

INSECT CONTROL GUIDE

Revised and Updated
for 1984

INSIDE

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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.

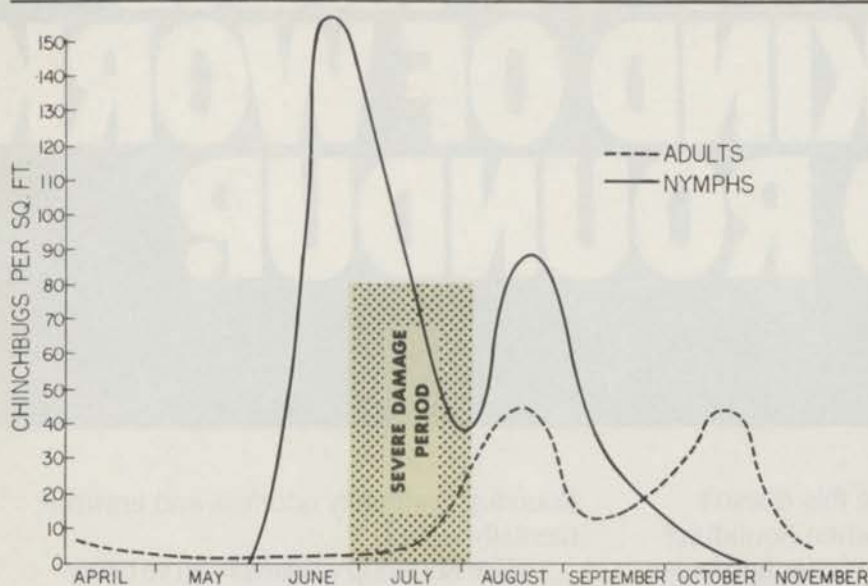
Mole Cricket—The biology of mole crickets varies considerably with the species and is still under study in many areas. Generally, these insects overwinter as adults deep in the soil, however some overwinter as nymphs.

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.

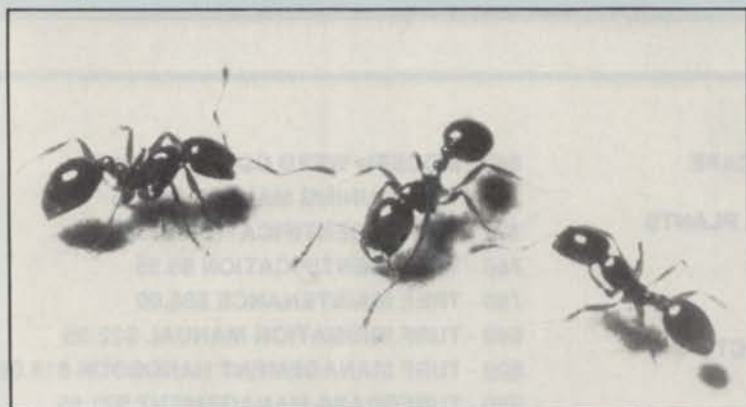
Though some variation in results has been experienced, application of Oftanol® (2 lbs. AI/acre) during this time has been generally successful in preventing summer damage. Irrigation following treatment is advisable.

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

continued on page 36

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.

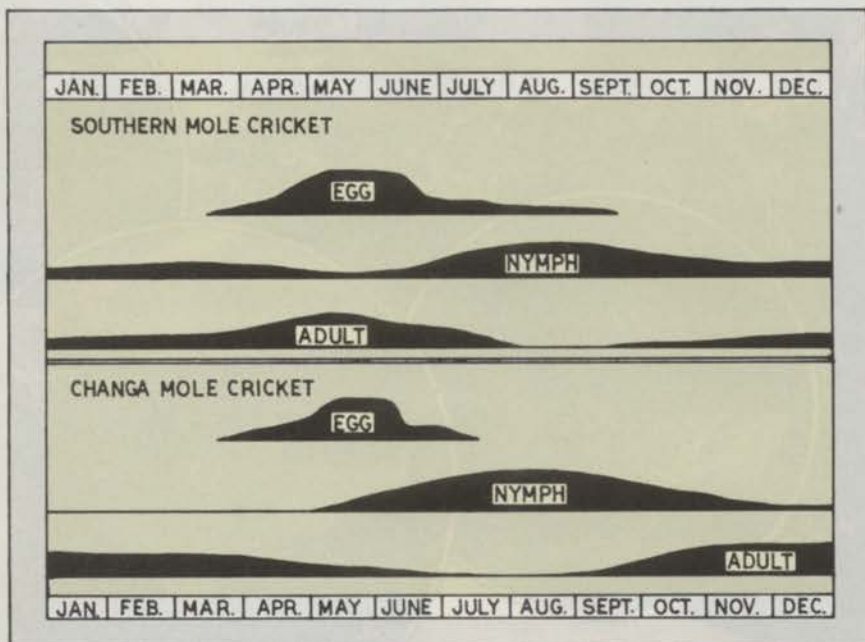
Sod webworm—Overwintered larvae of the sod webworm begin feeding as soon as the grass begins to grow. Usually damage is insignificant, but areas which do not green-up may be infested. These areas frequently have probe

