



## TURF INSECT CONTROL

Despite research on alternatives and supplemental methods, insecticides remain the primary means of controlling insect damage to turf.

by Dr. Harry D. Niemczyk, OARDC; and Dr. Patricia Cobb, Auburn University

**M**any species of insects and other closely related arthropods live in the turfgrass environment. To control the relatively few we consider pests, it is wise to think of them in relation to the specific segment of the turfgrass environment in which they live.

Some, like mites and aphids, spend some or all of their lives on the grass blades; others such as billbug adults, cutworms, chinchbugs and sod webworms live in the thatch. Grubs usually live at the thatch-soil interface where they feed on thatch and living roots.

Focusing on the specific segment of the environment inhabited by a pest and delivering the control material or management practice so that it has the desired impact on the pest is known as the "target principle." Simple, but the amount of success in achieving control is directly related to the extent to which the target was reached.

### Keys to control

Knowing the seasonal occurrence and damage of all life stages of each pest common to your area is a major step toward effective control. This information, combined with the characteristics of the particular turfgrass cultivar and the known length of residual of the proposed insecticide, makes insect control scientific rather than speculative.

Still, there will be twists to confuse any control program, such as soil type, heavy thatch, weather, and poor application uniformity.

Differences between the cool- and warm-season zones and among mountains, plains, and coastal areas, also result in variations in pest species and their seasonal occurrence.



Larger sod webworm (*Pedesia trisecta*) adult.



Grubs at a thatch/soil feeding, and a sod webworm in the thatch.

Knowledge of each pest's life cycle in your area is often as important as the choice of insecticide.

The purpose of this guide is to point out some major pests to watch out for in cool- and warm-season turfs in 1986, when their vulnerable stages occur, and some insecticides that may be used. No endorsement of named products is intended nor is criticism implied for those not mentioned.

### Late winter (Mar.)

**Chinchbugs and Billbugs**—In northern zones chinchbugs 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 chinchbug and bluegrass billbug also occur in zoysia, Kentucky bluegrass and fine fescues.

In southern Florida, the southern chinchbug is active throughout the year. Most varieties of St. Augustinegrass and some bermudagrass are damaged by southern chinchbugs. Zoysia and bermudagrass are more likely to be infested by the hunting billbug.

When summer damage from chinchbugs and/or billbugs is expected, a preventative application of liquid or granular Dursban (chlorpyrifos-1 lb. AI/acre), or Oftanol (isofenphos-2 lb. AI/acre) may be made as soon as these insects begin to move about. Treatment at this time controls adults before eggs are laid. If spring is early, these applications may be needed as early as the second week of March. During a late spring, applications may need to be delayed until the last week of March.

Retreatment for chinchbugs in mid to late summer may be necessary if reinfestation from adjacent untreated





Vertical cross-section of black cutworms in their burrow.

areas occurs.

Preventative treatments may not be successful in southern Florida where the southern chinchbug has multiple generations and is resistant to most organophosphate insecticides in some areas. In southern Florida, where resistance is a problem, the insecticides Pydrin, Pounce, or Baygon have been substituted for organophosphates. Replacing susceptible turf varieties with Floratam St. Augustinegrass, a variety highly resistant to the southern chinchbug, will provide excellent natural control.

**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 racoons who will tear up the turf searching for the grubs. Moles, which feed on grubs and earthworms, also become active at this time.

Application of Oftanol (2 lb. AI/acre) during March when frost is gone from the ground, provides control of overwintered grubs as they return to the surface. This treatment may not provide sufficient residual to control the late summer (July-August) infestation of grubs. Treatment at this time kills overwintering chinchbugs and billbugs and reduces infestations of these insects during the summer.

**Mole crickets**—Mole crickets have extended their range from Florida and eastern Georgia into southern Louisiana, eastern Texas and up the East Coast into the Carolinas. Timing of

treatments is critical and varies from one area to another.

