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Circle No. 133 on Reader Inquiry Card



Overwintered spittlebug eggs hatch in the spring. Noticeable damage usually appears in June and July and may continue during the summer and fall.

the grass greens up in spring. These larvae soon pupate, and moth flights are common in April. Larvae usually hatch about two weeks after the moth flight peaks.

Sod webworm damage to the turf may resemble disease injury. Areas frequented by birds (such as starlings) can be flushed with soapy water to verify the presence of sod webworms.

Cutworm moths begin egg laying in the spring. The larvae hatch, and feed at night on grass blades. Damage is most often a problem on golf greens. Moths prefer to lay eggs in aerification holes, so larval feeding may be mostly associated with the turf around these holes.

Feeding damage is usually a spring problem (April-May), but some years is observed throughout the summer. Insecticides for cutworm control should be applied late in the afternoon so that contact will be made with the night-feeding larvae. Little, if any, irrigation after treatment is advised, unless specified by the product label.

Fire ants continue to be a "people problem" throughout the South. These ants inflict painful stings to man and animals. Quarantine and regulatory measures require treatment and inspecting sod and nursery stock that is shipped out of the fire ant zone.

Fire ants begin to establish new mounds during warm, wet spring days. During this time these ants are near the soil surface and workers are actively foraging for food. Fire ant baits often work well during this time, and broadcast treatments may eliminate new mounds that are not yet visible above the turf surface.

Old, established colonies can be

mound-treated with a contact insecticide about two weeks after baits are broadcast. Most baits work slowly. Delaying treatment of established mounds gives the ants a chance to find the bait and feed it to the queen(s), but eliminates workers that might otherwise be present for several weeks.

Summer (June-August)

Chinch bug damage usually first appears during dry periods of June. Damage may continue into fall since there are several overlapping generations. St. Augustinegrass varieties (except Floratam in most extreme southern areas) are most commonly attacked, but as in the past dry summers, Bermudagrasses may occasionally be damaged.

Treatments may have to be repeated if re-infestation from untreated borders or lawns occurs. Billbug grubs can be found in the soil by middle to late June. Check areas of turf, especially zoysias and Bermudagrasses, where adult billbugs were observed in the spring.

Persistent drought stress symptoms on irrigated turf, or "thin" sod may indicate a billbug problem. Treatments should be applied like other grub treatments: watered immediately after application.

Grub problems are becoming more widespread in southern turf. Late summer treatments are usually the most effective for controlling grubs.

Beetle flights most often peak sometime in June, and "new generation" grubs are usually present by middle to late August. However, during drought years such as the last three seasons, grub emergence patterns, egg laying and survival may be

affected.

Check turf where spring grub activity occurred, or where bird feeding is observed, before treatment is done. If the weather is hot and dry, irrigate the day before treatment to move grubs into the root zone. Remember to also irrigate after treatment.

Green June beetle grubs may move over the turf surface (on their backs with legs up). These are large grubs that cause mostly mechanical injury. Because of their mobility they can move from untreated, unmanaged areas onto turf.

Mole crickets hatch during late spring and early summer. By late June and early July, newly-hatched nymphs of both species are present. In most areas of the South, mole crickets hatched almost two weeks late in 1988.

Because of the voracious feeding by the tawny mole cricket (and the short-winged mole cricket in south Florida), there is the potential for sudden, serious turf loss as nymphs increase in size during July and August. Timing of controls for mole crickets varies with location.

Monitoring hatching and weekly presence of newly hatched nymphs by soap flushing is suggested as an aid to developing a seasonal control program.

Residual controls, such as Mocap 5G and Oftanol, are most effective on younger nymphs. Treatments should be watered immediately. Triumph 4EC has provided several weeks residual control. Current registrations within southern states (Special Local Needs, 24(c), registrations) specify sites for Triumph's expanded use. Less residual mole cricket treatments include bait applications and/or sprays with Orthene 75S. Baits are most effective in the mid-Gulf states from July through September. Orthene sprays seem to be more effective on two- to three-week-old nymphs than on newly-hatched mole crickets. Orthene sprays and/or bait treatments should be applied late in the day to turf irrigated several hours earlier, and not irrigated (or as label specifies) after treatment.

Sod webworms damage warm-season turf most severely from late June through August. Insecticide applications should be made when larvae are present or a week or two after peak moth flights from infested turf. Twolined spittlebugs are primarily lawn pests. However, other turf areas have been damaged in recent years. Since spittlebugs are highly dependent upon moisture for survival any area with thick turf, thatch accumulation and high humidity is susceptible to



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Circle No. 149 on Reader Inquiry Card

APRIL 1989/LANDSCAPE MANAGEMENT 43

USE SUMMARY OF SOME COMMON TURF INSECTICIDES*

Common Name	Trade Name	Major Uses	Primary Use Site ***	Common Name	Trade Name	Major Uses	Primary Use Site ***
acephate	Orthene 75S	fire ants mole crickets	A, G, L, S	diazinon	Diazinon	billbugs chinch bugs fall armyworms fire ants grubs sod webworms spittlebugs	L
**bendiocarb	Turcam	grubs mole crickets	A, L	**ethoprop	Mocap 5G	grubs mole crickets	A, G, L, S
carbaryl	Sevin SL Sevimol	billbug (adults) cutworms fall armyworms green June beetle grubs grubs sod webworms	A, G, L, S	isofenphos	Oftanol	fire ants grubs mole crickets	A, G, L, S
chlorpyrifos	Dursban	billbug (adults) chinch bugs cutworms fall armyworms fire ants sod webworms spittlebugs	A, G, L, S	**isazofos	Triumph	chinch bugs mole crickets grubs	L (G&S in some states)
				trichlorfon	Dylox, Proxol	cutworms fall armyworms grubs sod webworms	A, G, L, S

*Fire ant baits (Affirm, Amdro, Logic, Pro-Drone) are not included above, but may be used in non-crop areas. ***A=athletic turf L=lawns
**Restricted Use G=golf courses S=sod farms

damage.

