

**TURF & ORNAMENTALS**

# Know your diseases

The majority of lawn care companies do not treat for infectious diseases unless they are chronic problems. But if the disease infection becomes chronic, the first step is to identify it before making a fungicide application. For disease damage to occur, three factors must be present:

- ▶ a suitable host plant,
- ▶ environmental conditions conducive to disease development and
- ▶ a virulent pathogen.

These chronic diseases in lawn care are closely associated with the host:

— Brown patch and gray leaf spot are destructive diseases of tall fescue, perennial ryegrass and St. Augustinegrass.

— Necrotic ring spot, summer patch and dollar spot are diseases that damage Kentucky bluegrass and fine leaf fescue. These diseases are best controlled by preventive fungicide applications.

— Some diseases, such as leaf spot on Kentucky bluegrass and fine leaf fescues and red thread in perennial ryegrass, can be effectively controlled with curative fungicide applications. To reduce the number of fungicide applications, make the first application when the symptoms first appear.

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## TABLE 1. ALTERNATIVE MEDICINES FOR YOUR TURF

Though these products don't guarantee the 99% effectiveness we've come to expect from chemical pesticides, they do offer alternative control solutions when pests are not at their max.

### PRODUCT

#### MINERAL REMEDIES

**Silica** Soluble forms of silica such as potassium silicate, calcium silicate, or silicate (SiO<sub>2</sub>) can be sprayed at a rate of 7 lb. per 1000 ft<sup>2</sup>. Dick Schmidt used Kasil #1 at 20 to 40 fl. oz. per 1000 ft<sup>2</sup>. (information on the product can be found at [www.pqcorp.com/Lines/PS.htm](http://www.pqcorp.com/Lines/PS.htm).)

**Sulfur** Sulfur is an inexpensive yellow powder available through many horticulture supply houses. It can be sprayed or dusted on the foliage at a rate of 1 to 2 lbs. per 1000 ft<sup>2</sup> for control of fungal pests.

**Manganese** Microelements like manganese (not to be confused with magnesium) are usually applied as a spray solution in either the mineral or chelate form.

**Iron** Iron chelate is a safer but more expensive alternative to iron sulfate. Both forms are generally applied as a spray because of the small quantities required.

**Nitrogen** Fast-release nitrogen fertilizer can be used to grow a turf out of many pest problems. N can be sprayed as a liquid or applied as a dry granular and irrigated to activate. A rate of 1 lb. per 1000 ft<sup>2</sup> solves many problems; a half rate is recommended for delicate turf areas.

**Phosphorus** Most phosphate products take far too long to dissolve and activate to aid in pest control. Quickly soluble sources like diammonium phosphate (DAP) can be dissolved and sprayed for faster action and medicinal effects.

**Corn gluten** This livestock feed product exhibits pre-emergence activity on crabgrass and other annual weeds. It also functions as a slow-release, natural fertilizer, containing 10% N.

### HOW TO APPLY IT / WHAT IT CONTROLS

**Lawrence Datnoff found silica fights** gray leaf spot, Marty Petrovic found activity against pythium blight, and Schmidt found it works against dollar spot. In other studies, silica applications reduced brown patch disease by 10 to 20%, and also had activity on powdery mildew.

**Roy Goss found that sulfur controls Microdochium patch.** Pete Dernoeden found good control of take-all patch. Bruce Clark and Jim Murphy found a 23% to 42% reduction in take-all patch from using ammonium sulfate fertilizer. Sulfur is also used to treat powdery mildew. Goss concocted a sulfur regiment for *poa annua* control in creeping bentgrass turf, though Vargas admits, "it might do the job, but God help the patient."

**Charles Peacock and his associates discovered that foliar applications of manganese reduce brown patch disease and even bentgrass summer decline.**

**Tara McLeod, agronomist for the New Zealand Turf Institute, discovered** that monthly applications of iron sulfate at 1.7 lbs. per 1000 ft<sup>2</sup> effectively eliminated clover, slender speedwell, dandelion, and daisy from sports turf. Iron applications also control moss and cow grass and can mask the symptoms of fairy ring and yellow tuft.

**Dollar spot, rust, red thread, pink patch, anthracnose, necrotic ring spot, summer patch, melting out and leaf spot** can be reduced by nitrogen applications, according to Vargas. Nitrogen even benefits so-called "high-nitrogen diseases" like pythium and stripe smut, when applied after the disease has run its course, aiding recovery. Nitrogen can similarly help repair damage from insect outbreaks. Daniel Potter and his colleagues found it vital in promoting recovery from grubs. Legume weeds, like clover and black medic, can be reduced or eliminated by periodic nitrogen treatments.