The tawny and southern mole crickets are the primary pest species. Except for southern Florida, both have one generation per year. Mole crickets become active in March from north central Florida throughout their range in the Gulf States after overwintering deep in the ground as adults or nymphs. Tunnelling damage takes place at night in moist soil and increases as mole crickets become more active. Both mole cricket species begin spring mating flights in late March. In most areas March treatment is seldom required.

In years when feeding of overwintered mole crickets resumes earlier than normal, Oftanol (2 lb./AI/acre) has been used with some success. Generally, such applications are better made later in the year.

**Black turfgrass ataenius**—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.

While an application of Oftanol in March may be successful in preventing summer infestations of larvae, the probability of success is increased by waiting until April.

**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.

Treatment for the greenbug is not appropriate during the late winter.

**Sod webworms**—In cool-season areas, the most common 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.

Treatment for sod webworm is usually not appropriate during late winter.

## Spring (April-May)

**Chinchbugs and Billbugs**—As warm days of spring approach, movement of chinchbug and billbug adults increases rapidly. Generally, egg laying begins the first week of April on warm-season turf and the first week of May on cool-season turf. Occasionally adult billbugs can be seen wandering about sidewalks on warm afternoons.

Generally, application of insecticides to prevent infestations of chinchbugs and billbugs should be completed by the first week in May in cool-season and mid-April in the South. Such applications are made before significant numbers of eggs are laid. This time may vary as much as a week or more depending upon the spring weather.

When the preventative approach is not used and southern chinchbugs are detected in May, diazinon (4 lb. AI/acre) provides control. In areas with three to five generations, two retreatments at six-week-intervals may be needed.

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

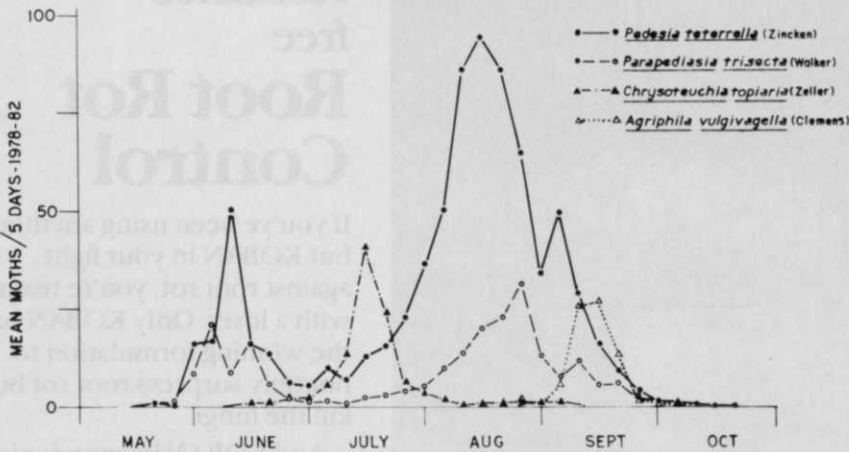
In cool-season areas, a single application of Oftanol (2 lb. AI/acre) made during April has been successful in controlling overwintered grubs with one year life cycles. This treatment and similar applications of Oftanol in May or June may not provide control of late summer infestations.

Infestations of such grubs can also be controlled during April (South) or May (North) by spot or general treatment with Turcam (bendiocarb, 2 lb. AI/acre), Peoxol (trichlorfon, 8 lb. AI/acre) or diazinon (5-6 lb. AI/acre). Golf course superintendents may also use ethoprop (Mocap, Scotts



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COMMON SOD WEBWORMS OF OHIO  
WOOSTER, OHIO 1978-1982



Nematicide/Insecticide, 10 lb. AI/acre). Sevin (carbaryl, 2-4 lb. AI/acre) has been effective against larvae of the green June beetle.

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

Although milky spore 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. It should be noted that only the Japanese beetle grub will be affected by milky spore.

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

Controls such as Oftanol, diazinon, Proxol, or Turcam should be applied in August or September during years of when large numbers of adults are seen.

