

This second annual edition of the **INSECT CONTROL GUIDE** has been updated to reflect infestations of importance and new product developments. The basic text of the turf section is authored by Dr. Harry Niemczyk, professor of turfgrass entomology, Ohio State University, Wooster. The landscape section is by Dr. Robert Partyka, Director of Horticulture, ChemLawn Tree and Shrub, Columbus, OH. Additional thanks to Oregon State University, Ricks Pluenneke of Ft. Worth, TX, Mobay Chemical Corp., Ortho Division of Chevron, and Dr. Reed Funk of Rutgers University, NJ.

Substantial progress has been made in identifying varieties of cool- and warm-season turfgrasses that show resistance or at least tolerance to feeding by insect pests, such as the chinchbug, billbug, and sod webworm. The recent discovery by Dr. Reed Funk of Rutgers University that a species of fungus (called an endophyte), growing within certain ryegrass and tall fescue plants somehow imparts resistance to feeding by certain insects, holds much promise for the future.

While research on alternatives and supplemental means of controlling damage to turfgrass by insect pests is making rapid progress, insecticides remain the primary means of control in 1984.

New insecticides

Ciba Geigy expected EPA registration for its Triumph insecticide in 1983. Submitted for registration in 1982, Triumph has now been reviewed by EPA and approval is now expected during the spring or early summer.

When registered, a 4E formulation will be available for professional turf applicators.

Research data on Triumph has shown effectiveness on a broad range of turf pests; including grubs, mole crickets, chinchbugs,

billbugs, sod webworms, and cutworms. The label rate is expected to be 2 lb. AI/acre for grubs and mole crickets and 1 lb. AI/acre for surface insects.

The rapid effect of this insecticide against grubs and mole crickets, plus the fact that it moves readily through thatch, are its greatest benefits. It is not a long residual product.

Ortho Division of Chevron expects a turf label soon for Orthene (acephate). Pests on label include armyworm, sod webworm, leafhopper, and Greenbug.

Keys to control

The key to successful use of these materials requires knowing the seasonal occurrence of all life stages of each pest common to your area. This information, together with the known length of the residual of the proposed insecticide, are then fitted together to achieve control. Detailed knowledge of pest(s) and pesticides are and will continue to be essential.

The purpose of this guide is to point out some major pests to look for in 1984, when their vulnerable stages occur, and some insecticides that may be used to affect control during these times. No endorsement of named products is intended nor is criticism implied for those not mentioned.



Clover mite damage to fine fescue lawn (above) and a magnified view of the mite in the circle.

LATE WINTER (March)

Chinchbug and Billbug—Both of these insects overwinter as adults in the thatch, but some move to sheltered sites near buildings or other protected locations. On warm days, the insects begin moving about.

When summer damage from chinchbug and/or bluegrass billbug is expected, summer infestations can be prevented with an application of liquid or granular Dursban® (chlorpyrifos, 1 lb. AI/acre) or Diazinon (2.5 lb. AI/acre) made as soon as these insects be-



Damage to Pennncross bentgrass greens caused by *Ataenius spretulus* at Laurel View Country Club, Hamden, CT.



Chinchbug damage to lawn and a drawing of the insect in the circle.

gin to move about. If spring is late, this could be as early as the first or second week of March.

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.

Application of Oftanol® (isofenphos, 2 lb. AI/acre) during March when frost is gone from the ground, provides control of overwintered grubs as they return to the surface. In most cases, such a treatment will provide adequate control of fall grub infestation. In addition, treatment at this time kills overwintering chinchbugs and billbugs and prevents infesta-

tion of these insects during the summer.

