



Adult billbug. Photo courtesy Max Badgley.

Insect Control For Recreational Landscapes

Americans living during the '60s and early '70s have memories of protest marches, long hair, peace signs and radical opinions about life in this country. Those years raised questions in the minds of nearly everyone, whether or not they subscribed to the opinions voiced by protesters at the time. Those days are gone but not forgotten.

The sports turf industry is a perfect example. Some of the idealism brought to the surface during the protest years stuck with businessmen who began to abandon the concrete and congestion of urban centers for homes and offices in the suburbs. They decided they could control the quality of their lives by living and working in a more natural, suburban environment.

The result was a boom in construction of suburban communities—and a corresponding boom in the construction of parks, schools, golf courses and sports complexes.

Those years of idealism, combined with later years of reason, practicality and compromise, are making an impact on sports turf maintenance today. Neither the sports turf manager, the golf course superintendent, the park superintendent, the univer-

sity groundskeeper, the sports turf contractor or the chemical manufacturer have forgotten the environmental issues raised in the '60s and '70s. Many of the idealists of those days are the decisionmakers of today. They take an interest in what others do to their environment and will, upon occasion, ask you questions. It's important that you have reasonable answers for them.

Recently, the U.S. Environmental Protection Agency has begun to reevaluate currently registered pesticides for their impact on ground water and certain highly sensitive wildlife. While these materials have already passed extremely extensive testing for mammalian toxicity (user safety), their use in the future may be restricted further. The use of diazinon for turf insect control on golf courses and sod farms is one of the first casualties of this review. Ciba-Geigy, the manufacturer, may appeal the ruling since it offered extensive restrictions of its own to reduce the risk of exposure to certain bird species. Diazinon can still be used as before for insect control in other locations.

State and Federal agencies are inquiring more about the fate of pesticides in the soil and whether or not they accumulate in ground water. They are looking most closely

at pesticides that need to be watered in following application. Some communities have instituted regulations that require pesticide applicators to post signs in treated areas for a certain period of time. In the future, some turf and landscape pesticide labels may require a specified "reentry period" before treated areas can be used (usually a matter of hours).

Extension specialists across the country are helping sports turf managers and chemical manufacturers respond to environmental concerns. By pinpointing the time when serious insects are most vulnerable to control, they enable you to control the pests with the highest degree of success and the least impact on the environment. Entomologists are trying to identify natural predators and diseases to insects where possible. They are learning where biological control leaves off and chemical control must take over.

Insect control grows in importance as the size, complexity and quality of the sports turf industry grows. While the task of landscape insect control has never been simple, it continues to grow increasingly complex. There are hundreds of ornamental pests and more than a dozen turfgrass pests. What's more, a number of pests can damage any one of hundreds of plants utilized in recreational landscapes today.

By necessity, the sports turf manager must concentrate on insects that cause severe damage year after year. That may be ten ornamentals insects and three or four turf insects. When an outbreak of an unusual pest hits, the pest control program needs to be adjusted based upon control information provided by the extension service and chemical distributors.

We interviewed extension entomologists from around the country to get an update on insect pests of particular importance to the sports facility manager this year. Some of these pests occur every year in regions of the country while others become serious in cycles. A third group consists of relatively new insects for which controls are not yet specified. In all cases, treatment must be made, or in some cases supervised, by a certified pesticide applicator. Becoming licensed or certified requires a fairly substantial amount of expertise.

Sports facilities in many areas employ a certified applicator. Others find it more practical to contract insecticide applications to pest control firms. Rising liability insurance rates are causing the price of contracted insect control to rise while acceptable levels of insect damage for recreational landscapes remain unchanged for the most part.

"The grounds manager has to decide how much insect damage is acceptable," says Dr. Warren Johnson, professor of entomology at Cornell University in Ithaca, NY. "If he wants 95 percent control, he needs to understand that pesticide applications will be necessary. Integrated pest management (IPM) programs, those which rely heavily on monitoring and biological controls, will not provide that degree of control."

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White grubs found when sod was pulled back. Photo courtesy: Max Badgley.

While the Japanese beetle has been a serious pest in the East and some sections of California, it is just beginning to spread westward across Missouri.

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Johnson predicts the usual serious infestations of Japanese beetle, eastern tent caterpillar, leaf miners and bagworms this year. Grounds managers in the area should be on the lookout for the hemlock woolly adelgid, says Johnson. The pest is reaching epidemic proportions within 50 miles of New York City. It was previously limited to the Northwest and the mountains of North Carolina. Adelgids protect themselves from pesticides with a layer of white, cottony wax. Horticultural oils and diazinon sprays have been used successfully to protect valuable hemlocks in the landscape.