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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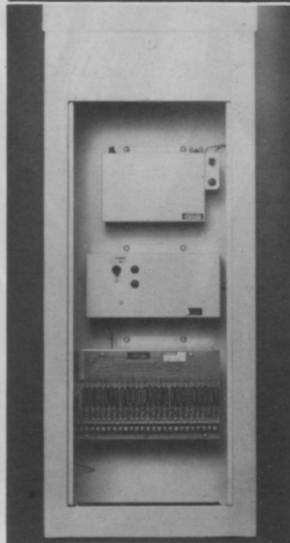
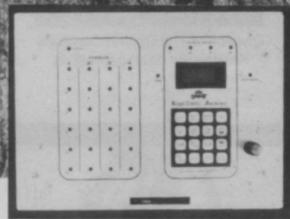


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applied after treatment.

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,

continued on page 44



**Always First
Always Outlasts**

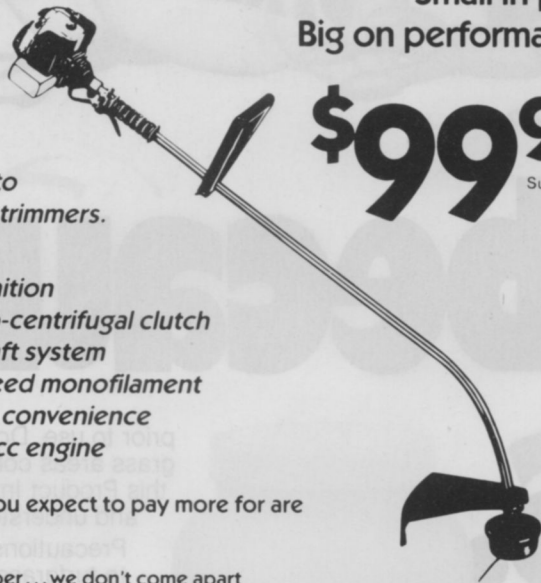
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TURF

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**

LANDSCAPE

by Dr. R.E. Partyka



Norway maple aphids.

Insect damage to woody ornamentals can vary from insignificant to widespread destruction that eventually results in death.

There are many ornamental plants, each with an assortment of insects attacking it. This results in a relatively large number of insect pests that can be destructive to ornamentals. Fortunately, all of these insect pests do not appear at one time or in one year, since many of them are cyclic.

Insect control is dependent on early recognition of the specific insect, its significance in the area, its life cycle or biology, a practical approach to control if needed, and materials to use on the pest and their effect on the environment.

Insect damage may be severe during one season and not others. You might consider what will happen in the future if nothing is done? How does the client view

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the pest problem? Are holes or webbing so obnoxious that a high degree of control is needed?

A late season defoliator may be annoying, but it does little harm to a plant that is essentially shutting down for the season. But, if this annoys the person who owns the plant, then appropriate suppressive measures must be applied at the proper time.

An early season defoliator may result in foliar devastation, but new leaves will form and mid-to-late-season appearance will approach that of undamaged plants.

Continued defoliation each year may be harmful to the plant and results in a second onslaught of problems at some later date.

DORMANT PERIOD

The winter is an ideal time to control insects that survive from season to season in the egg stage or

an immature form. These insects can be smothered by dormant oil sprays. Dormant, or superior oils, exclude oxygen from the insect while not harming most plants.

Some thin-barked trees are sensitive to oil and should not be sprayed; including birch, beech, hickory, and walnut. Oils will not control eggs laid in large masses that are protected by layers of hair, wax, or other material.