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

**Mole crickets**—Damage increases in April from north central Florida throughout the southern areas of the Gulf States. Mating and dispersal

flights continue as egg laying and hatching begin.

Spring treatment may be necessary in areas that were severely damaged last fall. Small damaged areas can be rolled or otherwise packed down so the turf roots are reconnected with the soil. To determine cricket presence, pour soapy water (2 oz. liquid dishwashing detergent in one gallon of water) on turf areas where infestation is suspected. Crickets will usually surface in 3 to 15 minutes (longer in cool weather).

Turcam (2 lb. AI/acre), diazinon (spray or granules, 5-6 lb. AI/acre, commercial turf only), or Oftanol (granular or liquid, 2 lb. AI/acre) can be used to control spring infestations.

In less critical areas, short residual treatment with Turcam (2 lb. AI/acre) or diazinon (5-6 lb. AI/acre) applied in late April or May may be adequate. Orthene, 755 Tree and Ornamental Spray (2 lb. AI/acre) applied late in the day and left unirrigated overnight may provide quick knockdown but little residual.

Critical turf areas may require greater residual control provided by early April insecticide applications. Mocap 10G (10 lb. AI/acre) provides up to four weeks control and Oftanol (2 lb. AI/acre) up to eight weeks control. Treatments should be made late in the day if possible and watered immediately.

**Black turfgrass ateniensis**—Adults of the black turfgrass ateniensis can be seen flying about 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. Check with local extension entomologists for more precise time if needed.

Applications of Oftanol during April or May has successfully prevented larval infestations during the summer. Diazinon (5-6 lb. AI/acre) applied to fairways during egg laying kills adults and also prevents the development of summer larval infestations.

A word of caution—diazinon applications 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.

In warm-season areas webworm larvae pupate during late March and early April. Moth flights begin in April in southernmost areas and during May in more 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.

Damage from the burrowing sod webworm may be evident in late May in the South. Rubbing a hand over turf suspected of being infested exposes larval burrows that are covered with a flap of duff and grass clippings.

When necessary, a wide range of insecticides including diazinon, Proxol, Aspon, Sevin, and others applied at labelled rates may be used to achieve control.

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

Black, granulate, and variegated cutworm moths become active in March and April in the South. Larvae are present on turf, especially on golf greens and tees. Damage can become evident as early as mid-April. By May, the larvae are large enough to cause severe damage.

Generally the insecticides effective against sod webworm are also effective





**Green June beetle grubs in their natural habitat—the turf.**

fective against cutworms. The *target principle* of controlling these pests is to apply the insecticide late in the afternoon and allow night feeding cutworms to contact and feed on the treated foliage. Irrigation following liquid application is therefore not advisable unless specified on the product label.

**Greenbug**—Greenbug eggs begin hatching as early as April, but significant infestations do not develop until later in the year. Aphid numbers are too low to detect.

**Winter grain mite**—Damage from this mite is often first noted in April when turf areas are receiving spring fertilizer applications. By late May, the mites will have laid their eggs and died. Mites do not appear again until the eggs hatch in October.

If treatment is necessary, liquid diazinon or Dursban will provide control.

**Clover mite**—Incidents of visible damage to home lawns has been seen in April in several Ohio cities and Denver, Col. Usually a nuisance pest in and around homes, the clover mite appeared 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 was often 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.

Treatment with liquid diazinon

(2.5 lb. AI/acre) or Dursban (1 lb. AI/acre) readily provides control.

**Fire ants**—Fire ants are spreading across much of the South causing serious and painful injury to man and animals. They begin establishing new mounds during warm, wet days of spring. During this time, ants are active near the surface of mounds and workers are foraging for food.

Mound treatments include diazinon granules or drenches; Orthene 755 dust, various Dursban formulations, Oftanol, or MC-96 (trichloroethane). Read the label for specific directions for mound treatment. Do not disturb the mound before or during treatment.

