Established by years of consistent performance.

Stop turf-damaging insects with the proven insecticide— PROXOL® 80 SP.

TUCO

Acti-dione RZ®

Broad spectrum
Turfgrass fungicide

For Use On:
Bluegrass, Bentgrass, Bermudagrass, Fescue, Ryegrass, and St. Augustinegrass

For the Prevention and Control of:
Large Brown Patch, Melting-Out, Rust, Dollarspot, Fading-Out, Grease Spot, Powdery Mildew, Leafspot (Helminthosporium) and Gray Leafspot

Also for Azalea Petal Blight

Canadian Registration No. 6935 PCP Act
Guarantee: Effective for Purposes Claimed
Cycloheximide 1.3% w/w
Quintozene 75.0% w/w
U.S. Patent No. 2,867,633

Store in a cool, dry place

WARNING!
HARMFUL OR FATAL IF SWALLOWED. KEEP OUT OF REACH OF CHILDREN.
See other warnings on back panel.

When you're responsible for turf playability season in and season out, you want management techniques and turf health products you can rely on. You want consistent performance. And that's why you should rely on Acti-dione® turf fungicides. They're a standard in the business. They have been for more than 20 years. And today there's still no evidence of fungus resistance.

In the spring, start your four-season spray program early before leafspot, dollarspot, or melting-out get started. Use Acti-dione TGF® or Acti-dione RZ®, alone or in combination. Both products are easy to use, economical, and attack fungi without killing bacteria that are helpful to grass.

As the weather turns warmer in the late spring, continue spraying tees, greens and fairways with Acti-dione TGF. Where brown patch is a problem, use Acti-dione® Thiram. Both products control the major hot weather diseases like dollarspot, melting-out, fading-out, leafspot, rust and powdery mildew.

You know how your tees, greens, and fairways look is a reflection of the care you give them. So give them the very best. Use Acti-dione turf fungicides. They're the standard.

TUCO
Division of The Upjohn Company

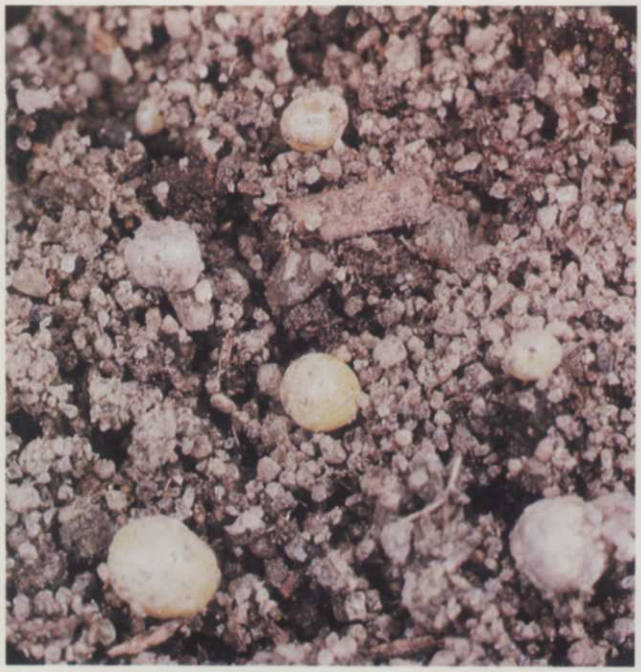
Chinch bugs

Mole cricket

White grub

Green June beetle

True armyworm



Ground pearls

Six Turf Pests

The turf manager must be able to recognize an insect problem, be familiar with the stages of an insect's life cycle during which damage may occur and know when to apply treatment for most effective control.

Grubworms are the larvae of hard-shelled beetles. They are white to off-white in color and have brown heads. When turf is rolled back, disturbed grubs may be found lying in a C-shaped position in the soil around the root area of the grass. Common grubs that cause much damage are Japanese beetles, Northern masked chafer and the June beetle. Damage in turf by grubs appears as brown patches of dead grass which can be rolled back like a carpet. Generally, damage is noticeable from May on.

Ground mole activity in turf is a good indication grubs are present, since moles feed on grubs. The best way to tell if you have grubs is to examine the soil from May to September. To do this, cut a foot-square flap on the three sides and roll the grass back so soil at the root area can be observed. Do this in several places in the turf. A treatment is needed when you find an average of two or more grubs per square foot, according to Richard L. Miller entomologist at Ohio State University.