Scales

Most scale insects are effectively controlled by a combination of dormant oil sprays and application of insecticide during the crawler stage later in the year.

Armored Scales—This class of scales includes oyster shell scale, cottony maple scale, obscure scale on oak, pine needle scale, euonymus scale, white peach scale, San Jose scale, European elm

scale, camellia scale and juniper scale. These insects may have more than one generation or overlapping generations, depending upon the region of the country.

Lecanium Scales—Control of these unarmored scales is more difficult than armored scales. Dormant oil spraying is considered secondary to control of the crawler stage later in the year with materials such as Orthene® (acephate), Turcam® (bendiocarb), Diazinon®, malathion, and dimethoate. This group of scales includes Fletcher scale, European Lecanium, magnolia scale, tulip tree scale, globous scale on prunus species, and wax scale on euonymus.

Eggs, single or single layer

Eggs deposited individually or in single layers are effectively suppressed with superior oils. In-

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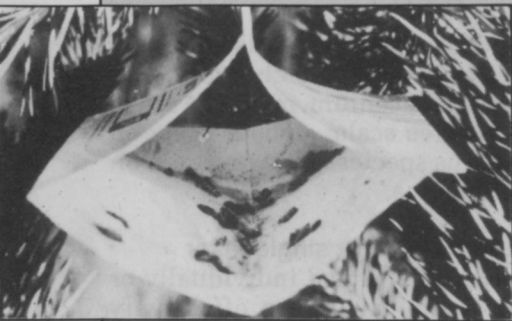
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A New Generation

LANDSCAPE

sects in this category are fall canker worm, aphids, spider mites, and eriophyid mites (causing ash flower gall, maple bladder gall, pear leaf blister, and arbovitae tip dwarf).

Pheromone traps are indicators, not total controls



Pheromone traps make an insect look for you instead of you looking for it.

The American homeowner often goes to great lengths to avoid getting professional help. Back yards across the country have a blue cast at night from millions of insect electrocutors hung on posts or tree limbs. What would a barbecue be without the crackling sound of insects flying into electrocutors?

Another method of 'stumping the pros' is collecting bags and bags of bugs in traps hung from little L-shaped posts stuck in the lawn. During the Japanese beetle summer invasion, homeowners empty the bags in their traps every night. But, what have they gained?

The trap is the result of research on pheromones, natural odors which can now be produced synthetically. Pheromones are specific to insects, i.e. what attracts a Jap beetle won't attract a tussock moth. Pheromones

Eggs in masses

Control of insects in this category is difficult with superior oils. Control later in the year of the larval stage is more effective. Insects in this category include

are used to confuse mating as well as to attract certain insects. "Gypsy moths have been tracked following a pheromone scent for up to 100 yards," says USDA Forest Service Researcher Dr. Lonnie Sower.

"Trapping-out, or using the pheromone to attract pests to a lethal trap, generally has a cost efficiency problem...because the compounds are expensive to produce. Male insects can also become habituated to the synthetic compound and no longer react to it," says Sower.

The advantages of pheromone traps are; they are species specific so non-target insects are not harmed, they let you know exactly when a certain insect is present so that control measures can be implemented or withheld, and research indicates pheromones are harmless to humans.

Control is possible with pheromones says Sower, but cost is related to the actual cost of pest damage. Up to 80 percent control was achieved in forest studies with aerial application of pheromones for tussock moth.

Still, their main use is for monitoring insect populations so pesticides can be used if needed at the right time. □

spring canker worm, gypsy moth, eastern tent caterpillar, and tussock moth.

Woody Galls

Immature forms of these insects are located near the base of needles and not in the galls during winter. Thorough coverage by superior oil gives a degree of control. Applications of Sevin®, malathion or Dursban® just prior to bud break may aid in control. Insects in this category include Eastern Gall, Cooley Gall, Horned Oak Gall, Oak Flower Gall and other galls. When using oils, watch for needle color shift to prevent over-application or sensitivity.

Bark Dwellers

Pine bark aphids, woolly aphids, and mealy bugs overwinter on the bark of woody stems. Pine bark aphids are found mainly on white pine and woolly aphids on apple and pear. Mealy bugs are common on taxus. High pressure sprays with superior oil will help reduce severe populations, but additional insecticides are needed later for best results.