Where mound treatment is impractical, the turf can be treated with Amdro fire ant bait (no more than 1.5 lb. AI/acre). All the bait should be used within three days of opening. Retreatment during the fall is usually necessary.

## Summer (June-August)

**Chinchbugs**—In northern cool-season turf, chinchbug eggs continue to hatch into June. Bright red nymphs appear. The number of chinchbugs increases rapidly in June and peaks 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 chinchbugs.

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.

Southern chinchbugs are not usually a problem in well-irrigated turf or during summers when rainfall is plentiful. Southern chinchbug-damage first appears during the dry periods of June and July. Damage may continue throughout the summer and into the fall because of overlapping generations.

A wide range of insecticides may be used at label rates to control existing infestations. They include Dursban, diazinon, Aspon, and Sevin. Treatments should be made before injury is severe, otherwise, damaged areas may not recover.

Areas of southern Florida have pockets of southern chinchbugs resistant to these insecticides. Pydrin, Pounce, or Baygon may be substituted. Floratam St. Augustine, a chinchbug resistant variety, should be the primary turf variety grown in more southern coastal areas and Florida where southern chinchbug is a problem.

**Billbugs**—The bluegrass billbug larvae feed in grass stems during June and move to the plant crowns and 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.

Infestations discovered during this time may be treated at the same rates used for existing grub infestations with diazinon, Turcam, and Proxol.

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Irrigation or rain following application is helpful for optimal results. If larvae are feeding in the foot zone, control may be difficult to achieve. Insecticide applied during June should control feeding larvae.

**Grubs**—By June, in cool-season areas, 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.

In warm-season areas, beetle flights continue and often peak in June, although the time flights occur varies from year to year. Japanese beetle flights occur mainly from mid to late May and June. Brown May or June beetle flights often follow heavy rains in late May and June. New generation grubs of most southern species can be found by mid-August.

Existing infestations of grubs found in July or August may be treated with Proxol, Turcam, Oftanol, diazinon, or Mocap (commercial turf only) at standard label rates. Sevin (2-4 lb. AI/acre) is effective against the green June beetle larvae.

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.

**Mole crickets**—Egg laying diminishes in late June, and newly hatched nymphs of both species feed voraciously. Tunneling damage suddenly becomes obvious in July as the nymphs grow larger. Because of the potential for sudden damage at this time, turf areas should be inspected several times a week during this period.

Bait formulations have been effective in controlling mole cricket nymphs from June through August in the area from central Florida north and west through the Gulf States. Baits work best in eastern Georgia during spring and fall. Bait applications often must be repeated one or more times.

Bait formulations available include: 2% Baygon (1/2 lb./1,000 sq. ft.), 20% Sevin (5-10 lb. bait/acre), 5% Dursban (150 lb./acre or two applications of 75 lb./acre three weeks apart), and 2% malathion (100 lb./acre or two applications of 50 lb./acre three weeks apart).

Mole crickets are more active at night in moist soil. Turf should be irrigated several hours before baits are applied. Delay application until later in the day and do not irrigate for two-to-three days thereafter. Orthene 755 Tree and Ornamental spray (2 lb. AI/acre) can be applied late in the day and left unirrigated. However, re-treatment may be necessary due to short residual activity.

Residual control of mole crickets with Oftanol (2 lb. AI/acre) may vary with location and amount of rainfall. Applications of Oftanol have given up to 12 weeks control from the Florida panhandle along the Gulf Coast. Residual control was only six weeks in areas where August rainfall exceeded eight inches weekly. Oftanol works faster on mole cricket nymphs when watered in immediately.

**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.

If preventative applications of insecticide were not made, existing infestations may be spot or generally treated with Proxol, Turcam, diazinon, or Mocap at label rates.

**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 and is usually seen 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.

In warm season areas most sod webworms complete at least three generations a year with overlapping

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*During September, billbug adults that developed from summer larvae are often seen wandering about on paved surfaces.*

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generations toward the end of the season.