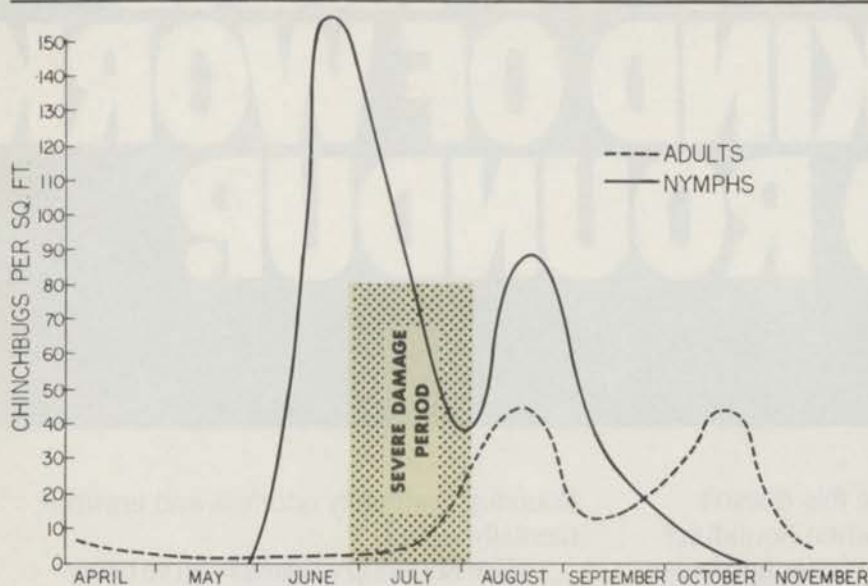
Mole Cricket—The biology of mole crickets varies considerably with the species and is still under study in many areas. Generally, these insects overwinter as adults deep in the soil, however some overwinter as nymphs.

Feeding activity resumes in March. Both adults and nymphs feed at night near the surface on turf roots, organic matter and other insects. During the day, mole crickets return to permanent burrows.

In years when feeding of overwintered mole crickets resumes earlier than normal, Oftanol® (2 lbs. AI/acre) has been used with some success. Generally, such applications are better made during May.

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 inten-

TURF



Life cycle of the chinchbug shows a treatment made in May will be effective in controlling nymphs, before they become adults and lay eggs, and before damage is greatest in July.

sifies 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 greenbug is not appropriate during late winter.

Sod Webworm—The most common sod webworm species on northern turfgrasses 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)

Chinchbug and Billbug—As warm days of May approach, movement of chinchbug and billbug adults increases rapidly. Generally, egg laying begins during May, but may occur as much as a month early in some areas. Occa-

sionally on warm afternoons, adult billbugs can be seen wandering about on sidewalks.

Generally, application of insecticides to prevent infestations of chinchbugs and billbugs should be completed by the first week in May, 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 moles, skunks, and racoons foraging on grubs can also be expected. Feeding by mammals and grubs continues through May.

A single application of Oftanol® (2 lbs. AI/acre) made during April has been successful in controlling overwintered grubs and preventing subsequent infestations during late summer. Application made during May may not provide immediate control, however, prevention of the late summer infestations may be expected.

Infestations of grubs can also be controlled during April or May by spot or general treatment with Diazinon (5.5 AI/acre), Turcam® (bendiocarb, 2 lb. AI/acre), or

Proxol (Trichlorfon, 8 lbs. AI/acre). Golf course superintendents may also use Nematicide/Insecticide (ethoprop, 10 lbs. AI/acre). Irrigation or rainfall should follow such applications, to move 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 ground. Spring is a good time for such applications because the soil is open and frequent rains help carry the spores deep into the soil. Remember, such products are effective against the Japanese beetle grub only.

Infestations of large grubs (larvae of June bugs) have been occurring on a three-year cycle in some areas of Michigan and Minnesota. 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 when large numbers of adults are seen. Eggs are laid in May and June, therefore treatment should be applied in late summer, early fall of that year or early the next spring while the larvae are small. Later applications against full-grown larvae have given inadequate control.

Mole Crickets—Mature adult mole crickets emerge from the soil in May and engage in mating and dispersal flights. Eggs are laid in chambers hollowed out in the upper six inches of soil.

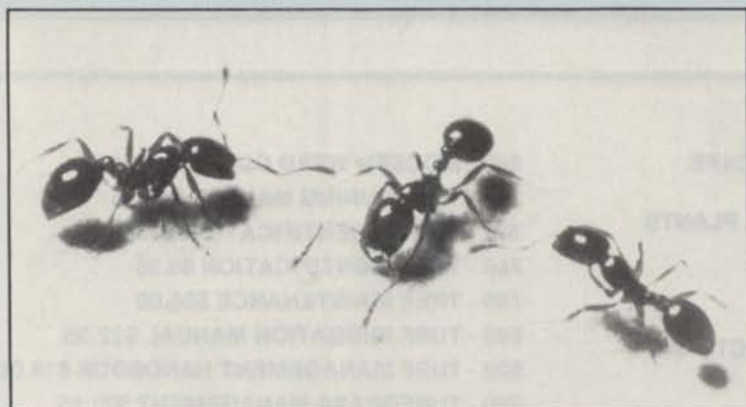
Though some variation in results has been experienced, application of Oftanol® (2 lbs. AI/acre) during this time has been generally successful in preventing summer damage. Irrigation following treatment is advisable.

