

# ATHLETIC TURF

## ASTM to review field safety

The American Society of Testing Materials will hold a symposium on the safety of natural and artificial playing fields. Although the conference will take place in December, the deadline for submitting abstracts on research is June 1.

The purpose of the symposium is to provide a forum for technical information on artificial and natural playing surface characteristics and safety. ASTM is inviting researchers to present papers on physical and functional properties; construction; maintenance; safety; economics; research; injuries; and comparisons of surfaces. Priority will be given to papers emphasizing research, case studies and information on how to choose the most appropriate type of turf for a particular application.

Related topics include:

- Case studies of injury data relating to artificial or natural turf.
- Turf characteristics, selection and best use and safety most likely to be encountered in the end application; and interpretation of those results.
- Unusual testing programs that incorporate several of the various environmental considerations encountered.
- Research on turf improvements.
- Field test methods for determination of field safety.
- Maintenance recommendations for playing fields.

The symposium, to be held in Phoenix, Ariz., on Dec. 6, 1988, is being sponsored by ASTM Committee F-8 on Sports Equipment and Facilities.

For more information on submitting and presenting papers at the symposium contact: Theresa Smoot, ASTM, 1916 Race St., Philadelphia, PA 19103; (215) 299-5413 before June 1, 1988.

## Hardness measurements continue

The task of quantitatively measuring the hardness of athletic fields continues. "When people can see a number, they can make a measurement," says Trey Rogers, a graduate student at Penn State University.

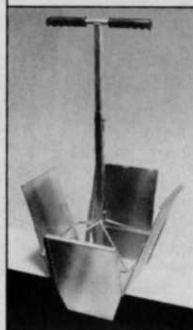
Studies conducted by Rogers are beginning to provide some data. From it, he came to some general conclusions:

- practice fields are harder than game fields;
- fields are harder inside the hashmarks;
- and there is a strong association between management practices, construction and hardness levels.

Rogers collected data at 12 test schools, testing two locations per field—inside and outside the hash marks. Testing was conducted in November 1986, March 1987, June 1987, August 1987 and November 1987.

Factors included in the testing were compaction, aerification, moisture, cutting height, vegetation, species, test hammer weight and thatch. Rogers presented preliminary data at the GCSAA Convention in Houston.

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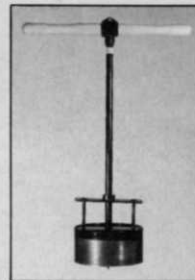
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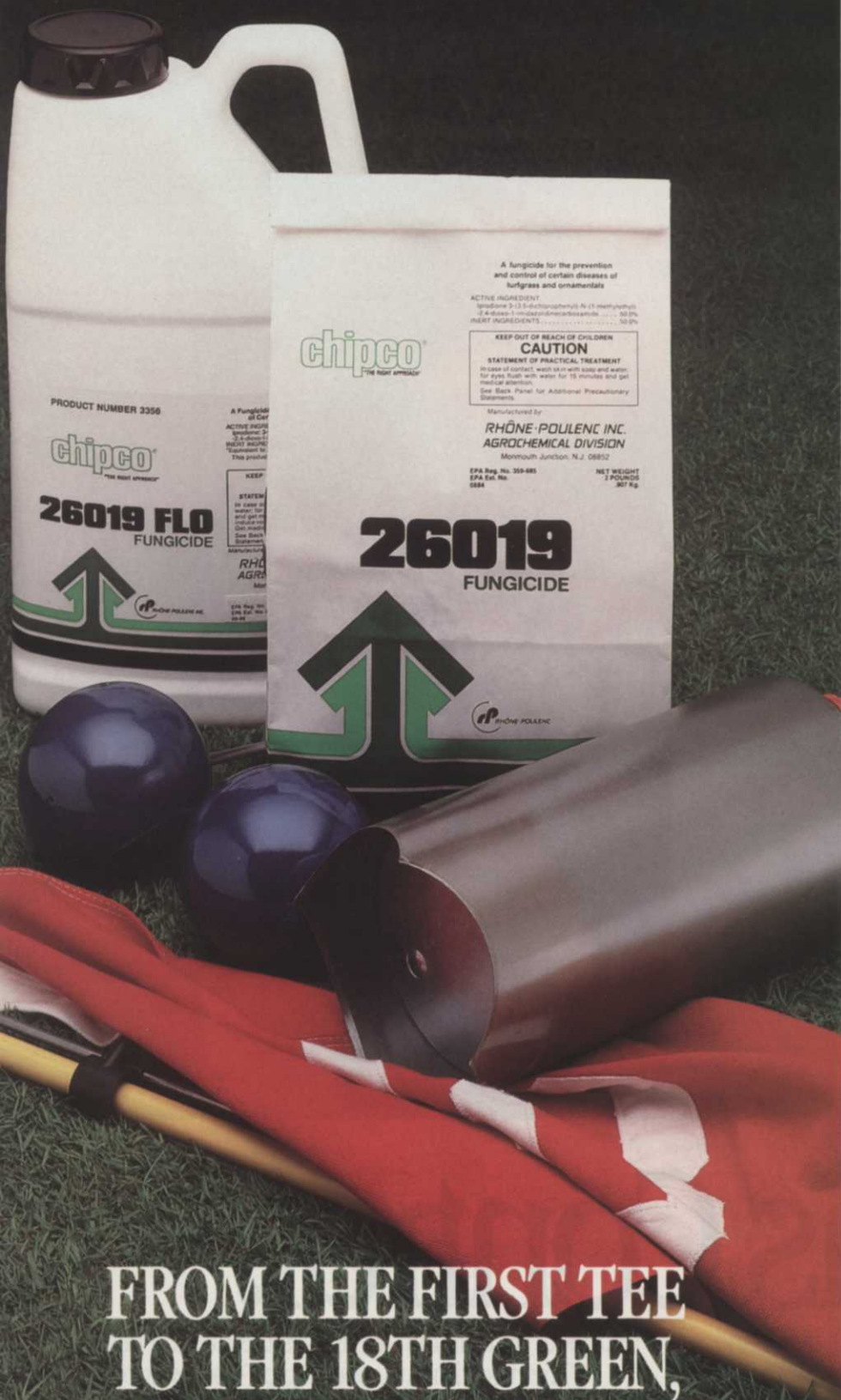