SPRING

Tender succulent foliage provides an ideal food source for certain insects that hatch with the first warm weather of spring. These spring feeders, when present in large numbers, can cause severe defoliation in a matter of days.

The young stages are often unnoticed because of minimal feeding. With warmer spring weather, they begin feeding ravenously on young, tender foliage. At this stage it is almost impossible to obtain control because the mass of insects requires such a large volume of pesticide. Often, one cannot treat plants fast enough to obtain control.

Foliage Feeders

Eastern Tent Caterpillar—Early development of the destructive stage takes place at bud break on wild cherry, apples, and crabapples. Webbing indicates problem

LANDSCAPE



Four life stages of the black vine weevil (left to right); egg, larva, pupa, adult.

areas. Apply Orthene®, Bt, Sevin®, malathion, methoxychlor, Dylox®, or dymet for control. One generation per year.

Forest Tent Caterpillar—Similar to eastern tent caterpillar but forms a silken mat on trunks and branches instead of webs. Same control as eastern tent caterpillar.

Spring Canker Worm—Eggs are deposited in the spring. Crawler has two prolegs, as compared with three prolegs of fall canker worm. Apply Bt, Sevin®, methoxychlor, Orthene®, or dymet. One generation per year.

Fall Canker Worm—Eggs deposited the previous fall. Three prolegs. Control same as spring canker worm.

Gypsy Moth—Voracious feeder on many plants, especially oak. Heavy population in Northeast with scattered outbreaks elsewhere. White egg masses on trees and buildings during winter provide clue to presence. Apply Sevin®, Bt, methoxychlor, or Orthene® over large area. One generation per year.

Tussock Moth—General feeders of trees and shrubs. White



Bronze birch borer and D-shaped emergence hole.



Cottony maple scales are found most easily before trees leaf out.

tufts of hair are common marking. Western tussock moth is a problem in mountain states. White marked may have several generations per year. Most materials listed for foliage feeders are effective.

Yellow-Necked Caterpillar—Yellow and black striped caterpillar with prominent yellow spot just behind head. Feed in groups and raise head and tip of abdomen when disturbed. Apply Sevin® or Orthene®. One generation.

Juniper Web Worm—Reddish-brown caterpillar overwinters in

frass on branches. May cause severe damage before recognized. Penetrating sprays of Orthene®, Diazinon®, Sevin®, or dymet early in the spring or early fall needed for control. One generation.

Green Stripe Maple Worm—Limited insect on maple in river bottoms, but a major defoliator when present. Two generations, the second is most damaging. Apply Sevin®, Orthene®, methoxychlor, dymet.

Elm Leaf Beetle—Larvae feed on the lower leaf surface causing

them to die and drop prematurely. More than one generation. Apply Sevin®, methoxychlor, dymet, and Orthene® for control.

Sawflies and Leaf Miners

European—Eggs are deposited in needles in late fall. Look for symptoms on needles to determine potential problem. Use Orthene®, methoxychlor, Sevin® in early stages. Other conifer sawflies develop during the summer.

Birch Leaf Miner—Small black fly-like wasp present when leaves are half grown, signifies time to apply a corrective control. Use Sevin®, Diazinon®, Orthene®, or dimethoate.

Arbovitae Leaf Miner—Small green caterpillar with black head that overwinters in mined leaves. Look for holes in terminal tissue. Adults are small moths. One generation. Direct sprays in spring of Orthene®.

Locust Leaf Miner—Many plants skeletonized by adults. Mining occurs on black locust. Two generations. Limited materials for control. Lindane and Dibrom® are listed.

Other Sawflies—Skeletonized foliage or consumed foliage. Need to watch for damage as insects are sporadic. Most materials listed will give good control.

Sucking Insects

Aphids—Often present on new growth. Use malathion, Diazinon®, dymet, Orthene®, and Turcam®. Orthene and Turcam have longer residual but new generations build quickly. Need to watch closely.

Spider Mites—Common on evergreens. Need to watch for off-color foliage. Spruce spider mite may be a problem at this time. As weather warms, two spotted spider mite becomes common. Apply Kelthane®, malathion, Vendex®, or dymet.

Plant Bugs and Leaf Hoppers—Common on honey locust as new growth unfolds. Sevin®, dymet, Diazinon®.

Lace Bugs—Found on hackber-

ry, oak, mountain ash, sycamore, elm, and azalea. Wings appear lace-like with many veins. Can cause considerable leaf browning. Several generations. When severe, use malathion, Sevin®, Turcam®, dymet, or methoxychlor.

