Insect control in cool-season turf

There is little scientific data offering high marks on efficacy for organic, natural and biological insect controls.

by Harry Niemczyk, Ph. D.
Ohio State University

■ Interest in—and demand for—organic, natural, biological and bio-rational ways to control damage from insect pests of turfgrasses remains high.

The EPA, as well as other agencies and organizations, strongly encourages the use of some such insect control materials. *Collective scientific data to* date still provide relatively little encouragement where their effectiveness is concerned.

Grub control—Various species of insect pathogenic nematodes have been evaluated over the last eight to 10 years. While successful control is occasionally reported by researchers, no single species has provided consistent results. In the view of this author, nematodes and other forms of biological control will meet with limited success—at best—until equipment is developed to place these agents directly into the zone of grub habitation. The distance from the turf surface to the target is a formidable one for these agents to transverse. We are simply not there, *yet*.

Cutworms and sod webworms—Grass-eating, thatch-inhabiting sod webworms and cutworms are more readily reachable targets for biological control materials than are subsurface pests such as grubs.

Results with surface applications of insect pathogenic nematodes such as Exhibit (*Steinernema carpocapsae*), a Ciba Geigy product for control of cutworms on golf course greens, have been somewhat encouraging. This writer encourages golf course superintendents to try them in 1992 and report their impressions and results to the company.

Further encouragement for control of this group of pests has been seen with the use of insect growth regulators (IGRs), some of which are natural extracts from the neem tree.

Chinchbugs—Few, if any, of the biological control materials have been effective against this thatch-inhabiting pest. Insect growth regulators show some promise for control when applications are made to the early developmental stages.

Billbugs—The fact that the larval stages of this—the No. 1 pest of cool-season lawns—feeds in the stems and crown of grasses, makes it a more reachable target for insect pathogenic nematodes and other biological control materials. Results of 1991 research have been encouraging, but broader field evaluation is needed to confirm effectiveness.

Expectations—Biological controls will not totally replace insecticides for control of insect pests of turfgrasses. Our expectations for biological agents should be for them to act as suppressors of pest populations, not as complete control agents in themselves.

Knowledge about the lifecycle of pests in any specific area and the determination of the need for treatment based on evaluation of populations at vulnerable periods during the insect's life cycle remain the keys to successful control.

This guide points out the seasonal occurrence of the eight most important cool-season pests of this region and some of the insecticides that may be effective.

Billbug damage is often mistaken for drought, disease or other stress. Examination of the grass removed and the root zone distinguishes billbug damage from that of other pests.

No endorsement of products is intended, nor is criticism implied of those not mentioned.

—The author is Professor Emeritus and turf insect research coordinator at the Ohio State University's Ohio Agricultural Research & Development Center, in Wooster, Ohio.

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Cool-Season Insect Control Strategies