**Regular phosphate applications reduced crabgrass and dandelion** populations to 5% from 26%, according to work by Wayne Huffine. Foliar sprays of soluble phosphate have also been shown to have a mild curative effect on brown patch disease.

**Nick Christians discovered** the herbicidal side-effects accidentally and has gone on to patent it for turf. Rates of 100 lbs. per 1000 ft<sup>2</sup> are needed for 95% crabgrass control. Work by Tom Turner has found mixed results of gluten, depending on the year, rate, and weather.



## HERBAL REMEDIES

**Salicylic acid** — Salicylic acid is the white dusting you find on the surface of many plants, most notably on the bark of aspen trees. Aspirin is a derivative of salicylic acid. It is a natural protectant in plants that shields against oxidation and stimulates healing.

**Xanthomonas** — Suspensions of Xanthomonas bacteria can be sprayed on the turf on weekly intervals or injected through the sprinkling system for control of *poa annua* (annual bluegrass).

**Schmidt has used salicylic acid to improve fitness** against disease and even to enhance frost and cold tolerance. "We buy salicylic acid by the 10-lb. bag and it's cheap," he says. His recent studies have had more success with root applications — rather than foliar.

**Japanese researchers, led by S. Imaizumi, found** reductions in annual bluegrass populations of up to 75% from certain strains of Xanthomonas. Kentucky bluegrass, bentgrass, and zoysia were unharmed. Recent work by Vargas confirmed these findings. He found additional Poa control by mixing PGR (plant growth regulator) with the bacterial suspension. Work at the University of Massachusetts found that Xanthomonas works better against the annual strain of Poa annua than the perennial strain.

## LIVE BIOLOGICAL REMEDIES

**Pseudomonas** — Michigan State University's TX-1 strain of Pseudomonas can be injected via a BioJect appliance into the irrigation system for disease suppression.

**Nematodes** — Seven different strains of beneficial nematodes are available for control of insect pests. Nematodes are microscopic pinworms, applied alive, that parasitize certain insect pests. However, when sprayed on, most will dry out and die. Granular applications are preferable. (A list of suppliers can be found online at

<http://edis.ifas.ufl.edu/pdf/IN/IN09600.pdf>)

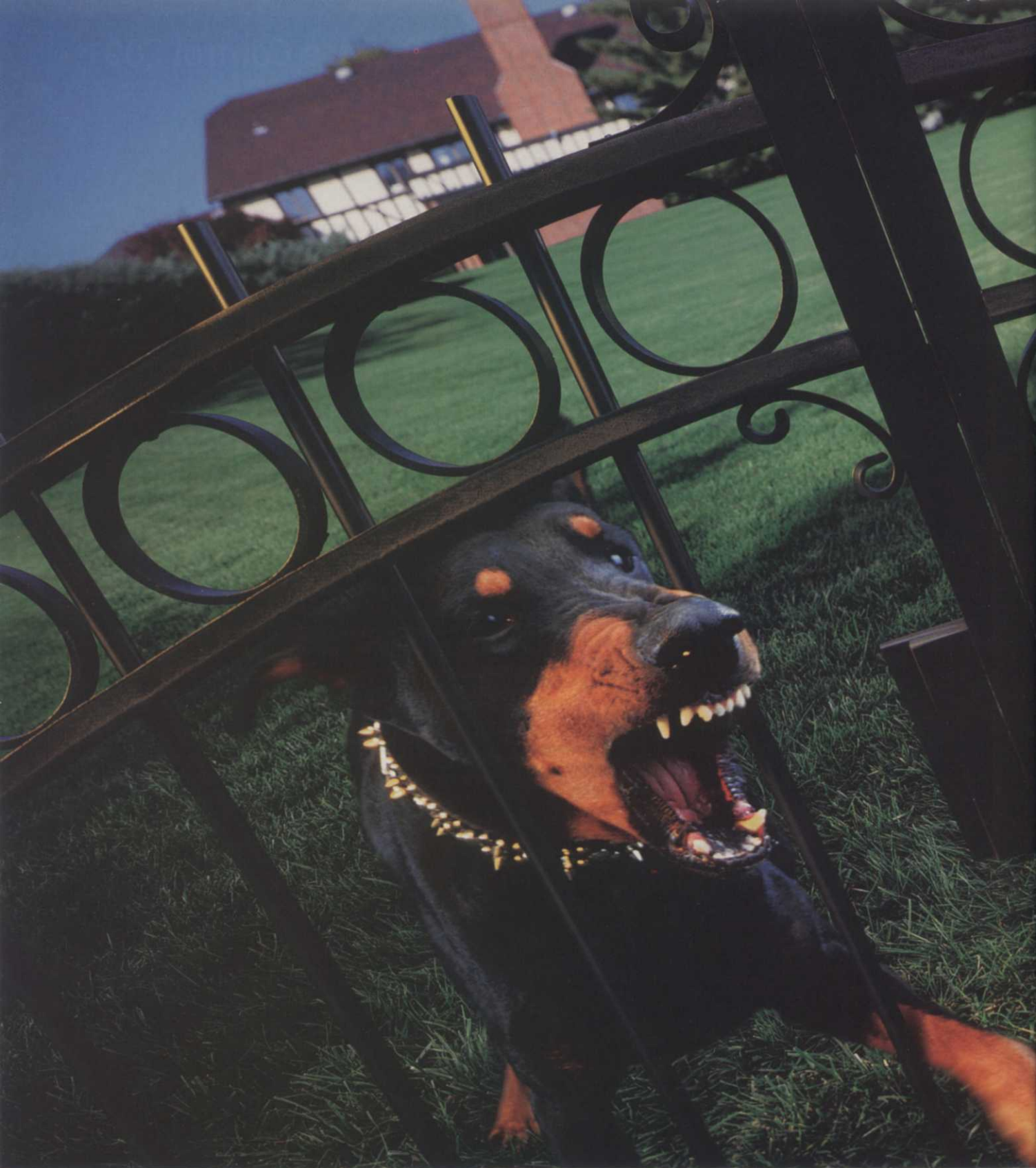
**Pseudomonas bacteria has shown activity against dollar spot, brown patch, and pythium diseases.** It also shows minor activity against anthracnose, leaf spot, take-all patch, bermudagrass decline, necrotic ring spot, summer patch, pink snow mold, and gray leaf spot, according to Vargas. However, under severe disease pressure, fungicides are still required. Graham Davis reported a 27 to 33% reduction in dollar spot severity from TX-1, when tallied across an entire growing season.

