

## Billbugs!

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**Bottom line: Billbugs are probably the cause of more damage on turfgrass than is acknowledged. This is because they are difficult to find, and the symptoms of their feeding are similar to those caused by diseases and drought stress. Cultural controls are often sufficient when infestations are light. But if infestations have been serious in the past, springtime preventive applications of chlorantraniliprole (Acelepryn), imidacloprid (Merit) or thiamethoxam (Meridian) directed against grubs may be necessary. Curative applications of contact insecticides such as chlorpyrifos (Dursban), cyhalothrin (Scimitar), bifenthrin (Talstar) and cyfluthrin (Tempo) can also be used against adults in the springtime (before significant damage occurs) with relatively good results. Curative chemical controls that are applied AFTER significant damage is observed are the least effective measure, but can help reduce the damage caused by serious, surprise infestation of billbugs.**

### Don't underestimate them!

Billbugs are considered to be one of the most misdiagnosed insect pests on golf course turf. Their small size and their tendency to hide inside stems, crowns and roots make them difficult to find, even when infestations are heavy. And symptoms of infestation are difficult to properly identify, since the damage that they produce can be similar to that caused by dollar spot, drought stress, spring dead spot, delayed spring green-up and other turf stressors.

### Types of billbugs

There are over 50 species of billbugs in North America, but most do not feed on turf (corn and other grains, as well as wild grasses are common host plants). The most common turf pests are listed in Table 1. Greens, tees, fairways and even roughs can be attacked.

**Table 1. Billbugs that cause injury to turf.**

Common name	Host plants	Geography
Bluegrass billbug <i>Sphenophorus parvulus</i>	Bluegrass, rye, fescue, bentgrass (occasionally) zoysia	North America
Hunting billbug <i>S. venatus vestitus</i>	Zoysia & hybrid Bermuda. Occasionally on bahia, centipede & St. Augustinegrass	Southern U.S., Caribbean, Hawaii
Phoenician billbug <i>S. phoeniciensis</i>	Bermuda, zoysia and kikuyugrass	CA, AZ
Denver billbug <i>S. cicatristriatus</i>	Cool-season turf, esp. bluegrass and ryegrass	CO, NM, WY

### Adult billbugs: early warning system

Although adult billbugs (Figure 1) cause much less damage to turf than grubs (Figure 2), adults are much easier to spot and to identify. The most distinctive feature is of course the billbug's long "bill" or snout, at the end of which the chewing mouthparts are present. The insect's elbowed antennae arise from the base of the snout.

These are relatively small insects — the adults reach a maximum of 5/16" (8mm), not including the snout. Adults become active during the first warm days of

spring (when average air temperatures reach 65F (18C) and can sometimes be seen walking on cart paths and other paved areas, greens and even bunkers.

**Figure 1. Typical billbug adult**



Adults live above-ground, and their primary damage to turf occurs when females chew small holes at the base of stems, where they deposit their eggs. The adults serve as an excellent "early warning system" that damaging grubs will appear in the next 2 – 4 weeks.

### The culprit

**Figure 2. Billbug grub (larva) in the thatch/soil interface, where this small insect (<3/8" long) is sometimes found (it is also found inside the stems and crowns of turf plants). The inset photo shows an enlarged view of a billbug grub. Note the lack of legs.**



Billbug adults alone are not a significant problem for turfgrass. But their presence should sound a warning bell in your head that trouble is on its way in the next 2-4 weeks in the form of tiny, innocuous looking white grubs that are legless. Billbug activity and damage typically continues throughout the summer until cooler temperatures force them into hibernation (in northern climates) or dramatically decreased feeding (southern climates)

Billbug grubs resemble black turfgrass ataenius grubs, but billbugs are unique in their defiance of the old (and sometimes erroneous) rule that all insects have six legs. No matter how closely you look at a billbug grub, you will never see even one leg on this animal. They remain legless as long as they are grubs (4 – 8 weeks), and only develop legs when they are in the adult stage (Figure 1). In contrast, black turfgrass ataenius grubs conform to the conventional view of insects and obligingly have three pair of legs.