Damage is most severe from late June through August. In southern Florida where the tropical sod webworm is active throughout the year, damage is most severe in late summer and fall.

Hybrid bermudagrasses are favored by sod webworms, but damage occurs on other warm season grasses. Webworm damage to bermudagrass often superficially resembles symptoms of some diseases. Flushes of soapy water can be used to determine the presence of sod webworm larvae.

Insecticide applications should be made when larvae are present and/or one to two weeks after peak moth flight.

Formulations of Dursban, diazinon, Sevin, Proxol, or Aspon applied at labelled rates provide control. Retreatment may be necessary depending upon the location and number of generations.

**Cutworms**—Cutworm larvae continue to cause possible 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.

Cutworm larvae can be controlled with a wide range of insecticides label rates; including Dursban, Proxol, As-

pon, Sevin, and others. Irrigation following liquid applications are generally not advisable unless required on the label.

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

But in the South, summer always means the arrival of the moths of this migratory pest. Although in mild winters fall armyworms may overwinter among the Gulf Coast, it is generally believed that the moths are blown in on winds from Central and South America. Several generations occur each season, one about every five weeks. Generations overlap in the fall.

Lush, green bermudagrasses are preferred. By late June, fall armyworm damage to turf has usually been reported along the Gulf Coast. Damage is seldom permanent, unless drought and/or heat stress follow.

Fall armyworms may feed anytime during the day but are most active in the early morning and late evening.

Treatment is most effective at these times. During hot, mid-day hours, larvae may retreat into the thatch.

Insecticides such as diazinon, Sevin, Dursban, and Proxol can be used at labelled rates to control fall armyworm.

**Greenbug**—Damaging populations of greenbug can occur from June through August. Populations and incidents of damage frequently varies 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.

Greenbug infestation may be controlled with liquid treatments of Dursban (1 lb. AI/acre), diazinon (2-5 lb. AI/acre), or Orthene at labelled rates. If reinfestation occurs following treatment with Dursban or diazinon, Orthene at labelled rates has been effective.

**Fire ants**—Fire ants are more difficult to control during hot, summer days because they are deeper in the soil. However, during rainy periods, they may become active and establish new mounds. Treatments during these months should be applied early in the morning before the heat of day.

**Scale insects**—Although Rhodgrass scale is present in Gulf Coast areas throughout the year, damage be-

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comes most pronounced during the hot, dry days of summer. Bermudagrass and St. Augustinegrass are preferred hosts, but other grasses are also infested. Several treatments with diazinon and a wetting agent are required for control to be effective.

Ground pearls are scale insects that live in the soil throughout the year, sometimes 8-10 inches deep. In the spring eggs hatch producing nymphs that feed through out the summer by piercing turf roots and extracting plant fluids.

Chemical control for ground pearls has not been effective at any time of year. Damage is most severe during summer months when the turf is stressed from heat and drought.

Centipedegrass is especially susceptible to damage, particularly when weakened by overfertilization or drought. Proper fertilization, disease control, and adequate irrigation to maintain healthy turf is the best defense.

## Summary of grub control tests in Ohio - 1971-84<sup>1</sup>

Insecticide	Rate Lb AI/A	No. tests ( ) <sup>2</sup> and avg. % control
bendiocarb (Turcam) 76W	2.0	(9) 82%
ethoprop 5G (Mocap)	5.0	(5) 89%
ethoprop 5G (Mocap)	10.0	(5) 95%
ethoprop 10G (Mocap)	5.0	(3) 83%
ethoprop 10G (Mocap)	10.0	(2) 99%
trichlorfon (Proxol) 80S	8.0	(29) 73%
isazophos (Triumph) 4E	2.0	(8) 82%
isazophos 1G (Triumph)	2.0	(2) 99%
isofenphos (Oftanol) 2I	2.0	(12) 90%
isofenphos (Oftanol) 5G	2.0	(17) 86%
isofenphos (Oftanol) 1.5G	2.0	(7) 86%
diazinon 2G	5.5-6	(7) 66%
diazinon 5G	5.5-6	(2) 49%
diazinon 50WP	5.5	(1) 69%
diazinon 4EC	5.5-6	(20) 63%
diazinon 14G	5.5-6	(5) 29%
carbaryl 80S	8.0	(2) 63%
chlorpyrifos 0.5G (Dursban)	4.0	(8) 33%
chlorpyrifos 2EC (Dursban)	4.0	(5) 64%
chlorpyrifos 4EC (Dursban)	4.0	(6) 51%

<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.

