

COOL-SEASON INSECT CONTROL

The good news is that the drought last summer reduced grub populations. The bad news is that chinch bugs will pick up the slack.

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What impact will the Midwest's drought of 1988 have on turfgrass insects in 1989? Well, it should come as no surprise that there is both good and bad news.

The good news is that grub populations in many areas are reduced. The drought delayed emergence of adult beetles that often had to lay eggs in dry soil. Because these eggs need to absorb soil moisture soon after being laid, many eggs did not survive. Eggs that did hatch produced larvae that had a tough time surviving in dry soil.

Though the population of egg-laying adults was reduced in 1988, irrigated turfgrass areas often had grub infestations that were near "normal."

Chinch bugs are pests that are at their peak under hot, droughty conditions, which is why they thrived last summer. The fact that the turfgrass turned brown and went into dormancy poses no problem for these pests. Though dormant, the plant is still very much alive so chinch bugs can probe plant stems, crowns and roots with their piercing, sucking mouthparts and obtain all the plant fluids necessary to keep them alive and well.

The bad news

The real damage is caused by them simultaneously feeding and injecting salivary fluids into the plant. The presence of this foreign substance reduces the plant's capability to circu-

late water and nutrients, and can ultimately lead to its death. Turfgrasses under moisture stress are particularly susceptible.

Billbugs lay their eggs in early April and May. Therefore, when turfgrasses became dormant in 1988, the larvae were well established and had no problem finding living crowns, roots and rhizomes to feed on.

Unlike the chinch bug, which can frequently be seen darting around the turfgrass surface on adjacent paved areas in July and August, billbug larvae feed beneath the soil surface, hidden from view. Damage from both these pests is most severe in turfgrass areas under moisture stress, where damaged turf looks no different than



Is it drought, insect injury or both? Damage from chinch bugs (left), like billbug damage, is frequently masked by the similar symptoms associated with moisture stress (right).

the dormant turf and is therefore frequently undetected. It often becomes apparent only after the turf receives rain or irrigation yet fails to recover.

Look for an abundance of chinch bugs and billbugs this year.

Despite the influence of the 1988 drought, near "normal" infestations of grubs can be expected in 1989, especially if "normal" amounts of precipitation occur.

Life cycle is key

Knowing the life cycle of pests is still at least as important as selecting an insecticide for their control. This guide points out some of the seasonal occurrence of some important cool-season pests to be on the lookout for this year. Best control will come when you apply insecticides during the pest's most vulnerable stages, which are outlined here. No endorsement of products is intended, nor is criticism implied for those not mentioned.

Late winter

Chinch bugs and billbugs—

In northern zones chinch bugs and billbugs both overwinter as adults in thatch or sheltered sites near buildings. Summer drought has led to high overwintering populations.

They can become active during warm days in March. Infestations of hairy chinch bugs and bluegrass billbugs 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 tear up the turf in search of them. Moles, which feed on grubs and earthworms, also become active at this time.

Black turfgrass atanius—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.

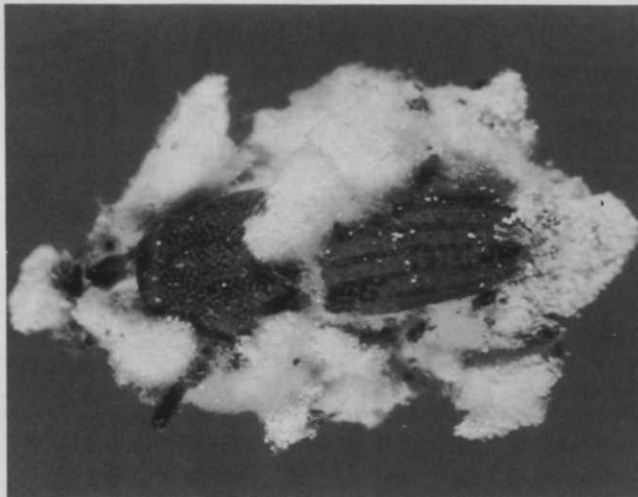
Greenbug—The only stage of the greenbug known to overwinter in northern states is the egg. Shiny black eggs deposited the previous fall may be found adhering to grass blades, fallen tree leaves or other debris.

Sod webworms—The most com-

mon sod webworm species overwinter as larvae in the thatch or upper inch of soil. Feeding does not resume until hibernation (dipause) is broken by early spring warmth.

Spring

Chinch bugs and billbugs—As warm days of spring approach, movement of chinch bug and adult billbugs increases rapidly. Generally, egg laying begins the first week of May, but can begin in mid-April if spring arrives early. Occasionally adult billbugs can be seen on sidewalks on warm after-



A bluegrass billbug infected with the parasitic fungus (*Beauveria* spp.).

noons.