The adults of different species of June beetles which vary from light brown to nearly black, emerge from the soil during May and June. Adults feed at night on the foliage of such trees as oak, hickory, walnut, birch, elm, willow and many others. During the day they hide in the soil, usually a grass area, where the females lay their eggs. Eggs of these beetles, when first laid, are pearly white and elongated. They become swollen and almost spherical six to seven days later. Then they hatch into tiny grubs in about three to four weeks.

The young grubs feed on decaying and living vegetable matter in the soil during the first summer. As cold weather approaches, they burrow deeper into the soil, remaining there until the spring of the following year when they return near the surface to continue their feeding on the roots of the plants.

Grubs feed vigorously and grow rapidly throughout the second summer, Miller said, causing most of the damage to turf during this year. About mid- October, they burrow into the soil to spend the second winter. In the following spring they move to the surface once more and feed for a month or two on the roots of grasses and other plants. About the middle of June they move downward in the soil and change to the pupal stage. After spending a month as pupae, they change to adults but remain in their pupal chamber throughout fall and winter and emerge as adults the following May and June.

Female beetles begin to lay eggs in the soil shortly after emerging, thus starting another cycle. Apply recommended insecticides, such as diazinon, dursban, dylox or proxol in late March or early April, or in the fall before the ground freezes. Water the turf after treatment. One treatment properly applied will last five years or more, Miller said.

Chinch bugs are more likely to be serious in bentgrass turf, however, bluegrass is also attacked. Damage to turf by chinch bugs is caused by the young bugs or nymphs. These bugs, when full-grown, are about ¼-inch long and black with a white spot on their back between their wings. They suck juices from the grass, causing it to turn brown and eventually die. Chinch bug infested turf may have many large, irregular dead patches. Look for the bugs in the circle of grass which has turned yellow around these dead patches.

Two generations of chinch bugs appear annually, in the Midwest at least, with nymphs being present in the lawn the last half of June, first generation, and again the last half of August, second generation. Two treatments are probably needed to keep the damage to a minimum in turf where the insect is a problem. Apply the first treatment in early June and the second in early August. Since the bugs are usually concealed in the thatch, it is best to water the lawn before applying treatment. Use any one of a number of insecticides, including sevin, diazinon, spectracide, ethion, aspon, dursban or trithion.

Mole crickets are light brown in color and are adapted for digging. The stout and shovel-like forelegs allow them to dig rapidly, says Howard B. Sprague in his *Turf Management Handbook*. Besides feeding on roots, they also burrow the soil uprooting seedlings and the soils dries out faster. A single cricket can damage several yards of a newly seeded lawn in a night. It is a pest primarily in the Southeast. Eggs are laid three to eight inches deep in the soil where they hatch to form nymphs that burrow and feed in the soil. Adults live for several months. If a locality has a record of mole cricket damage, it would be well to apply a preventive treatment rather than wait for damage to appear. Suggested insecticides for control include diazinon, baygon and dursban.

Ground pearls are a pest of centipedegrass and bermudagrass. They feed on grass roots to which they are attached by their needle-like mouth parts, according to John H. Madison in his *Practical Turf Management*. The young stages are small and relatively undifferentiated. The insect secretes a white, waxy sac about its body giving it the appearance of a small pearl. The pest causes irregular dead patches in the turf and is difficult to control.

Armyworms are named because of their habits. They move across the turf in large numbers and eat everything. The two common armyworms are fall and true armyworms, both of which can do serious harm to turf. Infestations noted early may appear as a small, webbed area in the turf. As they develop, the turf may be eaten to the soil. Suggested insecticides include sevin, proxol, dylox, diazinon or spectracide. □

Tree Evaluation Guidelines Get Green Industry Push

A public relations program being underwritten by the International Society of Arboriculture, National Arborist Association, American Association of Nurserymen and the American Society of Consulting Arborists is intended to bring to the attention of homeowners and others the value of trees. One of the persons charged with this campaign is Frederick R. Micha, Monroe Tree & Landscape, Inc., Rochester, N.Y.

"One of the purposes of our committee is to work with insurance companies to see if they can upgrade some of their principles they have written into insurance laws and regulations," he told WEEDS TREES & TURF. "Primarily the biggest thing is the loss of an individual tree or plant, compensation for it. $250 now stands for the basic homeowner's policy. But we have gotten it raised to $500 in six states as a trial balloon, and it may go even further.

"The next big battle that we started is with the Internal Revenue Service," he said. "As it stands now, our shade tree evaluation techniques and our formula for appraising trees is not acceptable under IRS rules. They call it a hypothetical formula, and we feel that is unfair. That is another hurdle that we are going to have to try to change."