## Fall (Sept.-Oct.)

**Chinchbugs**—In the northern U.S. the second generation of chinchbug is at peak numbers in September. Nymphs complete their development to adults in late October. Most chinchbugs 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 provides sufficient control.

Damage by southern chinchbug may continue in untreated areas. Late summer applications of insecticide usually make fall treatment unnecessary.

**Billbugs**—During September billbug adults that developed from summer larvae are often seen wandering about 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 is known to occur. Larvae of this generation have been known to cause visible damage in September and October. If necessary, diazinon, Turcam or Proxol may be used to control damage.

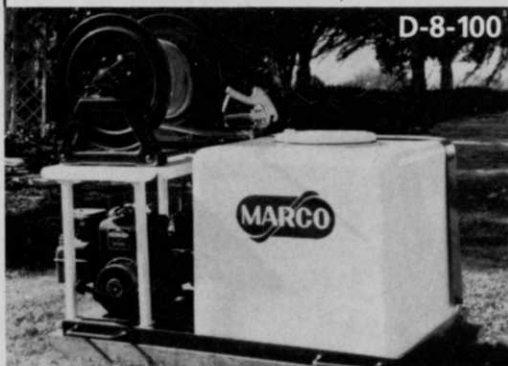
**Grubs**—Most species of grubs are in the third of their three stages of development and are feeding actively. When soil temperatures decrease in late October the larvae burrow deeper into the soil to overwinter. Severely cold winters have little effect on survival.

Treatments of existing grub infestations can be accomplished as late as early to mid-September, using standard grub insecticides. Treatment after this time may or may not kill the grubs before they move deeper into the soil to overwinter.

If the soil is dry, irrigation before treatment is advisable. Whenever treatment is applied, the grubs should be in the top one to two inches of soil.

**Black turfgrass ateniensis**—By Sep-

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tember, 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.

**Mole crickets**—Mole crickets fly again in the fall, but no egg laying is known to occur at this time. The crickets are large and difficult to control at this time. Damage becomes obvious as turf growth slows.

Sprays of diazinon (5-6 lb. AI/acre) or Turcam (2 lb. AI/acre) may have to be repeated several times. Oftanol (2 lb. AI/acre) may work too slowly for adequate control of large crickets in October. Mocap 10G (10 lb. AI/acre, commercial turf only) is usually effective at this time providing up to four weeks residual control.

**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.

Except for the most southern areas where development is continuous, sod webworm larvae present in September will overwinter. Areas treated earlier in the season may be reinfested by this time. Treatment in September reduces the population for next season.

**Fall armyworm**—Fall attacks on newly established turf from mid-September through October may result in damage that will not recover with fall fertilization. This forces the turf to enter winter in a stressed condition. Such damage can contribute to winter turf mortality.

If needed, apply controls early in the morning or late in the day when fall armyworms are most active. Use diazinon, Sevin, Dursban, or Proxol.

**Fire ants**—Hot, dry periods in September and October may make fire ant control difficult. Once rain begins, fire ants become active and may be effectively controlled with mound treatments of diazinon, Dursban, Orthene, Amdro bait or MC-96. Larger infested areas where mound treatment is impractical can be treated with Amdro fire ant bait (1.5 lb./acre).

**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 reexamined when mild temperatures extend late into the fall. Heavily infested turf will not survive through winter.

Late fall infestations may be controlled with the same insecticides used to control the pest in the summer. **WT&T**