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# COOL-SEASON INSECT CONTROL

Here's what's new in cool-season insect control: Triumph has finally received a label; diazinon cannot be used on golf courses; and nematodes may control insects biologically.

by Harry D. Niemczyk, Ph.D., Ohio Agricultural Research & Development Center

**F**inally, after more than 14 years of research and evaluation, Ciba-Geigy's Triumph 4E (isazofos) received EPA registration on Jan. 25. A restricted use product, Triumph may be used by certified applicators only.

The registration covers use only by commercial lawn pest control personnel on home lawns. Registration for use on golf courses is in progress but may be a year or two away.

University research has shown the insecticide to be rapidly effective against a broad range of pests, including grubs, chinch bugs, sod webworms, cutworms and billbugs. A maximum of one application per year is permitted for the 2 lb. AI/A rate. A maximum of two applications per year at least 60 days apart is permitted for the 1 lb. AI/A rate.

### Status of diazinon

EPA administrator Lee Thomas has taken diazinon off the board for use on golf courses and sod farms, though it is still available for use on home lawns.

Thomas, last month, stated in a 50-page opinion that Ciba-Geigy (major producer of the product) presented "inadequate" data regarding the safety of diazinon on golf courses and sod farms.

At presstime, Ciba-Geigy was still considering a visit to the U.S. Court of Appeals, which would be the next step in the judicial process. (See "Green Industry News"—Ed.)

### Nematodes for insect control

Two species of nematodes parasitic on the larval forms of insects such as sod webworms, cutworms, billbug larvae and grubs, continue to show promise.

The Biosis Co. of California, producer of the nematodes, reports continued progress in producing the nematodes and devising forms in which they can be shipped. Tests in Ohio in 1987 showed a single application in June gave 79 percent control of billbug larvae. This form of biological control appears to have real promise.

### AD?

AD is an abbreviation for accelerated degradation, a phenomenon whereby microorganisms (fungi, bacteria, actinomycetes) adapt to the presence of pesticide residues to the point where they actually use the pesticide as a source of energy.

Research at OARDC/The Ohio State University, Wooster, Ohio, has confirmed that AD is, in large measure, responsible for the reduced effectiveness of Oftanol experienced by users of the product over the past two years. Investigations at OSU continue in order to determine how much the AD phenomenon affects the effectiveness of other pesticides used on turfgrasses.

