

# Billbugs and White Grubs

Fact Sheet No. 5.516

Insect Series | Home and Garden



by W.S. Cranshaw and R. Zimmerman\*

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.” 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 long when full-grown. Young grubs feed within the crown area of the plant and kill it. 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 are produced during feeding.

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



Figure 1: Denver billbug adult.



Figure 2: Bluegrass billbug adult.

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. Peak larval injury occurs 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

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

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Figure 3: Denver billbug larvae.



Figure 4: White grub larva.

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 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 wasps, fungal diseases and parasites. Also, insect parasitic nematodes (*Steinernema* species, *Heterorhabditis* species) are effective against both larvae and adult stages and may be used as a biological control. See fact sheet

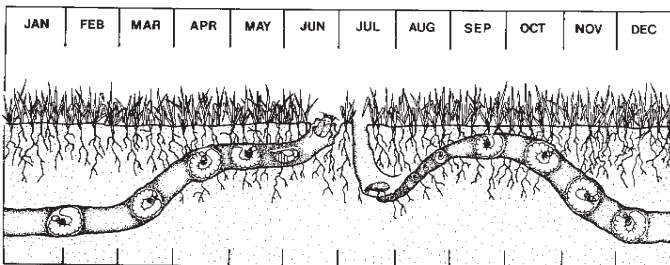


Figure 5: Life cycle of an annual white grub (chafer).

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. 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, in the 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. Because 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 live in the soil, often in the top inch of the root zone during warm months. They 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 1 to 1 1/2 inches long.

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.



Figure 6: Masked chafer adults.

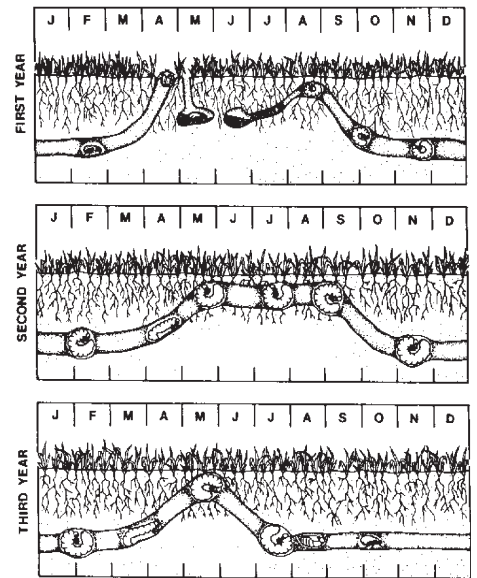


Figure 7: Life cycle of May/June beetle white grubs.

### 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 6). 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. 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.



Figure 8: May/June beetle.

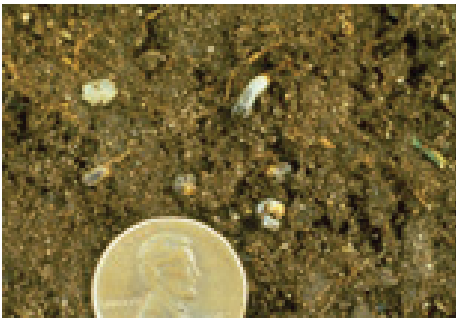


Figure 9: Black turfgrass atenium larvae.



Figure 10: Black turfgrass atenium larvae.

### 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 8). Adult beetles emerge during May and June and lay eggs in the soil. Grubs 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.

### Japanese Beetle

The Japanese beetle is a new arrival to Colorado and presently (2014) is only established in some limited sites in the Denver Metro area and in the West Slope town of Palisade. Unlike other white grub species present in the state, Japanese beetle is also important as a pest in the adult stage, which feeds on leaves and flowers of rose, grape, beans, crabapple and many other common yard and garden plants. Japanese beetles are distinctive insects with bright, metallic coloration and their identification is discussed in fact sheet 5.601, [Japanese Beetle](#). Traps attractive to adult Japanese beetles are available from many garden catalogs and are widely used in the eastern US, where this insect is a serious pest. Although these traps are quite effective for capturing adults, they have been shown not to be effective for control of this insect and are only recommended for monitoring its presence.