Pest	Spring April-May	Summer June-August	Fall-early winter Sept.-Dec.
Chinch bugs 	When summer damage expected, preventive application of liquid or granular Dursban (1 lb. ai/A); Triumph' (1 lb. ai/A) may be used as soon as the insects become active. Applications of insecticides should be completed by first week in May.	Treat before injury is severe, with Dursban (1 lb. ai/A); diazinon** (2.5-5.5 lbs. ai/A); or other labeled insecticides.	Treat if necessary. Generally, infestation not high enough to warrant using insecticides.
Billbugs	Same as for chinch bugs. 	Treat at grub rates with Triumph', diazinon**, Turcam, Mocap or Sevimol. App. in mid-late June most effective. Irrigate following application.	Treatment is usually not appropriate at this time.
Sod webworms	Overwintered larvae can cause damage in April or May. When necessary, apply diazinon** (5 lb. ai/A); Triumph' (1 lb. ai/A); Dylox or Proxol (6-8 lb. ai/A). Use flush of water/liquid detergent to scout for infestation level.	Apply when damage is seen, or larvae are present. Use Dursban (1 lb. ai/A) , Triumph' (1 lb. ai/A); diazinon** (5 lbs. ai/A); Sevin-Sevimol (6-8 lbs. ai/A) ; Proxol-Dylox (6-8 lbs. ai/A), or other labeled products.	Larvae cause little damage at this time. Treat in Sept. to reduce spring population. 
Cutworms	Use insecticides that are effective against sod webworms. Apply late in afternoon. Do not irrigate after liquid applications unless specified on label.	Use Orthene (1-3 lbs. ai/A); Dursban (1 lb. ai/A);Triumph' (1 lb. ai/A) ; Proxol-Dylox (8 lbs. ai/A). Do not irrigate following liquid applications unless specified on label.	Same as for summer. 
Greenbug aphid 	Aphid numbers too low to detect.	Orthene (1 lb. ai/A); Dursban (1 lb. ai/A) ;diazinon** (2.5 lbs. ai/A)	Severe infestations may occur as late as Dec. Use the same insecticides as in summer.
Grain mites 	If treatment is necessary, use liquid diazinon** (2-3 lbs. ai/A) or Dursban (1 lb. ai/A). Avoid repeated use of Sevin-Sevimol.	If needed, use spring treatment.	If infestations develop in Dec. use summer treatment.
Clover mites 	Liquid diazinon** (2.5 lbs. ai/A) or Dursban (1 lb. ai/A) may be used.	Treatment usually not needed. Mite is in egg stage.	Treat as needed, with liquid diazinon** (2.5 lbs. ai/A) or Dursban (1 lb. ai/A)
Grubs 	If treatment of overwintered grubs is necessary, apply when all grubs are in the first two inches of surface soil. General or spot treatment with Triumph' (2 lbs. ai/A); Oftanol, Sevin-Sevimol or Mocap. Mocap (5 lbs. ai/A) or Turcam (2-4 lbs. ai/A) may be used. Irrigate as soon as possible after application. Green June beetle larvae are difficult to control at this time. Sevimol (2-4 lbs. ai/A) may be effective.	Existing grubs found in Juy or August may be treated with Triumph', Dylox, Proxol, Turcam, Oftanol, Sevin-Sevimol or Mocap. Apply at label rates. If soil and/or thatch is dry, irrigate thoroughly before and as soon as possible after app. Treat green June beetle with with Sevin (2-4 lbs. ai/A).	Treatment can be made as late as mid-late Sept., as long as grubs stay in first nch of surface soil. Triumph' Mocap, Dylox, Proxol at labeled rates may be effective.
Black turfgrass ataenius	Dursban (1-2 lbs. ai/A) applied to fairways in April for control of overwintered, egg-laying adults, reduces potential for summer larval infestations. Retreatment after two weeks may be necessary.	If preventive applications were not made, spot or generally treat with Triumph'(2 lbs. ai/A); Proxol-Dylox (8 lbs. ai/A); Turcam (2-4 lbs. ai/A) or Mocap (5 lbs. ai/A), as needed.	Undeveloped larvae die with developmentof ground frost.

' For use only by commercial lawn pest control personnel, and only on golf course tees, greens and aprons, and on sod farms. See soil restrictions.
**Diazinon may not be used on golf courses or sod farms.

Source: Dr. Niemczyk

Insect control in warm-season turf

Close observance of pest populations is essential for maximum effectiveness of your various control efforts.

by Patricia P. Cobb, Ph.D., Auburn University

■ Turfgrass professionals in the South are growing a variety of grasses and managing them better than ever before. Part of the price of this success is often increased "opportunities" for controlling a variety of insect pests.

Successful turfgrass managers, who are always concerned about the environment, continue to weigh all pest control options when developing new control strategies. This concern, coupled with increased pest pressure and control costs, has stimulated the same creative ingenuity that has been responsible for the best turf quality in the South's history.

Because pest pressure is often so great and so varied, integrating cultural and biological tactics as part of the control plan is nothing new. What *is* new, is an increased interest in determining factors that influence control efforts, and in using this information to develop safe, effective, well-balanced tactics as a part of total turf management programs.