Black Turfgrass Ataenius—Adults of the black turfgrass ataenius can be seen flying about in April and are often found in clipping catchers after early

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Fire ant spread continues, millions bitten monthly

The imported red fire ant reportedly bites more than 2.5 million Americans each month. Its painful bite makes this insect the nuisance pest of the 80's.



Imported red fire ants.

Both black and red imported fire ants entered the U.S. from South America in 1918 through the port of Mobile, AL. The black version hasn't been nearly as successful in spreading across the South as its cousin has. The red imported fire ant reached Texas in 1953 and currently occupies portions of Florida, Georgia, South Carolina, North Carolina, Oklahoma, Arkansas, Tennessee, Mississippi, Alabama, and Louisiana. Experts expect the pest to find its way to the humid portions of California and Ari-

zona during this decade.

According to Ricks Plueneke in Fort Worth, TX, red fire ant mounds range from small to two-feet in height and two or more feet wide.

Farmers have reported as many as 200 mounds per acre of pasture.

The ants construct a network of tunnels and chambers in the mound and in the soil beneath the mound. They move to the most comfortable portion of the den with changes in temperature and moisture. "Extremely wet weather is a good time to treat because the ants come out of the ground to work on the mound," says Dr. Craig Sheppard, research entomologist for the Coastal Plain Experiment Station, Tifton, GA. "The ants are

harder to control in extremely hot, dry weather or in the middle of a summer day, because they are deeper in the ground at these times."

Baits, drenches and fumigants have been tried to control the ants. Baits are effective during warm days when the ants are actively feeding. American Cyanamid developed the bait Amdro specifically for the fire ant.

Drenches are useful at any time. Plueneke recommends five gallons of insecticide solution per mound, making sure to flood all tunnels and chambers.

Most soil insecticides can be used for drenches, including Dursban, Orthene, Oftanol, Diazinon, Mocap and others. Orthene 75S, for example, is mixed with water at the rate of one ounce in five gallons of water. Ortho recommends a four-foot diameter area around the mound be soaked as well as the mound. Disruptions to the mound should be avoided or the ants will attempt to hide the queen, says Sheppard.

A combination of controls on a regular basis may be needed to prevent reinvasion from adjacent untreated areas. □

mowing of golf course greens. These adults begin laying eggs in early May, or about the time Vanhoutte spirea first comes into bloom.

Application of Oftanol® during April or May has successfully prevented larval infestations during the summer. Diazinon (5.5 lbs. AI/acre) applied to fairways when Vanhoutte spirea first

comes into bloom, kills egg-laying adults and also prevents the development of summer larval infestations.

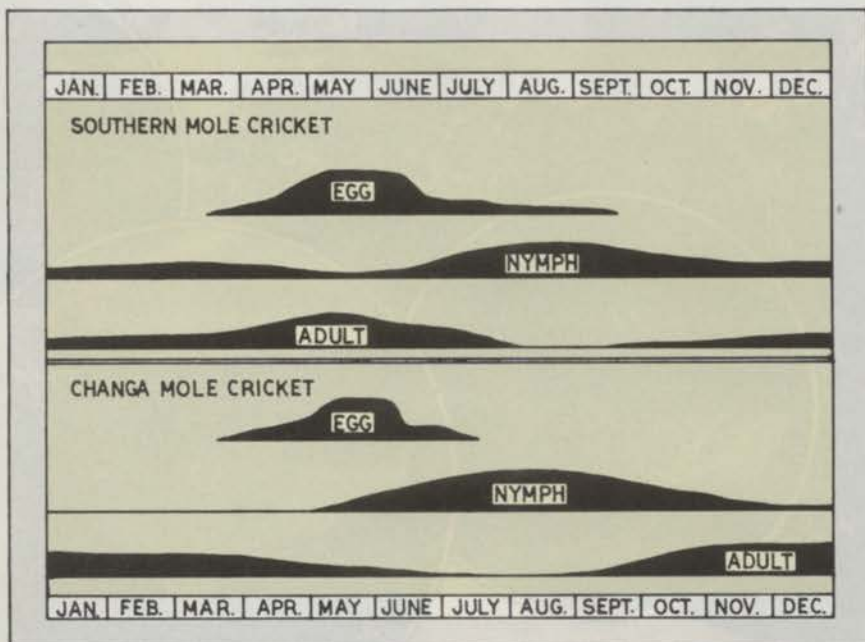
Sod webworm—Overwintered larvae of the sod webworm begin feeding as soon as the grass begins to grow. Usually damage is insignificant, but areas which do not green-up may be infested. These areas frequently have probe

marks from starlings who feed on the larvae.