### Life cycle is still key

Knowing the life cycle of pests is at least as important as selecting an insecticide for their control. This guide points out the seasonal occurrence of some important cool- and warm-season pests to be alert for in 1988, when their vulnerable stages occur, and some suggested insecticides that may be used to control them. No endorsement of products is intended, nor is criticism implied for those not mentioned.



A golf course superintendent applies parasitic nematodes to the green.

*continued on page 26*

# CALENDAR

## Late Winter (March)

**Chinch bugs and billbugs**—In northern zones chinch bugs and billbugs both overwinter as adults in thatch or sheltered sites near buildings. They can become active during warm days in March. Infestations of hairy chinch bug and bluegrass billbug also occur in zoysia, Kentucky bluegrass and fine fescues.

**Grubs**—The larvae of this group of pests normally overwinter six inches or deeper in the soil. If spring comes early, grub activity can be expected along with skunks and raccoons which will tear up the turf searching for the grubs. Moles, which feed on grubs and earthworms, also become active at this time.

**Black turfgrass ataeinus**—This golf course pest overwinters as an adult in the soil under debris in roughs or other protected areas. A few may be seen flying about on warm afternoons in early March. Usually this activity begins when crocus starts blooming and intensifies as the bloom of red bud appears.

**Greenbug**—The only stage of the greenbug known to overwinter in northern states is the egg. Shiny black eggs deposited the previous fall may be found adhering to grass blades, fallen tree leaves or other debris.

**Sod webworms**—The most common sod webworm species overwinter as larvae in the thatch or upper inch of soil. Feeding does not resume until hibernation (diapause) is broken by early spring warmth.

## Spring

**Chinch bugs and billbugs**—As warm days of spring approach, movement of chinch bug and billbug adults increases rapidly. Generally, egg laying begins the first week



Pulling back the turf on a green can reveal hidden cutworms.

of May, but can begin in mid-April if spring arrives early. Occasionally adult billbugs can be seen on sidewalks on warm afternoons.

Generally, application of insecticides to prevent infestations of chinch bugs and billbugs should be completed by the first week in May in cool-season areas. Applications may begin as early as the last week of March. Such applications must be made before significant numbers of eggs are laid. This time may vary as much as a week or more depending upon the spring weather.

**Grubs**—Overwintered grubs return to the surface and begin feeding on turfgrass roots in April. Increased activity and damage from birds, moles, skunks and raccoons foraging on grubs can also be expected. Feeding by birds, mammals and grubs continues through May.

Treatment should be delayed until grubs are in the top one-inch of soil. Irrigation or rainfall should follow such applications to aid in moving the insecticides to the target grub as soon as possible.

Although milky disease products for control of Japanese beetle grubs may be applied anytime there is no frost in the soil, spring is a good time for such applications. The soil is open and frequent rains move the disease spores into the soil and thatch. Milky disease products are primarily effective against Japanese beetle larvae. Infection in other species is low.

Incidents of large grub infestations (larvae of June bugs) have been increasing in cool-season areas. Locations of such infestations should be identified because reinfestation is likely every three years.

Eggs are laid in May and June, therefore treatment should be made in late summer, early fall of that year or the next spring while the larvae are small. Later applications against full-grown larvae have given inadequate control.

**Black turfgrass ataeinus**—Adults of the black turfgrass ataeinus can be seen "at wing" in April and are often found in clipping catchers after early mowing of golf course greens. These adults begin laying eggs in early May, or about the time Vanhoutte spirea firs come into bloom. Diazinon, applied to fairways at this time, kills adults and prevents summer infestation of larvae. Check with local extension entomologists for precise time if needed.

A word of caution: diazinon applications

## SUMMARY OF GRUB CONTROL TESTS IN OHIO - 1971-86<sup>1</sup>

INSECTICIDE	LB AI/A	MEAN % CONTROL	(NO. OF <sup>2</sup> TESTS)
ethoprop (Mocap)	5.0	92	(5)
isazofos (Triumph)	2.0	91	(15)
bendiocarb (Turcam)	2.0	85	(15)
isofenphos (Oftanol)	2.0	83	(33)
carbaryl (Sevin)	8.0	81	(9)
trichlorfon (Proxol)	8.0	80	(20)
diazinon	5.5	61	(12)
chlorpyrifos (Dursban)	4.0	34	(9)

<sup>1</sup> Includes Japanese beetle, *Cyclocephala* spp., *Phyllophaga* spp. only.