Field testing on parasitic flies and insect-parasitic nematodes continues. First results of massive releases of nematodes for mole cricket control look promising for long-range suppression. Formulations of virulent strains of *Bacillus thuringiensis* (Bt)—such as Biobit and Javelin—enhance control programs for surface-feeding caterpillar pests.

New subsurface technology—Subsurface, "precision" placement of insecticides has focused on controlling mole crickets and grubs. Spray insecticides can be placed into the turf by high pressure liquid injection—with or without slicing, depending upon the system.

Subsurface applications of lower rates of chlorpyrifos (Dursban) and isazophos (Triumph) for mole cricket control and isazophos (Triumph) for grub control have been promising in many cases. Recent studies indicate that saturated and poorly drained soil, and extremely hot and humid weather, influence the effectiveness of liquid injection applications.

Improvements continue in placing granular insecticides under the surface to control mole crickets and grubs. Shallow slits are cut in the turf, granules are deposited and covered—much like an overseeder but with less turf injury. Subsurface placement often results in the same level of control with half the rates of surface applications. Less surface residues decrease the potential for runoff and human exposure. Less potential for ULV breakdown and placement close to the pests provides control with less product.

Weather considerations—Winter weather, together with spring rains—or lack of rain—affects insect populations.

For example, the winter of 1991-92 was mild throughout most of the South. Fire ants were active in mounds during warm winter days. Tawny mole cricket emerges from the previous season's hatch that are usually present in March in the mid-Gulf states were rare in 1991.

Winter mole cricket activity during the 1990-91 "mild" winter indicates that these pests probably matured during this time. Tropical sod webworms, longtime pests in central and south Florida, again infested coastal areas from the Florida panhandle to Texas. Monitoring turf for insect pests is always important. In the South, the mobility of many pests and the variation of weather patterns from year to year make monitoring a must.

Keeping a close watch on pest populations is essential to get the most out of cultural, biological and/or insecticidal efforts.

—The author is an associate professor of entomology at Auburn University.

Tips for maximum efficacy:

Mole crickets	—Map areas of spring activity —Monitor hatch time, apply as recommended to young nymphs. —Pre-water dry soil to move pests to surface, unless label states otherwise. —Treat late in the day.
Grubs	—Map area to locate infestations. —Treat newly-hatched grubs, usually mid- to late summer. —Water before treatment unless label states otherwise.
Fire ants	—Apply broadcast (area) treatments after spring mating flights (May-early June) before mid-summer, and/or fall when drought conditions do not exist. In high use areas, three to five days after broadcast bait applications, mound treat with a contact insecticide to quickly eliminate stinging worker ants.
Chinch bugs	—Monitor early-season activity during warmer daytime hours. —Treat first generation nymphs in April-May.
Spittlebugs	—Monitor turf areas for nymphs in spittle masses deep in the turfin May-June. Infested areas feel "squishy" underfoot. —Mow and water lawn before treatment. —Monitor landscape plantings for adults; movement between shrubs and turf is common, especially between Japanese or other "small leaf" hollies, and centipede grass.) —Dethatch turf if needed at proper time for grass type.
Sod webworms	—Monitor spring moth flights of common sod webworms (April in most areas) and treat two to three weeks after peak flight (usually May). —Mow grass before treatment. —Watch for buildup of tropical sod webworms in coastal areas and Florida. Chewed grass blades are notched and ragged. Use lots of water when treating for tropical sod webworm (10 gals./1000 sq. ft.)

