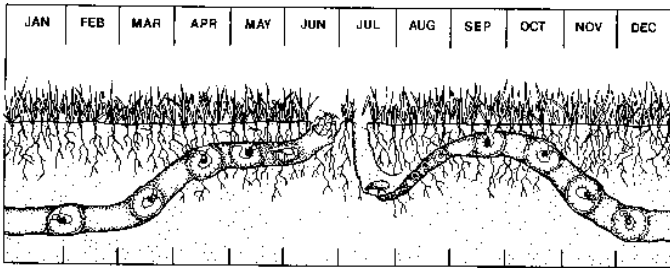


Figure 4: Life cycle of an annual white grub (chafer).

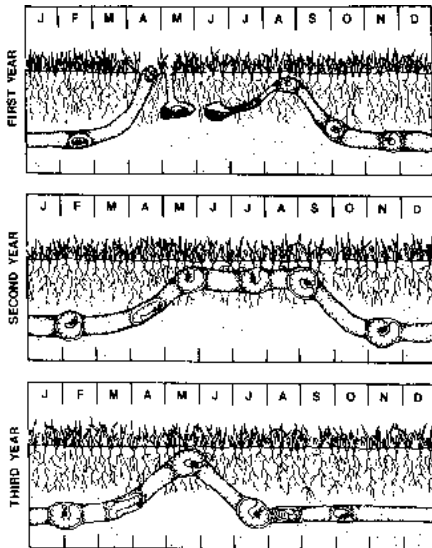


Figure 5: Life cycle of May/June beetle white grubs.

turfgrass *ataenius* (*Ataenius spretulus*). Damage by this species is confined to annual bluegrass, which is a common “weed” grass in lawns. Large infestations, of several dozen grubs per square foot, may be needed to cause visible injury. The small, black adult beetles are often seen flying at dusk during mid spring and again in early summer.

White grub control

The most important means of limiting grub injury is to grow a vigorous lawn. Healthy, well-watered lawns can tolerate grub feeding more easily than weakly growing lawns.

Several insecticides are registered for use against white grubs (Table 1). White grubs, however, are among the most difficult soil insect pests to control. Large grubs are highly resistant to insecticides. More importantly, since grubs feed in the soil, it is very difficult to get adequate amounts of insecticide into the root zone to contact the white grubs. Under typical conditions, control of white grubs often fails to exceed 75 percent. Even this amount of control requires a couple of weeks to become evident.

Thatch depth is important to insecticide performance for white grub control. To a varying degree, white grub insecticides become “bound” to the organic matter in thatch, which makes them unavailable for movement into the root zone for white grub control. A thick layer of thatch (greater than 3/4 to 1 inch) will block all insecticides from penetrating in sufficient amounts to the critical root zone. Treatments made in conjunction with soil aeration should increase the effectiveness. Proper watering can improve performance of certain insecticides. For example, post-treatment irrigations are recommended following use of imidacloprid (Merit, GrubEx) and Oftanol sprays to reduce the amount of insecticide that remains on leaf tissues. However, excessive watering does not improve the movement of insecticide into the root zone and can decrease the effectiveness of insecticides for soil insect control. Furthermore, excess watering increases potential problems with pesticide and fertilizer run-off.

The form of the insecticide has little effect in white grub control. Granular and liquid sprays often perform equally.

Optimal control is achieved when a high percentage of young white grubs are present in the upper soil layer (Table 2). This typically occurs in mid-summer (around August 1) for the masked chafers. Slightly earlier application is more appropriate for controlling young May/June beetle grubs. Treatments made against older grubs often result in poor control. Black turfgrass *ataenius* is best managed by applications that control adults, made during periods when large amounts of the beetles are observed at dusk.

Use of insect parasitic nematodes (*Heterorhabditis* species, in particular) show promise for control of white grubs in experimental trials. These biological controls are available from various suppliers.

Lawn Recovery

If lawn areas are damaged by white grubs or billbugs, give extra attention to the grass to assist in regrowth. This usually involves additional water to help the plants tolerate root loss and the use of fertilizers (not high nitrogen) that promote root regrowth. Adjust mower heights 2 ½ to 3 inches to encourage root growth. After grubs move into the soil in fall, bluegrass often will repair much of the earlier damage. The most important means to limit white grub injury is to grow a healthy lawn.

Table 1: Characteristics of insecticides used for control of billbugs and white grubs in lawns.

Common name	Trade names*	Comments
bendiocarb	Turcam	Moderately toxic to mammals. Highly toxic to earthworms and birds. Concentrated formulations are restricted use.
carbaryl	Sevin, Sevin SL, Sevimol	Fairly water soluble. Highly toxic to earthworms. Low toxicity to mammals and birds.
chlorpyrifos	Dursban, Ortho-Klor	Binds to organic matter and persists on foliage. May give good control of billbug adults but can be less consistent on root feeding insects. Not recommended for control of white grubs. Some associated odor.
diazinon	Diazinon, Spectracide	Highly toxic to birds, and not allowed on golf courses and sod farms. Moderate water solubility.
ethoprop	Mocap	Highly toxic and 10% granule (but not 5G) formulations are restricted use. Highly toxic to earthworms. Penetrates thatch well. Some odor. Use restricted to commercial turf. Also labeled as a nematicide.
imidacloprid	Merit, GrubEx	Has given excellent control of white grubs and has substantially longer persistence than other insecticides. However, movement in soil and activity against grubs is slow. Treatments must be applied prior to or in early stages of infestation.
isazophos	Triumph	Restricted use. Toxic. Cannot be used on sandy soils because of risk of groundwater leaching. Good thatch penetration ability. Has good persistence in some soils but slow acting. Post application watering required.
isofenphos	Oftanol	Has good persistence in some soils but slow acting. Post application watering required.
trichlorfon	Dylox, Proxol, White grub	Penetrates thatch well. Fast acting. Sensitive to high pH breakdown. granules

*Products are sold under a variety of trade names. Use of all pesticides must be in accordance with directions on the package label.

Table 2: Optimal timing of insecticide applications for control of billbugs and white grubs.

Pest species	Target stage	Approx. time of occurrence
Denver billbug	Adults	June-August
Bluegrass billbug	Adults	May-June
Annual white grubs	Young larvae	Late July-August
May-June beetles	Larvae near surface	July-August

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