Entomologists are watching closely for gypsy moth and cankerworms, two cyclic pests. "Gypsy moth damage has been low in the region for two years," states Johnson. Cankerworms become serious every six to seven years. Natural predators and diseases which build up during peak infestations are part of the reason for the cycles. After the insect population drops, populations of predators also drop until conditions for infestation become ideal again. Yearly applications of milky spore disease (*Bacillus popilliae*) have been providing up to 75 percent control of Japanese beetle larvae.

Dr. Norman Hummel, extension

agronomist at Cornell, says white grubs could be worse than normal this year. The bluegrass billbug is also killing more turf in the state. High maintenance turf consisting largely of annual bluegrass may be hit by the hyperoides weevil, predicts Hummel. The pest is producing a second generation in some parts of the state making a second pesticide application necessary.

Dr. Harry Niemczyk, professor of entomology at Ohio State University's (OSU) research center in Wooster, OH, predicts that beside the usual sod webworms and grubs, new insects are causing major damage to turf. Billbugs are killing Kentucky bluegrass, zoysia and bermudagrass lawns in many areas. Chinchbugs are not limited to golf courses or cool-season turf, he adds. "Billbugs and chinchbugs kill turf, they don't just feed on it." Furthermore, aphids and mites are also damaging turf in some areas.

Sports turf with consistent insect problems can benefit from seed now on the market containing endophytic fungus. The fungus lives within the tissues of some perennial ryegrasses, tall fescues and common bermudagrass, and provides the turf with resistance to sod webworm, armyworm, cutworms, aphids, chinchbug and some weevils. Dr. Richard Hurley, vice president of Lofts Seed, who studied the endophyte

at Rutgers University, explains that insects feeding on turf containing the fungus are poisoned. The fungus can only be transmitted by seed during planting, renovation or overseeding.

The predominant insecticides for soil- and thatch-inhabiting insects such as ants, grubs, mole crickets and chinchbugs are diazinon, Dylox, Mocap, Oftanol, Orthene, Proxol, Sevin and Turcam. These products must reach the insects in the soil or thatch so they usually must be watered in. Sports turf managers are finding granular fertilizers mixed with insecticides an efficient way to treat problem infestations. Golf course superintendents frequently use boom sprayers to apply liquid formulations.

These same insecticides, with the exception of Mocap and Oftanol, are also effective on foliage-feeding insect pests such as billbugs, sod webworms, armyworms, cutworms, weevils and aphids. Dursban is a highly effective insecticide for foliage feeders. Short-term knock-down of foliage feeders is possible with some insecticidal soaps. Short-lived synthetic pyrethroid insecticides are currently being developed for landscape and turf pests.

Some of the most severe ornamental pests in Ohio, reports Dr. David Nielson, professor of entomology at OSU, are borers, aphids, scales, Japanese beetle, the black vine weevil and a growing pest, the spruce gall adelgid. Lilac, ash, rhododendron, white birch, plum and honeylocust are some of the primary ornamentals being attacked by borers. Many lindens in the state are being infested with borers after being weakened by crown rot. Taxus and rhododendron have been damaged recently by the black vine weevil. Euonymus, pachysandra and magnolia are likely targets of scales.

In the case of the birch borer and the spruce gall adelgid, plant selection is a big part of the problem, says Nielson. The river birch can be used to replace the borer-prone white birch. Landscapes containing both Colorado blue spruce and Douglas fir are most likely to be attacked by the adelgid, since the Douglas fir is the alternate host for the pest. The two plants should not be in the same landscape.

You are inviting trouble with some plants, states Nielson. Flowering fruit trees such as plum and cherry are frequently attacked by eastern tent caterpillar, fall webworm and oyster shell scale. Honeylocusts are regularly infested with spider mites, pod gall midge and borers. Nielson suspects that the pine wilt nematode and pine bark beetle are more widespread in the state than people realize. Quarantines are already in place in the state for gypsy moth as more egg masses are found. "We haven't seen any serious defoliation yet, but it might be coming."

While the Japanese beetle has been a serious pest in the East and some sections of California, it is just beginning to spread westward across Missouri, states Dr. Jim

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Adult June beetle. Photo courtesy: Max Badgley.

There is no current method for effective control of the ground pearl. Not even fumigation has stopped brown, damaged spots from getting larger each year.