<sup>2</sup> Each test replicated 3 or 4x. Generally, treatments applied late summer or early spring. Irrigated (1/4-1/2 inch) after application, thatch - 1/2 inch, readings taken ca. 4-8 weeks after treatment. H.D. Niemczyk & K.T. Power.



# INSECT CONTROL GUIDE

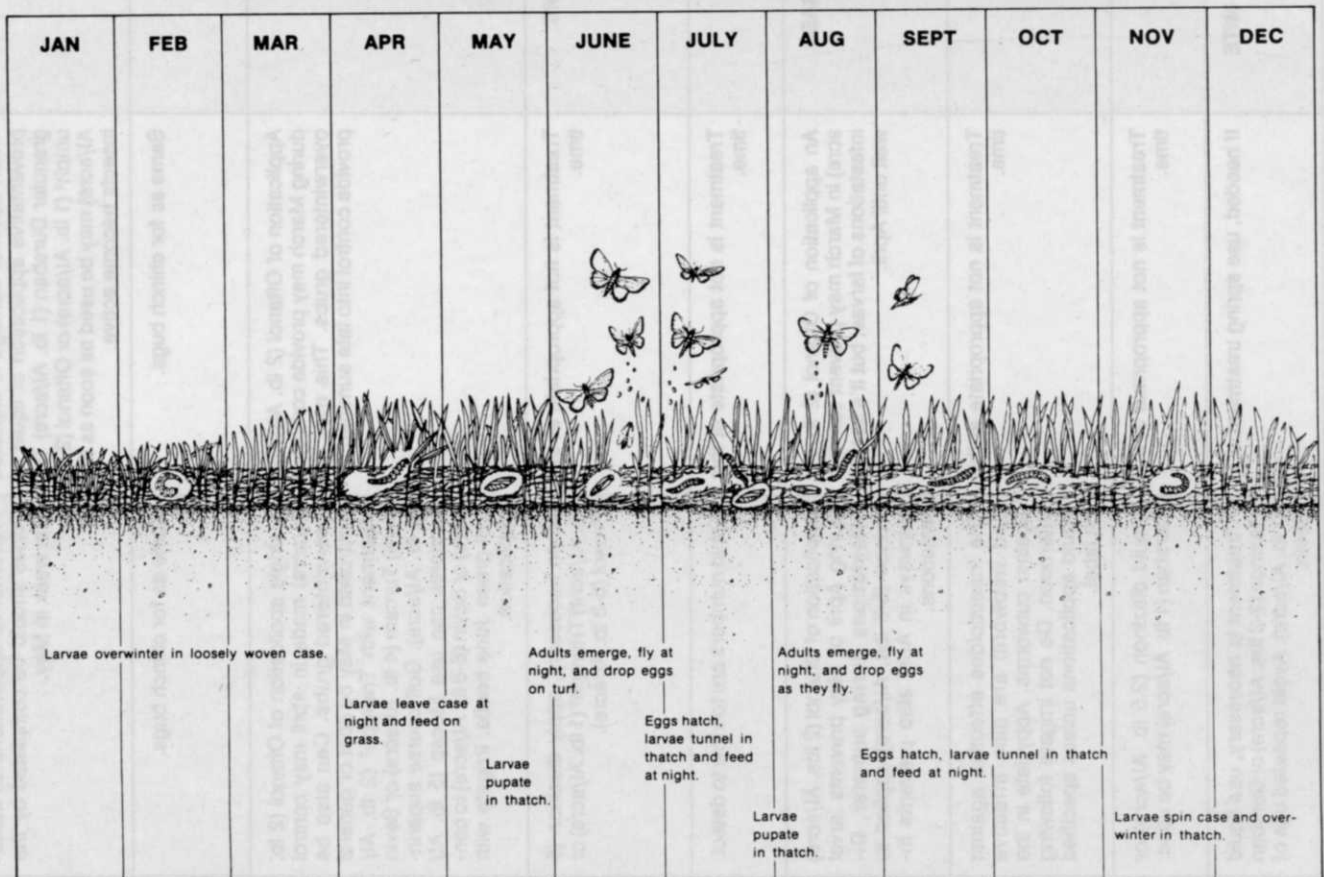


COOL SEASON*	LATE WINTER (March)	SPRING (April-May)	SUMMER (June-Aug.)	FALL (Sept.-Oct.)
<b>CHINCH BUGS</b>	When summer damage is expected preventative application of liquid or granular Dursban (1 lb. Al/acre) Triumph <sup>1</sup> (1 lb. Al/acre) or Oftanol (2 lb. Al/acre) may be used as soon as the insects become active.	Preventative applications of insecticides should be completed by the first week in May.	Treat before injury is severe with Dursban (1 lb. Al/acre), diazinon (2.5-5.5 lb. Al/acre), Triumph <sup>1</sup> (1 lb. Al/acre), Sevin (6-8 lbs. Al/acre) or other labeled insecticides.	Treat if necessary, but generally, infestation levels are not high enough to warrant using insecticides.
<b>BILLBUGS</b>	Same as for chinch bugs.	Same as for chinch bugs.	Treat infestations at same rates as grubs with diazinon, Turcam, Proxol or Sevin. Irrigate following application.	Treatment is usually not appropriate at this time.
<b>GRUBS</b>	Application of Oftanol (2 lb. Al/acre) during March may provide control of overwintered grubs. This may not provide control into late summer.	A single application of Oftanol (2 lb. Al/acre) made in April may control overwintered grubs. Can also be controlled in May by spot or general treatment with Triumph <sup>1</sup> (2 lb. Al/acre) Turcam (4 lb. Al/acre) or Sevin (8 lb. Al/acre). Golf course superintendents can use Mocap (5 lb. Al/acre) or Sevin (6-8 lb. Al/acre) to control green June beetle. Irrigate with application.	Existing infestations found in July or Aug. may be treated with Triumph <sup>1</sup> , Proxol, Turcam, Oftanol, Sevin or Mocap (commercial turf only) at rates used in spring. Treat green June beetle with Sevin (6-8 lb. Al/acre).	Treatment can be made as late as mid-September. Irrigate first if thatch or soil is dry.