### The damage

Billbug grubs cause damage by feeding inside stems, stolons, crowns and roots of turf plants. As a result of this feeding pattern, stems will break off easily when they are grasped in your fingers and gently pulled upwards. This “tug test” is one of the easiest ways to test for billbug damage.

**Figure 3. Billbug damage.** Phoenician billbug grubs tunneled through the kikuyugrass stem on the left. Examination with a hand lens (photo on right) shows the shredded appearance of the stem, as well as the tiny sawdust-like pieces of dead plant tissue that the grubs leave in their wake.



The symptoms that result from billbug grub feeding can vary depending on the intensity of the infestation, as well as on the turf type. Frequently, the damage resembles the general thinning and dry appearance of drought stress, and indeed, billbug damage typically shows up first in areas that are already stressed by drought. Another common symptom is the appearance of small, yellow or straw colored patches of dead turf that are very similar to dollar spot (Figure 4). But unlike dollar spot, the patches of discolored turf can be easily lifted up when tugged slightly. In warm-season

turf, symptoms can easily be confused with delayed spring green-up or even spring deadspot.

**Figure 4. Billbug damage on bermudagrass fairway**



### A new kikuyugrass record

Billbugs have been recorded as pests on a wide variety of turfgrass types — from bluegrass to centipedegrass to bermudagrass. But we can find only a few mentions of billbugs on kikuyugrass, and those cite only the hunting billbug which has been observed in kikuyugrass pastures in Hawaii. Earlier this year, we confirmed the presence of the Phoenician billbug (Figure 5) on kikuyugrass fairways, where it was causing significant damage. This is the first observation of the Phoenician billbug (sometimes known as the Phoenix billbug) on kikuyugrass that we are aware of.

### Prevention is critical

Billbug populations can grow slowly and stealthily, building up over a period of several years until they reach such high numbers that serious damage occurs. In order to avoid this problem, it is important to monitor for signs of billbugs BEFORE they get a foothold. There are several warning signs that billbugs may be present on the golf course:

1. Drought or disease symptoms such as those described above that do not respond to treatment
2. Presence of billbug adults on cart paths, greens or bunkers on warm spring days. Grubs will appear 2-4 weeks after adult populations are first detected.
3. Turf that easily breaks off at the stems when it is gently pulled upwards (the “tug test”)
4. Presence of billbug grubs (Figure 2) inside stems or in the top 1-2 inches of thatch and soil.
5. Trapping program: if you have an entomological bent, or if you are trying to get a better handle on billbug populations and their timing at your course, the time investment in a trapping program, as described on page 4 may be worthwhile.

### Management

If you determine that billbugs are causing damage on your golf course, you have several options:

- If infestations are light, and/or if damage is minimal, turf can sometimes “grow out” of the damage, especially if the turf is babied with more frequent irrigation and light fertilizer applications.
- If you are managing cool-season fairways and roughs, consider seeding with endophyte enhanced varieties of ryegrass or fescue. These turf types are inoculated with beneficial fungi that grow inside the turf plant and that produce molecules — alkaloids, indole diterpenes and peramine — that are toxic to billbug grubs and adults (Johnson-Cicalese and White, 1990). Even when turf stands contain less than 50% endophyte enhanced plants, billbug numbers can be significantly reduced. Endophyte enhanced turf varieties are widely available, and are usually marked with a plus sign (+) on seed bags.
- If treatment with insecticides is warranted, adult billbugs can be targeted curatively (in the springtime) with contact insecticides such as bifenthrin, chlorpyrifos, cyfluthrin or cyhalothrin (Table 2). However, timing is critical here since these products have brief residual activity. For this reason, applications must be made only when high numbers of adult billbugs are detected using one of the methods described above.
- Probably the most reliable method of control is based on preventive applications of a preventive product (see Table 2) against the larval, or grub stage. This application should be timed in the springtime, roughly 4 weeks after adults are first seen. Only one application per year is necessary. Preventive control is justified where billbugs have caused problems in the past, but may not be worthwhile if billbugs have never been detected.
- If you find yourself in a desperate situation where high numbers of billbug grubs are causing significant

damage, carbaryl (Sevin) will provide some relief. Imidacloprid (Merit) may also kill some (though not all) of the grubs. However, it is difficult to knock back high populations of billbug grubs with any labeled product, and partial control is the likely outcome. It will also be necessary to coddle the turf back into recovery with irrigation and fertilizer.