"We have already finished our third phase of this program," he said. "That was redoing the appraisal techniques of shade tree values. We took the guts out of our old guidelines and completely revised it. "We made it stronger because the man that now has the booklet has to be horticulturally trained as a plantsman to use it."

The committee consisted of Dr. L. C. Chadwick, director Emeritus of the International Society of Arboriculture; Dr. Spencer H. Davis Jr., New Brunswick, N.J.; Ray Gustin Jr., Silver Spring, Md.; and Micha. They worked with Valleau C. Curtis, Callicoon, N.Y., of the American Association of Nurserymen. For further information, contact Micha at Monroe Tree & Landscape, Inc., 225 Ballantyne Road, Rochester, N.Y., (716) 432-2900. □

Dr. L. C. Chadwick (left), director Emeritus of the International Society of Arboriculture, with Frederick R. Micha, Rochester, N.Y., and Ray Gustin Jr., Silver Spring, Md. These three were part of the committee to update evaluation guidelines and to spearhead a publicity campaign across the country about tree evaluation by experts.

This Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs and Evergreens *has been revised and is a tool used by qualified arborists and nurserymen to place a monetary value on trees.*

Sod cutting: You can use your back... or you can use your head.

By using your head, you can save time and money.

The cost of cutting sod isn't just the cost of the equipment you use to do it. It also includes the labor time involved. And at today's wages, time is most definitely money.

That's why the Ryan Jr. Sod Cutter makes sense even for small turf management operations. It can cut up to 135 feet of sod per minute, enabling one man to cut more sod in an hour than six men used to cut in six hours. The Jr. Sod Cutter is self-propelled, easy to handle, and can actually pay for itself in time savings in just one season.

But it also lets you take advantage of the benefits of sodding versus seeding. You can replace dead grass or plant a new stand almost instantly. You have immediate ground cover which prevents erosion and enhances the appearance of your grounds.

And like all Ryan equipment, it's built to last. You may never need a replacement.

Whether you manage a small golf course, cemetery, landscape service, school grounds, industrial complex, or park, the Jr. Sod Cutter can save you money by making sod cutting less of a time-consuming job.

Write for your Ryan catalog today.

RYAN®
TURF-CARE EQUIPMENT

OMC-Lincoln, a Division of Outboard Marine Corporation,
6527 Cushman Drive,
P.O. Box 82409,
Lincoln, NB 68501

New Trench Drainage Method Solves California Greens Problem

by David G. Finigan
Public Service Director
Walnut Creek, Calif.

The city of Walnut Creek, Calif. has successfully applied a technique called the "trench drain method" to improve the drainage of its municipal golf course greens resulting in an estimated savings of $75,000.

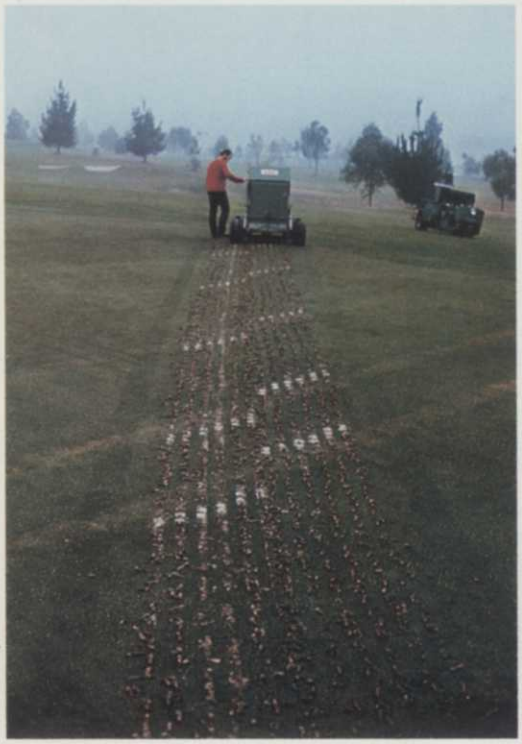
The city had been experiencing increasing difficulties with its greens for the past three years caused by water not percolating adequately through the green to the bottom drain lines. This resulted in "saturated" greens with unsatisfactory playing surfaces and promoted the invasion of *Poa annua* in the greens themselves. The greens' playing surface not only had "soft spots" because of the development of a thick layer of thatch, but "hard spots" caused by poor water drainage. Thus, a golf ball landing on the green might stay in the same place it hit or bounce a considerable distance.

In order to ascertain the nature and cause of the greens' drainage problem, the city made arrangements with the University of California cooperating extension service to conduct a series of greens tests. A representative of the Extension Service, with assistance from the golf course maintenance staff made the following four tests of the greens: water infiltration test, soil profile test, examination drainage outflow test, and precipitation rate test.