<b>SOD WEBWORMS</b>	Treatment is not appropriate at this time.	When necessary, apply diazinon (5 lb. Al/acre) Triumph <sup>1</sup> (1 lb. Al/acre) or Proxol (6-8 lb. Al/acre).	Make application when larvae are present or two weeks after peak moth flight. Use Dursban (1 lb. Al/acre), Triumph <sup>1</sup> (1 lb. Al/acre), diazinon (5 lbs. Al/acre), Sevin (6-8 lbs. Al/acre) or Proxol (6-8 lb. Al/acre).	Larvae are small and cause little damage at this time. Treatment in September reduces population for next spring.
<b>GREENBUGS</b>	Treatment is not appropriate at this time.	Aphid numbers are too low to detect.	Use Orthene (1 lb. Al/acre) or Dursban (1 lb. Al/acre) or diazinon (2.5 lb. Al/acre).	Severe infestations may occur as late as December. Use the same insecticides as in the summer.
<b>BLACK TURFGRASS ATAENIUS</b>	An application of Oftanol (2 lb. Al/acre) in March may prevent summer infestations of larvae, but it's best to wait until April.	Application of Oftanol (2 lbs. Al/acre) during April or May prevents larval infestations during summer. Diazinon (5-6 lbs. Al/acre) applied to fairways in April also prevents infestations.	If preventative applications were not made, spot or generally treat with Proxol (8 lbs. Al/acre), Turcam (2-4 lbs. Al/acre), Sevin (8 lbs. Al/acre) or Mocap (5 lbs. Al/acre), as needed.	Undeveloped larvae die with frost.
<b>CUTWORMS</b>	Treatment is not appropriate at this time.	The insecticides effective against sod webworm are also effective against cutworms. Apply late in the afternoon. Do not irrigate following liquid applications unless specified on label.	Use Dursban (1 lb. Al/acre), Triumph <sup>1</sup> (1 lb. Al/acre), Proxol (8 lbs. Al/acre) or Sevin (6-8 lbs. Al/acre). Do not irrigate following liquid applications unless specified on label.	Same as for summer.
<b>COVER MITES</b>	Treatment is not appropriate at this time.	Liquid diazinon (2.5 lb. Al/acre) or Dursban (1 lb. Al/acre) may be used.	Treatment usually is not necessary.	Treat as needed with liquid diazinon (2.5 lbs. Al/acre) or Dursban (1 lb. Al/acre).
<b>WINTER GRAIN MITE</b>	If needed, use spring treatment.	If treatment is necessary, use liquid diazinon (2-3 lbs. Al/acre) or Dursban (1 lb. Al/acre). Avoid repeated use of Sevin.	Treatment is not appropriate, since mite is in egg stage.	Treatment is not appropriate since mite is in egg stage.