Source: Dr. Cobb

'Best Time' Uses of Some Common Turf Insecticides*

INSECTICIDE/REGISTERED SITES	SPRING: March-May	SUMMER: June-August	FALL: September-December
B.t. (i.e., Biobit, Dipel, Javelin) GT	Sod webworm (young larvae): see label		
Crusade 5G, GC;S	Mole crickets (nymphs): 4lb. ai/A	Grubs: 4 b. ai/A	
Diazinon, L	Spittlebugs: 4lb. ai/A		
	(adults) Billbugs (larvae) 4lb. ai/A		
	Fire ants (mounds): see label		
	Grubs: 4lb. ai/A	young grubs	
	Chinch bugs, sod webworms: 4lb. ai/A		
Dursban, GT	Cutworms: 1lb. ai/A		
	Chinch bugs, sod webworms: 1lb. ai/A		
	Fire ants: see label		
		Fall armyworm: 1lb. ai/A	
		Mole crickets: 75-150lb. bait/A	
Dylox, Proxol, GT	Cutworms: 6-8lb. ai/A		
		Fall armyworm: 6lb. ai/A	
	Grub	8lb. ai/A	
	Sod webworms: 6lb. ai/A		
Mocap 10G, GC;S	Billbug (larvae): 5lb. ai/A		
		Grubs: 5lb. ai/A	
	Mole crickets (nymphs): 7.5-10lb.ai/A		
Oftanol 2, 5G, GT	(Adults-oft.2) billbugs (larvae-5G):2lb.ai/A		
	Chinch bugs: 2lb. ai/A		
	Fire ants: see label		
	Mole crickets (nymphs): 2lb.ai/A		
		Grubs: 2lb. ai/A	

INSECTICIDE	SPRING: March-May	SUMMER: June-August	FALL: September-December
Orthene Turf, Tree & Ornam. Spray, L; REC	Fire ants: see label	Fall armyworm: 1-21/2lb. ai/A	(Overwintered) Mole crickets (nymphs): 2.6-3.5lb. ai/A; Sod webworms: 6lb. ai/A
Carbaryl (i.e.,Sevimol,Sevin SL), L; REC	(adults) Billbugs see label; Cutworms: 2-4lb. ai/A; Chinch bugs: 6-8lb. ai/A; Fire Ants (mounds): see label	Fall armyworm: 2-4lb. ai/A; Green june beetle grubs:2-4lb. ai/A (young grubs)	Mole crickets (nymphs) 6lb. ai/A
Tempo2, WP, L	Chinch bugs: 14lb. ai/A; sod webworms: .09lb. ai/A	Fall armyworm: .09lb. ai/A	
Triumph 4E, L; GC**, S**	(Overwintered) (young nymphs) Mole crickets: 2lb. ai/A; (adults) Billbug (larvae): 2lb. ai/A	Grubs: 1-2lb. ai/A	
Turcam 2.5G, 76WP, GT	Billbugs (larvae): 76WP: 3lb. ai/A; Chinch bugs: 1-2lb. ai/A; Fire ants: see label	Mole crickets (nymph): 3lb.ai/A; Grubs: 3lb. ai/A	
Fire Ant Baits Affirm (Ascend) Amdro Award (Logic), GT	See label		

(——— = best choice application timing; - - - - - - - = 2nd choice timing.)
Registered sites: L = Home Lawns; GC = Golf Courses; S = Sod; GT = General Turf; REC = Recreational Turf

*No endorsement or exclusion of specific products is intended.
**Special registrations (24c) for golf greens, tees, aprons, sod in some states.

Source: Dr. Cobb

Ornamental insect control

Pest invasions are symptoms of plant stress. Reduce stress, and ornamental insect problems will decrease.

by David J. Shetlar, Ph. D., Ohio State University

■ The extremes in temperatures and precipitation we have seen over the last several years push ornamental plants to their limits.

In 1991, many plants died or were killed by borers simply because they couldn't withstand the drought after having their roots rotted off in the wet soils of 1989 and 1990.

In 1992, you can expect to see additional trees and shrubs die from previous years' stresses. Many insects, especially borers, take advantage of these stressed plants. Remember that these pests are a *symptom* of plant stress, *not the cause* of the stress. Eliminate the plant stress and the pest problem will be greatly reduced or eliminated.

Cool, wet years see an increase in Japanese beetle populations and "cool-season" pests such as the spruce spider mite. On the other hand, hot and dry seasons seem to give the advantage to soft scales, borers, lace bugs and "warm-season" mites.

Remember: cool seasons cause pest activity to be delayed and spread out over a longer time; warm seasons cause pests to be active sooner in the season, and often they are present for a shorter period.