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Johnson, assistant professor of entomology at the University of Missouri in Columbia, St. Louis, MO, has been the westernmost point of Japanese beetle infestation outside of California until recently. The beetle has started spreading west along the Merrimac River. "Be on the alert for Jap beetles this spring," Johnson warns Missouri ground-keepers.

They have escaped the black vine weevil on taxus so far, says Johnson. It has not escaped the bronze birch borer or the euonymus scale, however. Both have reached serious populations throughout the state. Chronic damage is also being found on Scots and red pines from the pine wilt nematode and the pine tip moth. Pines are dying back rapidly from these pests. More and more sycamores are being infested by the lace bug in the state.

For the past three years white grub damage has been heavy in turf, and the masked chafer grub has begun to cause some problems in turf in late July and August. Milky spore disease is not effective on masked chafer grubs. The chinchbug has yet to become a problem on Kentucky bluegrass lawns in the state.

North Carolina landscape and turf managers have a bigger job of insect control than their peers in Missouri. "More than 400 types of woody ornamentals are planted in North Carolina," says Dr. Jim Baker, entomologist with North Carolina State University in Raleigh. "Add to that roughly 1,700 species of insects attacking them, and we have our hands full."

Each year groundskeepers can anticipate a variety of pests on azaleas, hawthorns, crepe myrtle, boxwood, rhododendrons, camelias and holly. "You can count on Japanese beetle damage to roses, crepe myrtle and plums every year," states Baker. Lace bugs are annual pests of azalea and hawthorn. Boxwood is being threatened by leaf miners, spider mites and psyllids. Black vine weevils have become serious on azalea, yew, rhododendron and hosta. Bedding plants are regularly infested with aphids, spider mites, leaf hoppers, fall armyworm and the European corn borer.

"The insects are not evenly distributed across the state," Baker reveals. "Instead they are abundant in one area and nonexistent a mile or two away. You have to scout for insects before treating."

Baker says the use of short-lived pyrethroids such as Mavrik and Talstar is

growing, as well as the use of milky spore disease, horticultural oils and insecticidal soaps. Manufacturers and distributors of Sevin, Orthene, Turcam, dursban, Sumithion (Pestroy), diazinon, malathion, Proxol, and other insecticides are providing sports turf managers with the information they need to explain the importance of insecticides. Baker says some applicators are using systemic insecticides such as Cygon, Disyston, Systox and Metasystox-R for spider mites, aphids, thrips and leafhoppers. They are not effective for scales, however.

North Carolina also has a wide range of turf insects. In addition to grubs, sod webworms and chinchbugs (on St. Augustine), the turf manager must deal with armyworms, cutworms, mole crickets and the ground pearl, a scale insect that feeds on the roots of warm-season grasses.

Mole crickets are concentrated in the coastal resort areas of the state. They remain below the soil surface during the day and come up during the evening to feed on roots and tillers. By feeding and burrowing they cause serious damage to turf. The insecticide needs to be in the foliage and thatch when mole crickets, armyworms and cutworms are feeding, explains Rick Brandenburg, extension entomologist at NCSU. Instead of applying insecticide and watering it into the soil with irrigation as you would for soil insects, the insecticide is diluted in water and sprayed until the foliage and thatch are drenched. Mowing should be avoided after treatment. Clippings should not be removed if the area is mowed.

To check for an infestation of armyworms or cutworms, apply a solution of soapy water to the turf. The soap irritates the insects and brings them to the surface where they can be seen. The only way to check for grubs is to dig out a section of turf and soil and look for the white larvae. Once found, the insects can be controlled with an assortment of pesticides.

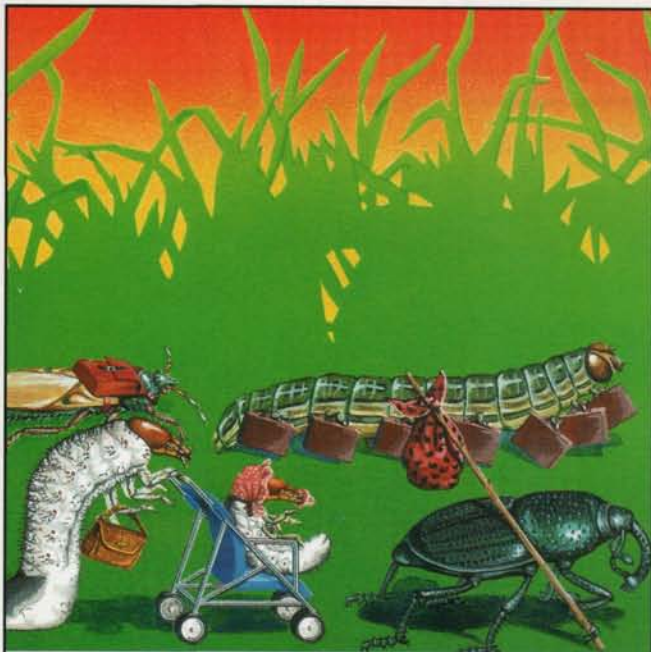
There is no current method for effective control of the ground pearl, states Brandenburg. Not even fumigation has stopped the characteristic brown spots from getting larger each year.