<sup>1</sup> For use only by commercial lawn pest control personnel. A maximum of one application per year is permitted for the 2 lb. Al/acre rate. A maximum of two applications per year at least 60 days apart is permitted for the 1 lb. Al/acre rate.

\* See accompanying text for details; always follow label directions.

# LIFE CYCLE OF THE COMMON SOD WEBWORM *PARAPEDIASIA TETERRELLA* (ZINCH)



may be toxic to waterfowl such as geese feeding on the treated turf.

**Sod webworms**—Overwintered larvae of the sod webworm begin feeding as soon as the grass begins to grow. Usually damage is insignificant, but areas that do not green up may be infested. These areas frequently have probe holes from starlings feeding on the larvae.

Moth flights begin in May in northern areas. Young larvae are usually present about two weeks after the spring moth flight peaks, so treatment of young larvae can be done in May in some areas.

**Cutworms**—Moths of cutworms begin laying eggs on golf course greens and other turf areas in the spring. These eggs hatch producing larvae that feed on grass blades during the night. The black cutworm is the most common species on cool-season turf.

While visible damage is uncommon on home lawns, damage can be significant on golf course greens in late May.

**Greenbug**—Greenbug eggs begin hatching as early as April, but significant infestations do not develop until later in the year. Greenbugs are also brought into the region from the south on upper air winds. Aphid numbers are too low to detect in lawns at this time.

**Winter grain mite**—Damage from this

mite is often first noted in April when turf areas are receiving spring fertilizer applications. Winter grain mites are identifiable for eight bright red legs and a dark body. By late May, the mites will have laid their eggs and died. Mites do not appear again until the eggs hatch in October.

**Clover mites**—Incidents of visible damage to home lawns are often seen in April in several Ohio cities and Denver, Col. Usually a nuisance pest in and around homes, the clover mite occurs in large numbers (5,000 per sq. ft.) across entire lawns and on turf next to building foundations. Symptoms of injury were the same as the winter grain mite. Turf next to foundations may be killed.

The clover mite has a slightly pink body and eight pale-colored legs. The first pair of legs are extremely long and protrude well out in front of the mite. The absence of bright red legs distinguishes the clover mite from the winter grain mite.

## Summer (June-August)

**Chinch bugs**—Chinch bug eggs continue to hatch into June. Bright red nymphs with a center white band appear. The number of chinch bugs increases rapidly in June. Their populations peak in July and August, when northern lawns can receive severe

damage. This damage is often masked by summer dormancy of turf caused by drought. Hot, dry conditions are ideal for chinch bugs.

During August the nymphs molt into adults that mate, lay eggs, thus producing a second generation. Some northern areas have only one generation per year.

**Billbugs**—Bluegrass billbug larvae feed in grass stems during June and move to the plant crowns, roots and rhizomes during July. This feeding causes brown spots that frequently resemble the symptoms of some fungus diseases. Symptoms are also often masked when the turf is dormant from drought. The larvae usually move deeper into the soil under dry soil conditions. During late July and August the larvae burrow deeper into the soil to pupate and transform into adults.

**Grubs**—By June, grubs have stopped feeding and are in the pupal stage three to four inches in the soil. Beginning in mid-June and continuing through mid-July, the adults of various species emerge and burrow into the soil to lay eggs. Hatching and appearance of young larvae occur during July and August.

Extreme heat and drought during the summer may cause some grubs to move deeper in the soil. Under such conditions, irriga-



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## INSECT EXPERT OR NOVICE?

Quiz yourself or your crew to see how much training is needed.