Generally, application of insecticides to prevent infestations of chinch bugs and billbugs should be completed by the first week in May. 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 on 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 continue through May.

Treatment should be delayed until the 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 any time 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. Ineffectivity against other species is low.

Incidents of large grub infestations (larvae of June bugs, for example) 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 in past studies.

Black turfgrass

atanius—Adults of the black turfgrass atanius 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 first comes into bloom. Dursban applied to a fairway at this time kills adults and prevents summer infestation of larvae. Check with local extension entomologists for the precise time if needed.

A second application, two weeks after the first, may be needed to successfully prevent infestation.

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 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

SUMMARY OF GRUB CONTROL TESTS IN OHIO - 1971-81¹

INSECTICIDE	LB AI/A	MEAN % CONTROL	(NO. OF TESTS) ²
ethoprop (Mocap)	5.0	83	(10)
isazofos (Triumph)	2.0	92	(20)
bendiocarb (Turcam)	2.0	83	(18)
isofenphos (Oftanol)	2.0	80	(37)
carbaryl (Sevin)	8.0	64	(14)
trichlorfon (Proxol)	8.0	81	(23)
diazinon	5.5	60	(16)
chlorpyrifos (Dursban)	4.0	43	(11)

¹ Includes Japanese beetle, *Cyclocephala* spp., *Phyllophaga* spp. only. ² 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.

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 March or April when turf areas are receiving spring fertilizer applications. Winter grain mites are identifiable by 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. Usually a nuisance pest in and around homes, the clover mite occurs in large numbers (5,000 per square foot) 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 is 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 in-

creases 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 and 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 pattern 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, irrigation several hours before treatment and a thorough soaking afterward is advisable.

Black turfgrass ataenius—Eggs laid by beetles during May hatch in June and the larvae immediately begin feeding on 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 some states. The second generation larvae are capable of damaging turf. States farther north have only one generation.

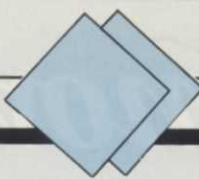
Sod webworms—Damage from sod webworm larvae occurs occasionally in most of the cool-season turf region. Injury is more common in mid-western states, usually in July and August. Older sod fields or areas with heavy thatch are good candidates for infestation. There are generally one or two generations per year, depending on 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 ar-

INSECT

CONTROL



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

¹ For use only by commercial lawn pest control personnel except in states where Special Local Needs labeling permits use on golf course tees, greens and aprons, and on sod farms. A maximum of one application per year is permitted for the 2 lbs. Ai/acre rate. A maximum of two applications per year at least 60 days apart is permitted for the 1 lb. Ai/acre rate.

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

** Diazinon may not be used on golf courses or sod farms.

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myworm is seldom a problem of cool-season turf.

Greenbug—Damaging populations of greenbugs can occur from June through August. Populations and incidents of damage frequently vary from area to area, even within the same city.

Symptoms of injury include turf under the dripline of trees and in open areas having a burnt orange color. When symptoms are apparent, 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 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 ataenius—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 the first 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**

INSECT EXPERT OR NOVICE?

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

1. Droughty, dormant turf often masks chinchbug and billbug damage.

true
false

2. The rastral pattern of the northern masked chafer is two parallel rows of spines.

true
false

3. Black turfgrass ataenius lay most of their eggs in _____.

April
May
June
July
August

4. *Beauveria* is a fungus that infects and kills chinchbugs.

true
false

5. The northern masked chafer completes its life cycle in _____ year(s).

one
two
three

6. Chinchbugs have _____ mouthparts.

chewing
piercing-sucking
rasping

7. Grubs consume _____.

turf roots only
thatch
soil
soil, turf roots and thatch

8. Bluegrass billbug adults lay eggs in _____.

soil
thatch
grass crowns
grass stems

9. Greenbugs feed on tree leaves.

true
false

10. _____ is a common pest of golf greens in the cool-season region.

sod webworm
armyworm
black cutworm

11. Most species of grubs overwinter as _____.

larvae
pupae
adults
eggs

12. Chinchbugs can be controlled by spring application of insecticide.

true
false

13. Mites have _____ legs.

four
six
eight

14. The phone number of the Poison Control Center nearest my place of business is posted where it is readily available to me and my employees.

true
false

15. Resistance is usually not the problem when poor insect control is obtained with insecticide.

true
false

If you got:

15 right you're super
14 right: a job well done
13 right: not bad
12 right: OK but...

11 or fewer correct means you need some training!

1. True. 2. False. 3. May. 4. True. 5. One. 6. Piercing-sucking. 7. Soil, turf roots and thatch. 8. Grass stems. 9. False. 10. Black cutworm. 11. Larvae. 12. True. 13. Eight. 14. True (I hope). 15. True.