The results of the greens tests indicated that the golf course had a severe drainage problem in most of its greens. The infiltration test indicated that the average water percolation rate was .39 inches per hour without turf in place, compared to a standard average of one to one and one-half inches per hour. The greens profile tests indicated the presence of saturated layers of soil in the soil mix, again indicating inadequate drainage. The precipitation test proved that the greens were receiving adequate irrigation coverage.

Following the greens test, representatives of the city's public service department, extension service, and the golf course architect met to review the test results and discuss alternative improvement measures. It was concluded that the primary cause of the greens' drainage problem was the inability of the existing greens' soil mix to pass water successfully. Since the greens' soil mix was a combiantion of native soil, sand and organic matter, it was concluded that the fine clay soil particles in the native soil mix were building up at various levels in the soil strata, causing a barrier to water drainage.

The traditional method of correcting a severe greens' drainage



Ed Watson, golf course supervisor for the city of Walnut Creek, prepares one of the trench drains for a green (left), and after work has been completed (right).

problem such as this is to rebuild the green. Since it costs approximately $6,000 to rebuild a green, the total cost of this alternative was economically unfeasible.

Public service department staff, working with representatives of the extension service and golf course architect developed a new experimental method for improving the greens at considerably less cost. This method, termed the "trench drain method", involved the digging of four-inch trenches at two to five foot intervals (following the surface contour) throughout the green surface and filling these trenches with sand to create a series of "dry wells" or vertical drains allowing the irrigation water to percolate through the green to its base drain tile into the greens' drainage system. Small grooves, one-half inch in width and about two inches in depth, were also made in a diagonal pattern to the trenches to provide additional channels for surface irrigation water to move into the trenches and drain down to the drain tile. We estimated the cost of the method to be approximately $1,000 per green.

In October, 1974, golf course maintenance staff performed the method on the eighth green. By making only a few trenches each day, filling with sand and resodding immediately, the green was never taken out of play. A series of 13 trenches, five feet apart and 12 inches deep, were made throughout the green. A verticutter was used to make four-inch grooves one foot apart in a diagonal pattern to the trenches. This process took about three weeks.

This work was followed by the topdressing program of adding ⅛ inch of sand to the surface of the green twice a month. This was necessary to build up the surface of the green to smooth any unevenness caused by the trenches and grooves and facilitate surface drainage to the sand trenches. The green was topdressed twice a month for nine months, after which it is currently being done once a month. The cost of using the method on this green was $475 for materials (sand and equipment rental) and 160 workhours for the installation and filling of the trenches.

The eighth green was observed closely during the winter months to determine how well it drained the excess water caused by rain. The drainage of this green during this time was determined to be improved significantly well beyond our original expectations. Golf course maintenance staff also reported that during the spring and early summer, this green drained the irrigation water much better. The topdressing program developed for the greens has resulted in an improved playing surface.

Last May a representative of the cooperating extension service made a series of infiltration tests on the eighth green to measure the change in water percolation through the green. The results of those tests indicated that the overall drainage of the green has improved significantly. Not only is the drainage in those portions of the green above the trenches improved as expected, but most importantly, there was a lateral movement of water to the trenches through the grooves and sand layer developed through the topdressing program.

The city is now using the method on an annual basis to improve the remaining golf course greens. Three of the greens, however, had to be rebuilt because of extensive problems with their drains and soil mix. Since inadequate drainage of greens is a common problem for many golf courses, we believe that the method provides an economical technique for making drainage improvements to golf course greens. □

Swing-shift!

Equip your 3-point hitch tractor with a new Ford rear blade. Ten to choose from. Great way to match your job needs, your tractor power, and your budget.

Swing offset adjustment is standard on most models, making it easy to offset blades right or left of center. Steel moldboards are specially formed to roll the load. Cutting edges with highway standard hole spacing can be replaced.

Blades can be angled, tilted, and reversed 180-degrees, adapt to many grading, leveling, landscaping, ditching, terracing and backfilling operations.

Ten new Ford rear blades. 6 to 10-foot widths. Now at your Ford Tractor dealership. He's listed in the Yellow Pages under "Tractor Dealers" or "Contractors' Equipment & Supplies". See him for information on how to buy, rent or finance.

Landscape, build lawns, maintain beaches and roadways, clean up with new Ford Landscape Rakes. Economy and swing offset models. 6 and 8-foot widths. Optional attachments for special needs.