- All stages of chinch bugs, except eggs, damage turf.  
true false
- Generally, insect specimens sent to an entomologist for identification should be sent \_\_\_\_\_.  
dry in formaldehyde in alcohol in distilled water
- The rastral pattern of which of the following insects has spines arranged in the shape of a small "V"?  
European chafer Japanese beetle Northern masked chafer
- Sod webworms and cutworm moths lay their eggs \_\_\_\_\_.  
at night early in the morning on bright days
- Which of the following turf moisture conditions is most conducive to the development of damaging populations of chinch bugs?  
excess adequate droughty
- Turf with small or large damaged spots breaks off at the soil line when pulled, and shows evidence of a sawdust-like material at the base of the stem, probably was damaged by \_\_\_\_\_.  
white grubs billbugs sod webworms chinch bugs
- The rastral pattern of which of the following is scattered (no pattern)?  
European chafer Japanese beetle Northern masked chafer
- Liquid soap in water applied to turf is a good way to tell if the turf is infested with \_\_\_\_\_.  
grubs billbugs cutworms chinch bugs
- Bluegrass billbugs pass the winter as \_\_\_\_\_.  
egg larva pupa adults
- During January, the Japanese beetle is in which stage of development?  
egg larva pupae adult
- The chinch bug has \_\_\_\_\_ generations a year in your area?  
one two three
- The Japanese beetle completes its life cycle in \_\_\_\_\_ year(s).  
one two three
- The big-eyed bug is a \_\_\_\_\_.  
pest predator parasite
- The adult cutworm is larger than the adult sod webworm.  
true false

Turn the page upside down for the answers.

ANSWERS: 1. True 2. in alcohol 3. Japanese beetle 4. at night 5. droughty 6. billbugs 7. Northern masked chafer 8. cutworms 9. adults 10. larva 11. one or two—You should know your area! 12. one 13. parasite 14. True  
If you got:  
14 right—Super!  
13 right—Well done  
12 right—Not bad  
11 right—OK  
less than 11—Training needed  
Turn the page for the answers.

tion several hours before treatment and a thorough soaking afterward is advisable.

**Black turfgrass ateniensis**—Eggs laid by beetles during May hatch in June and the larvae immediately begin feeding on the turf roots and thatch.

From late June to mid-July, symptoms of injury include wilting in spite of irrigation. In July, larvae move deep into the soil, pupate and emerge as adults. These adults

lay eggs during August, producing a second generation in states such as Ohio. The second generation larvae are capable of damaging turf.

**Sod webworms**—Damage from sod webworm larvae occurs occasionally in most of the cool-season turf region. Injury is more common in midwestern states, usually in July and August. Older sod fields and heavily thatched turfs are good

candidates for infestation. There are generally one or two generations per year, depending upon the species.

**Cutworms**—Cutworm larvae continue to cause damage to golf course greens from June through August. These larvae pupate in the soil or thatch and emerge as moths that lay eggs for additional generations.

**Fall armyworm**—The fall armyworm is seldom a problem of cool-season turf.

**Greenbug**—Damaging populations of greenbug can occur from June through August. Populations and incidents of damage frequently vary from area to area even within a city.

Symptoms of injury include turf under the dripline of trees and in open areas having a burnt orange color. When symptoms are seen, numerous aphids (40 or more) may be seen on a single grass blade. Close examination of damaged turf is necessary because the aphids are small. If left untreated, a heavy infestation can kill the turf.

### Fall (Sept.-Oct.)

**Chinch bugs**—In the northern U.S. the second generation of chinch bug is at peak numbers in September. Nymphs complete their development to adults in late October. Most chinch bugs overwinter in the turf, but some move to protected areas before winter.

Generally, infestation levels at this time are not high enough to warrant the use of insecticides. Early fall rains and infection by a parasitic fungus (*Beauveria* spp.) usually provide sufficient control.

**Billbugs**—During September, billbug adults that developed from summer larvae are often seen on sidewalks, driveways or other paved surfaces. Before winter, these adults seek shelter in thatch, along sidewalk edges or near foundations and overwinter there. Many, if not most, overwinter in turf.

In some areas (Cincinnati, Ohio) a partial second generation may occur. Larvae of this generation have been known to cause visible damage in September and October.

**Grubs**—Most species of grubs are in the third of their three stages of development and are feeding actively. When soil temperatures decrease in late October, the larvae burrow deeper into the soil to overwinter. If soil temperatures remain warm, larvae stay at the surface and continue feeding. Severely cold winters have little effect on survival.

**Black turfgrass ateniensis**—By September, adults of the current generation begin to fly into protected areas, such as golf course roughs, to overwinter. Larvae that have not completed development to adults before frost are killed.

**Sod webworm**—Northern sod webworm larvae are small and cause little if any damage in the fall. Late in the fall the larvae construct a cocoon-like shelter in which they overwinter.

**Greenbug**—Severe infestations of greenbug have been known to occur as late as the first week of December. Areas having a history of infestation should be re-examined when mild temperatures extend late into the fall. Heavily infested turf will not survive through winter. **LM**