**Nematodes are effective against** grubs, mole crickets, caterpillars, and soil inhabiting larva. Beneficial nemas are particularly "host specific," meaning that a given strain of nematode is picky, preferring certain insect pests over others. Be sure to get the right strain for your intended critter.

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**FUNGICIDES**

Table 1. Fungicides labeled for residential lawns

Pathogen	Fungicides	Rates (oz/1,000 ft <sup>2</sup> )
<b>Brown Patch</b>	Azoxystrobin (Heritage 50WG)	0.2 — 0.4
	Flutolanil (ProStar 70WP)	1.5 — 3.0
	Thiophanate-methyl (Cleary's 3336 50WP)	2.0
	Trifloxystrobin (Compass 50WG)	0.1 — 0.25
<b>Dollar Spot</b>	Fenarimol (Rubigan 1AS)	0.75
	Myclobutanil (Eagle 40WP)	0.5 — 1.2
	Propiconazole (Banner MAXX 1.3 MEC)	1.0 - 2.0
	Thiophanate-methyl (Cleary's 3336 50WP)	2.0
	Triadimefon (Bayleton 50WP)	0.5
<b>Gray Leaf Spot</b>	Azoxystrobin (Heritage 50WG)	0.2 — 0.4
	Thiophanate-methyl (Cleary's 3336 50WP)	4.0 — 8.0
	Trifloxystrobin (Compass 50WG)	0.15 — 0.25
<b>Leaf Spot (Melting out)</b>	Azoxystrobin (Heritage 50WG)	0.2 — 0.4
	Thiophanate-methyl (Cleary's 3336 50WP)	4.0 — 8.0
	Trifloxystrobin (Compass 50WG)	0.1 — 0.2
<b>Necrotic Ring Spot</b>	Azoxystrobin (Heritage 50WG)	0.4
	Fenarimol (Rubigan 1AS)	4.0 — 8.0
	Myclobutanil (Eagle 40WP)	1.2
	Thiophanate-methyl (Cleary's 3336 50WP)	4.0 — 8.0
	Propiconazole (Banner MAXX 1.3 MEC)	4.0
<b>Red Thread</b>	Azoxystrobin (Heritage 50WG)	0.2 — 0.4
	Fenarimol (Rubigan 1AS)	8.0
	Myclobutanil (Eagle 40WP)	0.6 — 1.2
	Triadimefon (Bayleton 50WP)	0.5 — 1.0
	Thiophanate-methyl (Cleary's 3336 50WP)	2.0
	Propiconazole (Banner MAXX 1.3 MEC)	1.0 — 2.0
	Trifloxystrobin (Compass 50WG)	0.1 — 0.2
<b>Summer Patch</b>	Azoxystrobin (Heritage 50WG)	0.4
	Fenarimol (Rubigan 1AS)	4.0 — 8.0
	Myclobutanil (Eagle 40WP)	1.2
	Triadimefon (Bayleton 50WP)	2.0
	Thiophanate-methyl (Cleary's 3336 50WP)	4.0 — 8.0
	Propiconazole (Banner MAXX 1.3 MEC)	4.0
	Trifloxystrobin (Compass 50WG)	0.2 — 0.25