When necessary, a wide range of insecticides including Diazinon, Dursban®, Proxol®, Aspon, Sevin® (carbaryl) and others applied at labelled rates may be used to obtain control.

Black Cutworms—Moths of the black cutworm begin laying eggs

TURF



Life cycle of the mole cricket indicates adult treatment is most effective in May and nymph treatment in late June.

on golf course greens and other turf areas in the spring. These eggs hatch producing larvae that feed on grass blades during the night. While visible damage is uncommon on home lawns, damage can be significant on golf course greens in late May.

Generally, the insecticides effective against the sod webworm are also effective against cutworms. The principle of controlling these pests is to apply the insecticide late in the afternoon to the grass and allow the cutworm to feed on and contact the treated foliage. Irrigation following liquid application is therefore not advisable.

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 home lawns are receiving spring pesticide and 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 were seen during April in several Ohio cities and Denver, CO. Usually a nuisance pest in and around homes, the clover mite appeared 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 foundation was often killed.

The clover mite has a slightly pink body, 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 lbs. AI/acre) or Dursban® (1 lb. AI/acre) readily provides control.

SUMMER (June-August)

Chinchbug—Chinchbug eggs begin hatching in May and continue into June when bright red nymphs appear. The number of chinchbugs increases rapidly

reaching a peak during July when northern lawns can sustain severe damage.

During August the nymphs molt into adults that mate, lay eggs, and produce a second generation. Some northern areas have only one generation each year.

A wide range of insecticides, such as Dursban®, Diazinon, Aspon®, and Sevin® may be used at labelled rates to control existing infestations. Treatments should be applied *before* injury is severe, otherwise, damaged areas may not recover.

Billbug—Billbug larvae feed in grass stems during June but move to the plant crowns and roots during July. This feeding causes brown spots that frequently resemble the symptoms of some fungus diseases. During August the larvae burrow deeper into the soil to pupate and transform into adults.

Infestations discovered during this time may be treated with applications of insecticides such as Diazinon, Turcam®, and Proxol® at rates used to treat existing grub infestations. Irrigation or rain following applications is needed for optimal results. If larvae are feeding in the root zone, control may be difficult to achieve. Oftanol® applied during June controls feeding larvae and also provides control of late summer grub infestations.

Grubs—By June, grubs have stopped feeding and are in the pupal stage three to four inches deep 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.

Oftanol® applied in June provides control of developing grubs during August as well as chinchbugs and/or billbug larvae present in the turf at the time of application. Existing infestations of grubs found in August may be treated with Proxol®, Turcam®, Oftanol®, Diazinon, or

TURF

Nematicide/Insecticide (golf courses only) at standard label rates. At least one-half-inch of irrigation following treatment maximizes insecticide effectiveness.

Mole Crickets—Mole crickets lay eggs through mid-June. Depending upon location, eggs hatch from early June through August

with peak hatch during June.

In areas where damage occurred previously, sprays of Baygon® (propoxur), Sarolex® (diazinon), or granular Mocap® (ethoprop) at labelled rates have shown effectiveness when applied in early June. Irrigation of one-half-inch or more should be



White grubs can be found close to the soil surface after April and before November.

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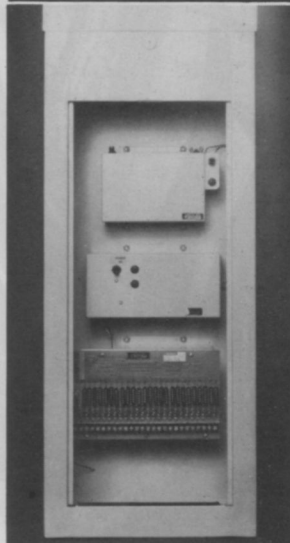
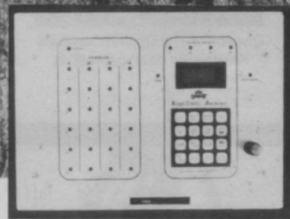


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applied after treatment.

Bait formulations with Baygon®, Malathion, or Sevin® have also been effective when applied during late June. Irrigation should not be applied for three to four days after application of baits.