FORD TRACTORS

Ford

Circle 121 on free information card

Insect-Tree Relationships In an Urban Environment

by David G. Nielsen
Ohio Agricultural Research
and Development Center

Urbanization following the mechanical and industrial revolutions created an environment hostile for growing many plants, including trees and shrubs. As the United States urbanized population became affluent enough to permit visits to forested areas and to plant trees in neighborhoods, people developed an increased appreciation for trees.

Today, most people agree that healthy trees are desirable for aesthetic value, temperature-moderating effects, noise abatement and as organisms that simple help make life more pleasant. We would like woody plants to grow well in the artificial environment created by the urban community. Considerable efforts have been made to beautify our cities with trees but we have seldom considered how the urban environment stresses trees, making them more susceptible to attack and damage by pests.

Understanding insect-tree relationships in an urban community may lead to reasonable decisions about what kinds of trees should be used on urban sites and how existing trees can be managed to minimize losses from insect pests.

Foresters spend much research effort identifying site characteristics best-suited to individual tree species. Landscape horticulturalists have learned some trees do better on well-drained or acidic soils or with full or partial shade. However, those who plant trees in cities seldom consider certain tree species may not be well-suited to city living.

Trees have been planted in increasingly hostile locations, often drastically foreign to their genetic adaptations, without considering potential pest problems and associated tree maintenance. Little is known about how urban stress predisposes plants to insect attack. Understanding insect tree-host relationships in an urban community may lead to reasonable decisions about what kinds of trees should be used on urban sites and how existing trees can be managed to minimize losses from insect pests.

Stable host-parasite relationships are products of evolution. And through this process, a balance or state of equilibrium is reached where the parasite survives at some level low enough to enable both host and parasite to maintain a vigorous existence. A good example of this kind of relationship is the pine needle scale on conifers. This tiny scale insect is usually found in extremely low population density in the forest. However, in the nursery and in the landscape this insect often reaches pest status and can seriously reduce aesthetic quality of trees or even kill them. No one really knows why the parasite is benign in the forest and often destructive on landscape trees. Differences between the forest and man-made communities undoubtedly contribute to differences in how a scale population behaves on its host plant.

G. F. Edmunds Jr. of the Department of Environmental Biology at the University of Utah has said outbreaks of black pineleaf scale occur following unusually high mortality of natural enemies caused by "sorptive dusts" or insecticides used for control of other pests. He has also reported "scale populations apparently become adapted to specific host individuals and population density can become high only with genetic fitness of the scale population to the host species and individual." In his studies, scale nymphs had the best chance of survival on the parent tree, less chance on other trees of the same species and little chance when transferred to another host species.

This explains why one species or a single tree supports a heavy insect infestation while similar, nearby trees may be uninfested or support

to page 22


"THE RIGHT APPROACH" TO GOOD TURF
CHIPCO TURF HERBICIDE MCPP
CHIPCO TURF HERBICIDE MCPP
NET CONTENTS 5 GALLONS
CAUTION: Keep Out of Reach of Children
"THE RIGHT APPROACH" TO GOOD TURF
CHIPCO TURF HERBICIDE "D"
CHIPCO TURF HERBICIDE "D"
For control of broadleaf weeds in turf, including golf courses, parks, grounds, and other non-crop turf areas.
NET CONTENTS 5 GALLONS
CAUTION: Keep Out of Reach of Children
CHIPCO THIRAM 75
CHIPCO THIRAM 75
TURF FUNGICIDE
CAUTION:
"THE RIGHT APPROACH" TO GOOD TURF
CHIPCO BUCTRIL
CHIPCO BUCTRIL
For the Control of Certain Broadleaf Weeds in Newly Planted Grasses for Sod or Seed Production
NET CONTENTS 5 GALLONS
CAUTION: Keep Out of Reach of Children
Do NOT Store with Foodstuffs
"THE RIGHT APPROACH" TO GOOD TURF
CHIPCO TURF KLEEN
CHIPCO TURF KLEEN
CAUTION: Keep Out of Reach of Children
Do NOT Store with Foodstuffs
CHIPCO SPREADER-ACTIVATOR
CHIPCO SPREADER-ACTIVATOR
FOR TURF and ORNAMENTAL SPRAYS
CAUTION:
"THE RIGHT APPROACH" TO GOOD TURF
CHIPCO MICROGREEN LIQUID
CHIPCO MICROGREEN LIQUID
A blend of metal organo complexes of iron, zinc, manganese, and copper for the correction of turf nutritional deficiencies
NET CONTENTS 5 GALLONS
CAUTION: Keep Out of Reach of Children