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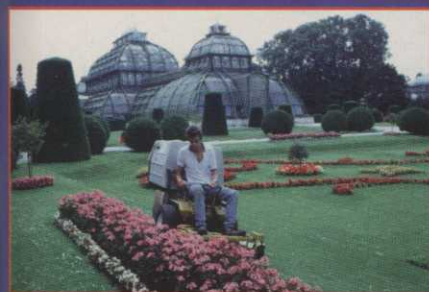
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## COOL- AND WARM-SEASON INSECT PESTS

INSECT	WHERE TO FIND THEM	DAMAGE SYMPTOMS	CONTROL PRACTICES
<i>Warm-season insect pests</i>			
<b>Cutworms/Armyworms</b> <i>Scouting: Soap flush</i>	Warm-season grasses	Turf clipped at soil level; large bare areas	<ol style="list-style-type: none"> <li>1. treat late in day.</li> <li>2. do not mow or remove clippings for 1-3 days;</li> <li>3. may be present from early spring to late fall</li> </ol>
<b>Fire ants</b>	Warm-season grasses	Unightly mounds that may damage mowers, painful stings a problem in high-traffic areas	<ol style="list-style-type: none"> <li>1. control in spring and fall when workers forage for food;</li> <li>2. labor-intensive mound treatments are most effective;</li> <li>3. use continuous control once you start;</li> <li>4. do not disturb mounds in treatment;</li> <li>5. use baits before using contact insecticides (they return baits to mound)</li> </ol>
<b>Mole crickets</b> <i>Scouting: Soap flush</i>	Bahiagrass, close-cut turf	Tunneling, dieback, thin spots	<ol style="list-style-type: none"> <li>1. treat in June/July when eggs hatch;</li> <li>2. follow-up treatments usually needed;</li> <li>3. Watch adults in March/April to pinpoint egg hatch areas</li> </ol>
<b>Ground pearls</b> <i>Scouting: Dig 2-4 in. in soil, sift and look for "pearls"</i>	Bermudagrass, centipedegrass	Yellowing, turf dieback, no new regrowth the following season	<ol style="list-style-type: none"> <li>1. no known effective controls;</li> <li>2. manage for turf tolerance;</li> <li>3. irrigate during dry weather</li> </ol>
<b>Southern chinch bugs</b> <i>Scouting: Look for nymphs under leaf sheath; use a cylinder pressed into ground, filled with water, to watch for floating bugs</i>	All warm-season grasses, especially St. Augustinegrass	Yellowed turf, turning reddish brown	<ol style="list-style-type: none"> <li>1. avoid overfertilizing;</li> <li>2. manage thatch;</li> <li>3. irrigate in dry spells;</li> <li>4. apply pesticides with plenty of water;</li> <li>5. multiple treatments often needed</li> </ol>
<b>Twolined spittlebugs</b> <i>Scouting: Look for spittle masses near base of plant; count nymphs in spittle masses</i>	Warm-season grasses	Yellowed turf, unsightly "spittle masses"	<ol style="list-style-type: none"> <li>1. control adults on ornamentals like hollies;</li> <li>2. treat on cloudy days when bugs are higher up on turf;</li> <li>3. start monitoring in early summer</li> </ol>
<b>White grubs</b> <i>Scouting: Dig sod squares 4- to 6-in. deep to detect grubs (will be closer to surface after rain)</i>	Warm-season grasses	Drought stress and turf dieback, may attract hungry moles or skunks	<ol style="list-style-type: none"> <li>1. treatments most effective late Aug./early Sept.;</li> <li>2. grubs like low-cut, high maintenance turf;</li> <li>3. avoid ornamentals attractive to adult Japanese beetles or green June beetles</li> </ol>
<b>Bermudagrass mites</b> <i>Scouting: Use hand lens to see small worm-like mites on grass and under leaf sheath</i>	Bermudagrass	Yellowing of leaf tips, then shortened internodes for tufted growth, death	<ol style="list-style-type: none"> <li>1. irrigate during dry spells;</li> <li>2. proper fertilization helps turf outgrow damage;</li> <li>3. use resistant cultivars;</li> <li>4. multiple treatments often needed</li> </ol>
<b>Bees &amp; wasps</b>	All turf types	Holes, mounds, tunneling in turf, visible flying insects	<ol style="list-style-type: none"> <li>1. maintain healthy, lush turf;</li> <li>2. mulch under shrubs and trees and keep it fresh to discourage nesting</li> </ol>