Adult spittlebugs are pests of ornamentals, but the piercing-sucking feeding of nymphs (immatures) damages turf. Adults are especially attracted to Japanese hollies, and move from these shrubs to surrounding turf.

Overwintered eggs, laid in the turf, hatch in the spring. Noticeable damage usually appears in June and July and may continue during the summer and fall due to at least two overlapping generations.

A variety of warm-season grasses may be infested. Damage first appears as yellow spots, then these areas spread and eventually die. Masses of "spittle" enclosing nymphs located deep within the turf may give the turf a "squishy" feeling when walked on. Infested areas should be mowed (remove clippings) and watered before treatment. Thatch management and prevention of excessive watering may disrupt the humid environment necessary for spittlebug survival.

Spittlebugs are usually not a widespread problem during drought years except on thick turf with irrigation.

Fall armyworm moths arrive in the spring from southerly areas such as Central and South America. Along the Gulf Coast, fall armyworm damage to turf is usually reported by late June. Bermudagrasses that are highly maintained are preferred. Although several generations may occur each year, damage to turf is usually not permanent unless disease, drought or other stress follows.

Damage to turf from fall armyworm feeding during summer can be "repaired" by proper fertilization and watering. Although fall armyworms may feed in large numbers anytime during the day, they are often most active in early morning and late afternoon. Treatments are most effective at these times.

Ground pearls are scale insects that live up to 10 inches deep in the soil. They are found in areas along the Gulf Coast, sandy soils of the central Gulf states, southern east coast areas and parts of the Midwest.

These pests damage turf most severely during summer when other factors such as heat stress, disease and drought weaken the grass. Centipede grass is especially susceptible to damage when over-fertilized. Eggs hatch within the soil in the spring, and nymphs feed throughout the summer by piercing root tissue and extracting plant fluid.

Chemical control of ground pearls has not been effective. Rather, proper fertilization, disease control and adequate irrigation have been effective in controlling damage.

Fall (Sept.-Oct.)

Fall may be the most difficult time of the season to control southern turf insect pests. Attacks on turf by surface feeders, such as fall armyworms and sod webworms, may result in damage that is difficult to repair on warm-season grasses before winter dormancy. Thatch-dwellers such as chinch bugs

and spittlebugs can be controlled during fall; but again, stress to the turf may be greater entering dormancy because of damage by uncontrolled populations.

Control of soil insects such as grubs, mole crickets and fire ants is often complicated by fall drought conditions. Irrigating turf before treatment as well as after treatment may be necessary to realize effective control of these pests.

Grubs and mole crickets are more effectively controlled at smaller, more immature stages earlier in the season. Grub treatments are usually most effective during August and September. Treatments become less effective as the soil temperature decreases and grubs move deeper into the soil to overwinter.

Mole crickets fly again in the fall, and damage is more severe as turf growth slows. As the temperature decreases, insecticides work more slowly. Fall mole cricket treatments of Orthene 75S are more effective in August and September than in October. As for residual treatments, Triumph 4E has provided effective fall mole cricket control (for use by professional lawn care only; or restricted in designated areas).

Fire ants that have become established during the season are difficult to control during hot, dry fall periods. Once rain begins, new mounds are established and area broadcast treatments, as well as mound treatments, may be necessary in heavily-infested areas. **LM**

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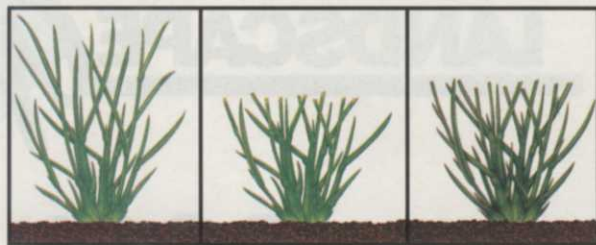
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"Cutless helped us convert from 80% Poa annua to over 95% bentgrass within five years. But I'm just as impressed with how Cutless creates a much thicker turf. It makes the grass as tough as nails, helps the ball sit up higher for our golfers."

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Circle No. 121 on Reader Inquiry Card

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.

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

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).

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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.

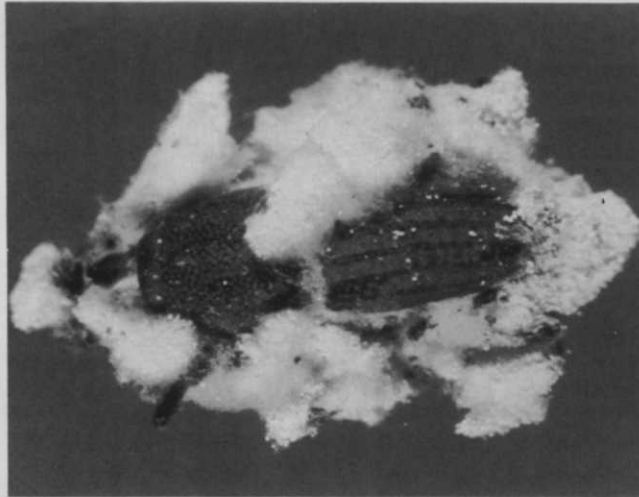
Greenbug—The only stage of the greenbug known to overwinter in northern states is the egg. Shiny black eggs deposited the previous fall may be found adhering to grass blades, fallen tree leaves or other debris.

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

ataenius—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