Borers

Clear Wing—Early season emergent holes. Use pheromone traps to detect activity. Protect new wood with Dursban® or lindane.

Bronze Birch Borer—Severely damages white birch. Plant vigor is a factor, but protection possible with Turcam® or lindane. Timely application needed.

Flat Head and Round Head—Enter wounded or weakened plant tissue. Little to no control once tissue is invaded. Plant vigor is major deterrent.

Scale

Crawlers—The early crawler stages of euonymus, oyster shell, oak kermes, golden oak and pine needle scale can be active at this time. Watch plants carefully for activity. Apply Orthene®, Sevin®, Diazinon®, or malathion. Multiple generations.

Shoot and Tip Moths

Pine Tip and Mugo Pine Tip—Several species of shoot and tip moths need to be treated at this time. Timing important. Several

materials suggested, including Sevin®, Orthene®, dymet, lindane, Turcam®, and dimethoate.

SUMMER INSECTS

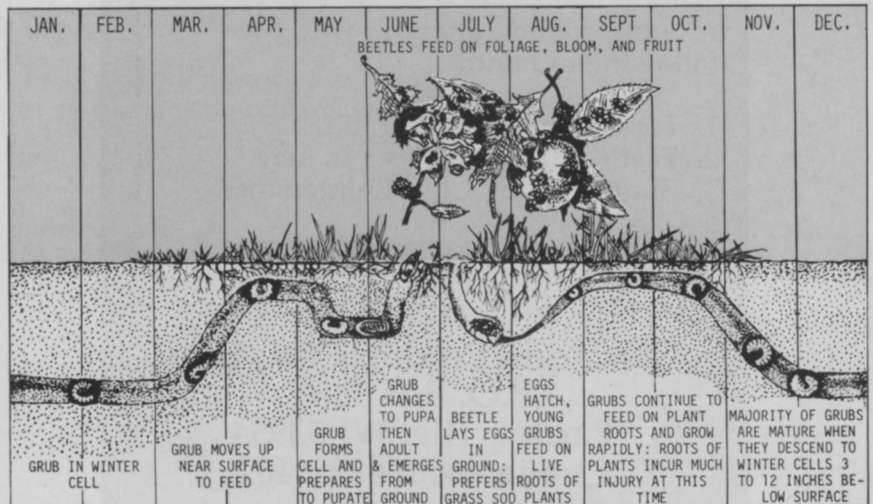
These insects feed on mature or near mature foliage. Injury at this time may reduce the amount of sugar or carbohydrates the plant can store for bud development and winter survival in colder areas of the country. Weakened plants are more susceptible to various stresses.

Foliage Feeders

Bag Worms—Most common on narrow-leaf evergreens, but found on many other plants when population levels rise. Reasonable control can be obtained with Sevin®, Diazinon®, Orthene®, malathion, methoxychlor, and Turcam® when insects are small. Dursban® and Orthene® are more effective against mature insects.

Japanese Beetles—Early to mid-summer favors the first emergence of this colorful but destructive flying beetle. Favored hosts are prunus, apple, rose, elm, and many other plants need to be protected with Sevin®, Turcam®, methoxychlor or Diazinon®. Long residual is important.

Black Vine Weevil—Leaf notching on taxus, azalea, rhodo-



Japanese beetle life cycle shows control with soil insecticides has the best chance of working in late April through October.

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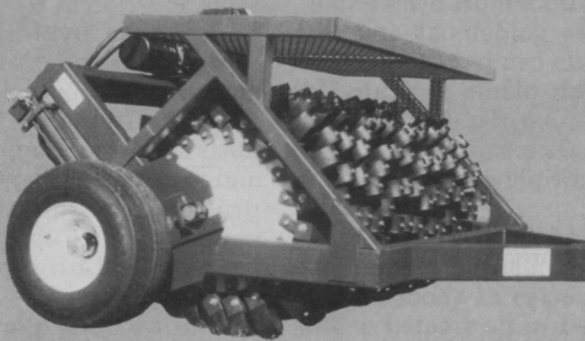
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dendron and numerous other plants in the landscape suggests weevil feeding. Black vine weevil is a night feeder. Larvae feed on roots. Control adults with Orthene®, Turcam® or lindane.