Black Turfgrass Ataenius—Eggs laid by beetles during May hatch in June and the larvae begin feeding on the turf roots immediately. From late June to mid-July, symptoms of injury include wilting of the turf, in spite of irrigation. In July, larvae move deep into the soil, pupate and emerge as adults. In states such as Ohio, these adults lay eggs during August producing a second generation of larvae capable of damaging turf.

If a preventative program was not applied, existing infestation may be spot or generally treated with Proxol®, Turcam®, Diazinon or Nematicide/Insecticide at label rates.

Black Cutworm—By June, larvae of the black cutworm are large enough to cause visible damage to golf course greens. These larvae pupate in the soil or thatch and emerge as moths that lay eggs on the turf in July. The larvae of this second generation are present on greens in August.

Cutworm larvae can be controlled with a wide range of insecticides such as Dursban®, Proxol®, Aspon®, Sevin® and others, at label rates. Irrigation following liquid applications is generally not advisable.

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

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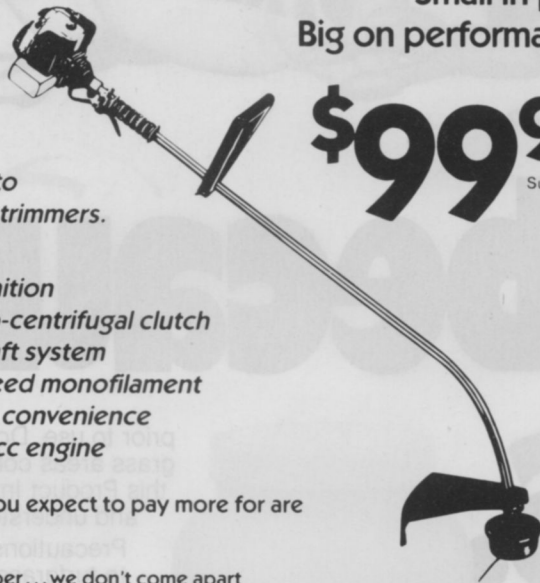
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TURF

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. Little damage from this pest was seen in 1983.

Greenbug infestations may be controlled with liquid treatments of Dursban® (1 lb. AI/acre) or Diazinon (2.5 lbs. AI/acre). If reinfestation occurs following treatment with these insecticides, Orthene (acephate) at labelled rates has been effective.

FALL (Sept.-Oct.)

Chinchbug—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 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 usually provides sufficient suppression.

Billbug—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. However, many, if not most, overwinter in the turf.

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 deep 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

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TURF

Reaction of Kentucky Bluegrass Varieties and Selections to Injury by the Bluegrass Billbug.

Variety or Selection	Percent of Turfgrass Damage	Number of billbug Larvae per sq. ft.
BA63-188	13.3a*	
Midnight	14.0a	
F-1757	24.7a-b	12.3*
F-353	26.7a-b	13.0b
EVB 3275	27.3a-b	
Kenblue	27.4a-b	1.3a
Eclipse	30.3a-c	
America	31.7a-c	
Majestic	37.7b-d	
Princeton P-104	39.1b-d	14.8b
Admiral	43.3b-e	
Adelphi	49.0c-f	
Somerset	53.3d-g	
Rugby	54.2d-g	
Fylking	57.2d-h	
Bristol	62.7e-i	
Touchdown	63.33-i	
Enmundi	63.3e-i	
Plush	64.3e-i	
Baron	67.8f-J	51.0c
Bonnieblue	69.3f-j	
Birka	71.0g-j	
Merion	76.0h-j	57.8c
A-34	78.2i-j	
Victa	79.5i-j	
Nugget	82.4i-j	60.3c
Cheri	83.5i-j	45.3c
K3-182	87.0j	18.5b
Ram I	89.3j	

*Means values: N = 3 for turfgrass damage and N = 6 for billbug counts. Means not followed by the same letter are significantly different at 5% level by Duncan's multiple range test.

Test results from one year's data.

using standard grub insecticides and sufficient (one-half-inch or more) irrigation. Treatment after this time may or may not kill the grubs before they move deeper into the soil to overwinter. Whenever treatment is applied the grubs should be in the top one to two inches of soil.

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 frost are killed.

Mole Crickets—Mole cricket

nymphs develop through the summer and most become adults by fall. However, recent studies in Florida show some egg laying continues throughout the year.

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 during the summer. **WT&T**