**Figure 5. Phoenician billbug.** This southwestern pest occurs on warm-season turf, primarily in California and Arizona. It can be distinguished from other billbug adults by the presence of an “M” shaped marking on its prothorax. The “M” is outlined in yellow in the photo to the right to highlight its presence.



## References

- Johnson-Cicalese, J.M. and R.H. White. 1990. Additional host plants of four species of billbug found in New Jersey turfgrasses. *J. Amer. Soc. Hort. Sci.* 115:602-04.
- Shetlar, D. 2003. Identifying billbugs means better control opportunities. *Turfgrass Trends*, July, 2003.

**Table 2. Key products labeled for control of billbugs.** Products should be lightly watered in (1/10 inch water or about 3 turns on most heads) so that the materials are washed off the foliage and into the thatch. Always consult product labels prior to application to confirm the most recent use instructions.

Active ingredient	Trade Name	RATE OF ACTIVE INGREDIENT		Target stage	Control
		Per acre	per 1000 sq ft		
bifenthrin	Talstar	0.8 – 1.6 oz	0.037 oz	adults	curative
chlorantraniliprole	Acelepryn	8 oz	0.18 oz	grubs	preventive
cyfluthrin	Tempo	1.5 oz	0.035 oz	adults	curative
imidacloprid	Merit	6.5 oz	0.15 oz	grubs	preventive
lambda cyhalothrin	Scimitar	1.1 oz	0.025 oz	adults	curative
thiamethoxam	Meridian	17 oz	0.39 oz	grubs	preventive

**Billbug monitoring program:** To get a more accurate fix on the numbers and timings of billbug populations, the monitoring program below, which makes use of a simple, but powerful entomological tool known as a pitfall trap, can be used. The time and effort involved should be minimal (about 1 hour per week during the spring and summer months), and the traps can be placed so that there is no interference with golf.

**Tools needed:**

- cup cutter
- 8 oz plastic containers with pinholes at the bottom to allow for drainage
- a data form (see attached)
- a 3 hole notebook for filing data forms, photographs, written observations
- A waterproof magic marker

**Procedure:** To be initiated in the springtime (once average air temperatures exceed 60F)

1. Select at least three locations on the golf course — preferably in locations where you suspect or know that billbugs occur (billbugs tend to return to the same location in successive years).
2. At each location, identify three sites for pitfall traps that will not interfere with golf play. These sites should be spaced at least 10 yards apart from one another.
3. Using the black magic marker, give each of the 9 plastic cups a unique trap number. First, label each cup with a number from 1 – 9. Then, indicate on each cup which fairway, green complex or tee complex it will be used on. For example, 3-F6 would refer to trap number 3 used on Fairway 6.
4. From each of the sites identified in #2 above, remove soil cores using a cup cutter. Make the cores shallow (about 3-4 inches deep).



5. Place an 8 oz plastic cup in each of the cut out areas. The lip of the cup should be just below the soil surface. Adult billbugs walking across the turf will fall into the traps and will not be able to get out.



6. Check the traps every Monday, Wednesday and Friday. Record the number of billbugs found in each trap in a notebook. Remove and discard (or kill!) the billbugs after you are finished counting them.
7. Rate the turf quality in the area near each pitfall trap. Use a scale of 0 – 9, where 0 = horrible dead turf and 9 = best possible turf.
8. If you are using preventive products such as Merit or March 2, they should be applied 2 – 3 weeks after the first big increase in adults is observed. If you opt for controlling adults with Talstar, Tempo, Scimitar or Dursban, the product should be applied within 1 week of seeing a big increase in adult numbers.