Imported Willow Leaf Beetle—Most willows attacked by this insect. Several generations. Apply Sevin®, Orthene®, methoxychlor. Timing is important.

Sucking Insects

Lace Bugs—Off color and stipple-pattern on leaves is common with shiny black fecal residue on underside of leaf. Common on azalea, rhododendron, sycamore, and pyracantha. Use malathion, Orthene®, Sevin®, dymet, or dimethoate.

Spider Mites—Hot weather will favor the buildup of these insects often found on juniper and spruce. Many regular insecticides give little to no control of spider mites. Other materials must be used such as Dicofol, dymet, or Vendex.

Aphids—Different species are present during the growing season. Must be alert to buildup, especially on new succulent tissue. Use Orthene®, Diazinon®, or malathion.

White Flies—Often found on the undersides of leaves of azalea, privet and foundation plants. Black sooty mold grows on the honey dew produced by the flies. Difficult to control insect due to life cycle. Apply Orthene®, dymet, Diazinon®, dimethoate, plus others.

Scale, Crawlers

Cottony Maple Scale—Cottony masses on silver maple and others. Wait for all eggs to hatch for best control. Use Orthene®, Diazinon®, Sevin®, or malathion.

Lecanium Scale—Wait for crawler stages to be active for control. Timing important. Use materials for scale listed above.

Oyster Shell Scale—Watch for branch dieback or slow leaf development.

MID-SUMMER, EARLY FALL
Chewing insects that feed on foliage at this time of the year are often more unsightly than harmful to the plants. However, if

LANDSCAPE

the object is to keep foliage for the fall color change, one must be aware of these late-season feeders.

Life cycles of certain insects also dictates that control measures be employed at this time for optimum results and satisfied clients.

Scale Insects

Magnolia Scale—The crawler stage of this scale is active in the latter part of the growing season. Use Sevin®, Diazinon®, malathion, or Orthene® on the crawler stage.

Pine Needle Scale—Second generations of this insect that can

blow in or be carried by other insects and birds, or were missed by earlier treatments, can explode and nullify all previous efforts. Use Sevin®, Diazinon®, dymet or Orthene® on the crawler stage.

Fletcher Scale—Watch for crawler stage at this time of year on prone plants and use Sevin®, malathion®, or Orthene®.

Adelgids

Cooley Gall—This adelgid leaves the gall in late summer to start as new life cycle or may return from fir trees if the alternate host of this pest is in the area. Good coverage of the new growth with Diazinon®, Sevin®, or malathion is important.

Eastern Spruce Gall—Similar in nature to the cooley gall, but activity is later so timing is important for the particular area.

Leaf Feeders

Fall Web Worms—The second generation becomes very obvious at this time of year with extensive webbing of the foliage. Suppression can be obtained with Sevin® or methoxychlor.

Japanese Beetle—This destructive flying beetle keeps feeding on foliage into the fall. Weather conditions play an important role in its numbers. Control with Sevin® or methoxychlor will be dependent on local analysis.

Mimosa Web Worm—Webbing similar to fall web worm where leaves are pulled together. Several generations. Apply Sevin®, Orthene®, Diazinon®.

Oak Leaf Skeletonizer—Second generation on oak. See controls under spring section.

Borers

Locust Borer—A problem on black locust. Emergence occurs in the fall and egg laying is when golden rod is in bloom. Lindane as a trunk protectant can be used where a problem exists.

Peach Tree Borer—Mid- to late-summer treatment may be necessary on valuable plants. Use Dursban® or lindane.

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Insecticide Directory

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Bt	Thuricide	Sandoz	252
	Dipel	Abbott Labs	253
	SOK Bt	Tuco/Upjohn	254
bendiocarb	Turcam	Nor-Am	255
carbaryl	Sevin	Union Carbide	256
chlorpyrifos	Dursban	Dow	257
diazinon	Diazinon Sarolex	Ciba Geigy	258
dicofol	Kelthane	Rohm and Haas	259
dicrotophos	Bidrin	Shell	260
dimethoate	Cygon	American Cyanamid	261
dinocap	Karathane	Rohm and Haas	262
dioxathion	Deltic	Nor-Am	263
dymet	Dymet	Mallinckrodt	264
ethoprop	Mocap Nematicide/ Insecticide	Rhone Poulenc	265
		O.M. Scott	266
fenamiphos	Nemacur	Mobay	267
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