Bronze birch borers emerged in Ohio in mid-June in 1990 (a cool year) and in late May in 1991 (a warm year). If you had followed a "spray calendar" of June 5-10, you would have been okay in 1990—but too late in 1991.

Two ways of dealing with changes in insect and mite activity is to use pest monitoring tools and degree-days. Many ornamental pests can be monitored using pheromone traps, light traps and visual inspection. The activity of others can be predicted using the degree-days.

Pheromone traps are readily available for many of the clearwing moth borers.

Scale control—Most of the scales are difficult to control because we have always relied on a calendar to predict when the crawlers will be active. If pine needle scales, euonymus scales or soft scales are a problem, locate an infestation nearby your operation. Observe the infestation two to three times a week to determine when the crawlers are emerging. You usually have two to three weeks after the crawlers are first noticed to apply a control product and still get good results.

Almost all of the soft scales—pine tortoise, magnolia, European fruit lecanium, terrapin, cottony maple—enter the fall as an immature female. Recent evaluations have indicated that these females are very susceptible to insecticidal soaps and horticultural oils or these materials mixed with standard scale insecticides.

Predators are beneficial—Spider mites and aphids seem to be perennial pest problems in urban landscapes. These pests easily rebound from pesticide applications. In fact, the two-spotted spider mite is often a more severe problem *after* being sprayed.

Pest Resurgence Prevention

Pesticides/Insect Targets	
Bacillus thuringiensis (microbial toxins, "Bt") 'Kurstaki' strains 'Tenebrio' strains	leaf beetles/foliage feeding caterpillars
Oils (mineral/botanical) Dormant (4-6%) Horticultural (1-2%)	insect and mite eggs; some scales; soft scales; scale crawlers; some aphids; mites
Citrus (d-limonene) usually with soap	soft-bodied insects and mites
Fatty acid salts soaps with insecticidal properties	soft-bodied insects (aphids, scales, caterpillars,lace bugs, mealy bugs, etc.) and mites
Sodium aluminofluoride a mineral which destroys insect gut linings (=kryocide, cryolite)	gypsy moth caterpillar, flea weevil, fuller rose weevil
Pyrethrins botanical insecticide (usually with piperonyl butoxide synergist)	aphids; caterpillars; white flies; thrips; etc.
Azadiractin-neem extract botanical insecticide with feeding inhibitor and growth regulator effects (= Margosan -O)	whiteflies, thrips, mealybugs, leafminers and caterpillars

Charts courtesy of: Dr. Shetlar

Lilac borer adult.

The major reason for these "pest resurgences" is that the pesticides also kill the beneficial predators and parasites (the biological controls). By using the "softer" pesticides and targeted applications, these biological controls can be conserved and many of the resurgent pests will no longer be a problem.

Many entomologists now say that Integrated Pest Management (IPM) should be renamed Integrated Plant Management, with more emphasis on plant health and less on the pests. As an example, most pine trees do not get bark beetles unless they are under water stress. When their vascular system is not strong, bark beetle females are able to chew through the bark and lay eggs without being gummed up in the pitch. Therefore, the first method for control of bark beetles should be restoring the vascular system, not the spraying or injection of a pesticide. This may mean watering or mulching.

Of course, if the infestation has already occurred, a rescue treatment may be required before reverting to plant health care tactics.

—Dr. Shetlar is an assistant professor of entomology at Ohio State University.

Pheromones for Ornamental Insect Control

Common name/Scientific name

Bagworm (*Thyridoptreyx ephemeraeformis*)

Clearing moth borers:
Banded ash borer (*Podosesia aureocincta*)
Lesser peach tree borer (*Synanthedon pictipes*)
Lilac/ash borer (*Podosesia syringae*)
Oak borer (*Paranthrene simulans*)
Peach tree borer (*Synanthedon exitiosa*)
Rhododendron borer (Synanthedon rhododendri)

Elm bark beetle (Scolytus multistriatus)
European pine shoot moth (*Rhyacionia buoliana*)
Gypsy moth (*Lymantria dispar*)
Nantucket pine tip moth (*Rhyacionia frustrana*)
San Jose scale (*Quadraspidiotus perniciosus*)