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# ► Insects / LM's Quick Reference Technical Guide

INSECT	WHERE TO FIND THEM	DAMAGE SYMPTOMS	CONTROL PRACTICES
<i>Cool-season insect pests</i>			
<b>Japanese beetle</b>	Sandy, loamy soils	Soil samples to count population	<ol style="list-style-type: none"> <li>1. determine species;</li> <li>2. target and time controls accordingly;</li> <li>3. water in grub insecticide thoroughly in irrigated turf</li> </ol>
<b>European chafer</b>	Poorly irrigated turf	Soil samples to count and identify population	<ol style="list-style-type: none"> <li>1. determine species;</li> <li>2. less susceptible to insecticides than most other grub species;</li> <li>3. target and time controls accordingly;</li> <li>4. water in grub insecticide thoroughly</li> </ol>
<b>Oriental beetle</b>	Turf in the Northeast United States	Look in hot/dry soils a few weeks ahead of Japanese beetles	<ol style="list-style-type: none"> <li>1. less susceptible to insecticides so time carefully;</li> <li>2. may need a followup treatment;</li> <li>3. water in grub insecticide thoroughly</li> </ol>
<b>Asiatic garden beetle</b>	Turf in the northeast United States	Soil samples to find tiny grubs	<ol style="list-style-type: none"> <li>1. may be less sensitive to many turf insecticides and can establish in place of other grubs controlled by these products;</li> <li>2. just a nuisance, but that could change;</li> <li>3. water in grub insecticide thoroughly</li> </ol>
<b>Northern masked chafers</b>	Roots and organic matter	Look for broken off roots or damage to root hairs	<ol style="list-style-type: none"> <li>1. determine species;</li> <li>2. target and time controls accordingly;</li> <li>3. most turf insecticides work reasonably well</li> </ol>
<b>Little billbug</b>	Turf in eastern and midwestern United States	Target emergence from hibernating sites before they lay eggs	<ol style="list-style-type: none"> <li>1. determine species and appropriate timing;</li> <li>2. target emergence;</li> <li>3. can use degree-day model;</li> <li>4. applications at larvae stage not as successful</li> </ol>
<b>Bluegrass billbug</b>	Predominant species in eastern United States	Target emergence from hibernation before they lay eggs	<ol style="list-style-type: none"> <li>1. determine species and timing;</li> <li>2. target emergence;</li> <li>3. can use degree-day model;</li> <li>4. applications at larvae stage not as successful;</li> <li>5. may use endophyte-enhanced turf cultivars</li> </ol>
<b>Uneven billbug</b>	Turf in eastern United States	Active adults in early spring and late fall	<ol style="list-style-type: none"> <li>1. determine species and timing;</li> <li>2. target emergence;</li> <li>3. treat accordingly;</li> <li>4. applications at larvae stage not as successful</li> </ol>
<b>Denver billbug</b>	Turf in Rocky Mountains and northern Plains states	May overwinter as medium/large larvae or adults	<ol style="list-style-type: none"> <li>1. determine species and timing;</li> <li>2. target emergence;</li> <li>3. treat accordingly;</li> <li>4. applications at larvae stage not as successful</li> </ol>
<b>Hairy chinch bugs</b>	Midwest and mid-Atlantic areas	Damage occurs when turf has heat or moisture stress	<ol style="list-style-type: none"> <li>1. identify chinch bugs;</li> <li>2. apply appropriate insecticides;</li> <li>3. damage may still remain, especially if turf is in summer dormancy;</li> <li>4. may use endophyte-enhanced turf cultivars</li> </ol>
<b>Webworms</b>	Several species in northern United States	Damage may be severe or sporadic; may not need attention	<ol style="list-style-type: none"> <li>1. treatments most effective 2 to 3 weeks after peak moth flight;</li> <li>2. timing reaches small, susceptible caterpillars as they become active;</li> <li>3. endophyte-enhanced turf cultivars are resistant to some species</li> </ol>

\* Check with your county cooperative extension agent for insecticide recommendations