Japanese beetles begin to lay eggs in late May with peak egg production by the end of July. Larvae are managed in a manner similar to other white grubs, with insecticides best applied in early summer, coincident with the period when eggs have begun to hatch. The eggs and young larvae are very susceptible to drying and will survive poorly if soil is dry during this critical time in their development.

Problems can result from a rarely seen small species of white grub, the black turfgrass atenium (*Atenium 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 midspring 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, because grubs feed in the soil, it is difficult to get adequate amounts of insecticide into the root zone. Under typical conditions, control is often less than 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 bind to the organic matter in thatch. This prevents them from moving into the root zone to control white grubs. 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 combined with soil aeration should increase the effectiveness.

Proper watering can improve performance of certain insecticides. For example, post-treatment irrigations are recommended for imidacloprid (Merit) 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 runoff.

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

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 midsummer (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 atenium is best managed by applications that control adults, made during periods when large numbers of the beetles are observed at dusk.

Use of insect parasitic nematodes can be a very effective biological control for white grubs. (See fact sheet 5.573, [Insect Parasitic Nematodes](#).) However, only nematodes in the genus *Heterorhabditis* are effective for control of white grubs. *Steinernema* spp. are not effective. These biological controls are available from various mail order suppliers.

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

Common name	Trade names*	Comments
Chalofenozide	MACH-2, Hi-Yield Kill-A-Grub	A growth regulator insecticide that is effective against younger stages of grubs and billbugs. Has some activity against webworms and cutworms. Fairly fast acting (days, weeks) and moderately persistent (weeks).
imidacloprid	Merit, Advanced Garden Season Long Grub Control, Scott's GrubEx, etc.	A neonicotinoid insecticide with long persistence (weeks-months) that consistently has provided good-excellent control of white grubs. Somewhat slow activity (a couple weeks) and should be applied to younger stages.
clothianidin	Arena	A neonicotinoid marketed in 2007. Has long persistence (weeks-months) that consistently has provided good-excellent control of white grubs. Also has some activity against webworms and cutworms.
chlorantraniliprole	Acelepryn	An insecticide in the new class of anthranilic diamides. Has shown excellent activity against white grubs, billbugs and caterpillars in turfgrass (webworms, cutworms). Low toxicity to non-target species allows classification as a Reduced Risk Pesticide.
<i>Heterorhabditis</i> spp. nematodes	HeteroMask, Grub-Away, BioStrike Hb, GrubStake Hb, Grub Stake Hi, others	A genus of insect parasitic nematodes that can directly penetrate through the insect body wall and is the only genus of nematodes that is effective against white grubs. Larvae are usually killed within one week of application.
<i>Steinernema carpocapsae</i> nematodes	Many suppliers, trade names	The most widely available species of insect parasitic nematode. It can provide good control of billbug larvae. It cannot control white grubs.
trichlorfon	Dylox, Proxol, Bayer Advance 24 Hour Grub Killer Plus Granules	An organophosphate insecticide that is highly water soluble. The most fast acting of the white grub insecticides. Persistence is very short and it degrades extremely rapidly in high pH soil.

\*Products are sold under a variety of trade names.

**Use all pesticides 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	Approximate time of occurrence
Denver billbug	Adults	June-August
Bluegrass billbug	Adults	May-June
Annual white grubs	Young larvae	Late July-August
Japanese beetle	Young larvae	Late June-August
May-June beetles	Larvae near surface	July-August

## Lawn Recovery

If lawn areas are damaged by white grubs or billbugs, give extra attention to the grass to help it grow back. Provide additional water to help the plants tolerate root loss and apply fertilizers (not high nitrogen) to promote root regrowth. Adjust mower heights to 2 1/2 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.