Brandenburg says the state is experiencing tremendous growth. A large number of businesses and high income families are moving in. Both are very interested in the quality of recreational facilities in the state.

Florida, one of the fastest growing states in the country, also has a large array of landscape insect problems. Dr. Don Short, entomologist for the University of Florida at Gainesville, reports that while grubs are not as severe in his state as in others, the mole cricket and fire ant more than make up for them. Fire ants build their mounds in virtually any soil. The mounds, however, are not as bothersome as the painful bite of the small ant as it forages for food.

St. Augustine and centipedegrass are vulnerable to attack by chinchbugs, sod webworms and spittlebugs (in northern Florida).

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Floratam and Floralawn are two new St. Augustines with improved resistance to chinchbugs. Short recommends that Florida turf be irrigated deeply and then not watered again until wilt symptoms are evident. Shallow root growth caused by frequent, light irrigation reduces the turfgrasses ability to recover from insect attack.

Ornamental insect control is challenging in Florida primarily because the growing season is so long. Insects are active in central and southern Florida twelve months a year. Plant material is completely different in northern Florida than from the rest of the state.

Short says there are more than 100 different types of scales infesting Florida ornamentals. These hard-to-control sucking insects alone present major problems. Leaf miners, spider mites, aphids, thrips, and lace bugs add to the challenge. The complexity of insect control is reflected in the state's certification test. A college degree or three years of experience under a certified pest control applicator are required before the test can be taken. Even then, says Short, 80 percent of those taking the test fail it.

Rapid growth and development, and a high water table have Short and other entomologists concerned about proper use of pesticides. Pesticides are too valuable to trust to untrained applicators, he remarks. "I'm not what you'd call an environmentalist, but I've really changed my mind in recent years about who should be allowed to apply pesticides and whether or not inspections and curative treatment are better than preventative treatment."

California also has a wide variation in plant material and length of growing season. Tremendous growth has placed stress on old oaks, eucalyptus, honeylocust, sycamores, pepper and ficus trees. New and old plantings in Southern California are at the mercy of irrigation systems which change as the sites are developed. It's the job of Dr. Tim Paine at the University of California, Riverside, to solve insect problems caused largely by rapid growth.

The Ips bark beetle is a growing problem on older pines. "The Monterey pine is susceptible to the beetles because it grows rapidly," states Paine. Since the trees are relatively short-lived, control of the beetle has not become a major issue.

Shaping during maintenance is also attributed to an increase in damage to fig trees *Ficus retusa* by the Cuban laurel thrip. The hardy fig is sheared to create dense new foliage. The thrips attack the new foliage causing the leaves to roll. Paine says Orthene has been used effectively to control the thrips.

Oaks, very protected trees in the state, suffer from a number of pests. Scales, defoliators and the oak twig girdler cause aesthetic damage to the trees more than anything else.

Scales, aphids and mealy bugs are consistent problems year after year in California. Sooty mold which grows on honeydew produced by aphids is a problem on many plants. Control of these pests is an annual affair for high quality landscapes.

Sports turf managers in California are fairly fortunate when it comes to turf insects this year. Only spotty infestations of white grubs and cutworms have been reported.

Nationwide, the landscape pesticide applicator is the man in the middle. As a professional he must have solutions to problems created by rapid growth and nearly constant use. Those solutions frequently involve the careful use of pesticides. He is the one that must explain their importance to sports enthusiasts who want high-quality turf.

The sports turf manager's success in bridging this gap between growth and concern over the environment depends greatly on his cooperation with the extension service. Working together, the sports turf manager and the extension agent have largely satisfied the concerns of idealists from the '60s and '70s. It does not appear that suburban development will slow nor will the concern for the environment disappear. With the number of recreational facilities tailing behind the rapid growth of many communities, limited sports turf areas must be kept safe and in play. In many cases, that requires well-planned and executed insect control.