



UNIVERSITY OF FLORIDA

With enemies like this...



*Courses spend
\$50,000-plus
on mole crickets*

Yep! It's that time of the year again. Time again for what is fast becoming one of the most important annual rituals we superintendents in Florida perform each year. The invasion of the mole crickets as my greens chairman puts it. Tunneling, foraging, devouring all of the turf lying in their path, they have truly become the scourge of the golf course industry in Florida.

How big of a scourge do you ask? In

Once upon a time, healthy turf lived here. And then Mr. Mole Cricket set up housekeeping.

TOM BENEFIELD, FGCSA

...you need a friend

the last survey done by the FGCSA, a question was asked as to what percentage of the pesticide budget was allocated to the control of mole crickets. The survey average was 70 percent. When you compile this figure with the average pesticide budget of \$75,000 (from those who returned their surveys) you can truly appreciate the magnitude of the problem. On average, an 18-hole facility will spend over \$50,000 per year to keep this pest in check. Certainly no other single item can cause as much monetary impact or agronomic destruction as our friend, Mr. Mole Cricket.

New products come and go. New methods come from the ingenuity of the golf course superintendents to become more efficient with higher efficacy rates than in previous years. Through this problem, we seek solutions and it this striving for a better mouse trap that brings our new solutions. For you see the old ways are on the way out. The days will soon be gone for products which are great for mole crickets but best-suited for nematodes. IPM of this pest has taken on a whole new concept. Biological controls are making their way into our arsenal of defenses, albeit ever so slowly.

New application techniques for some old mainstays which effectively reduces the runoff and odorous ill effects have become ever more promising. Yes we are getting better at controlling this pest and

at the same time becoming more environmentally conscious of our methods.

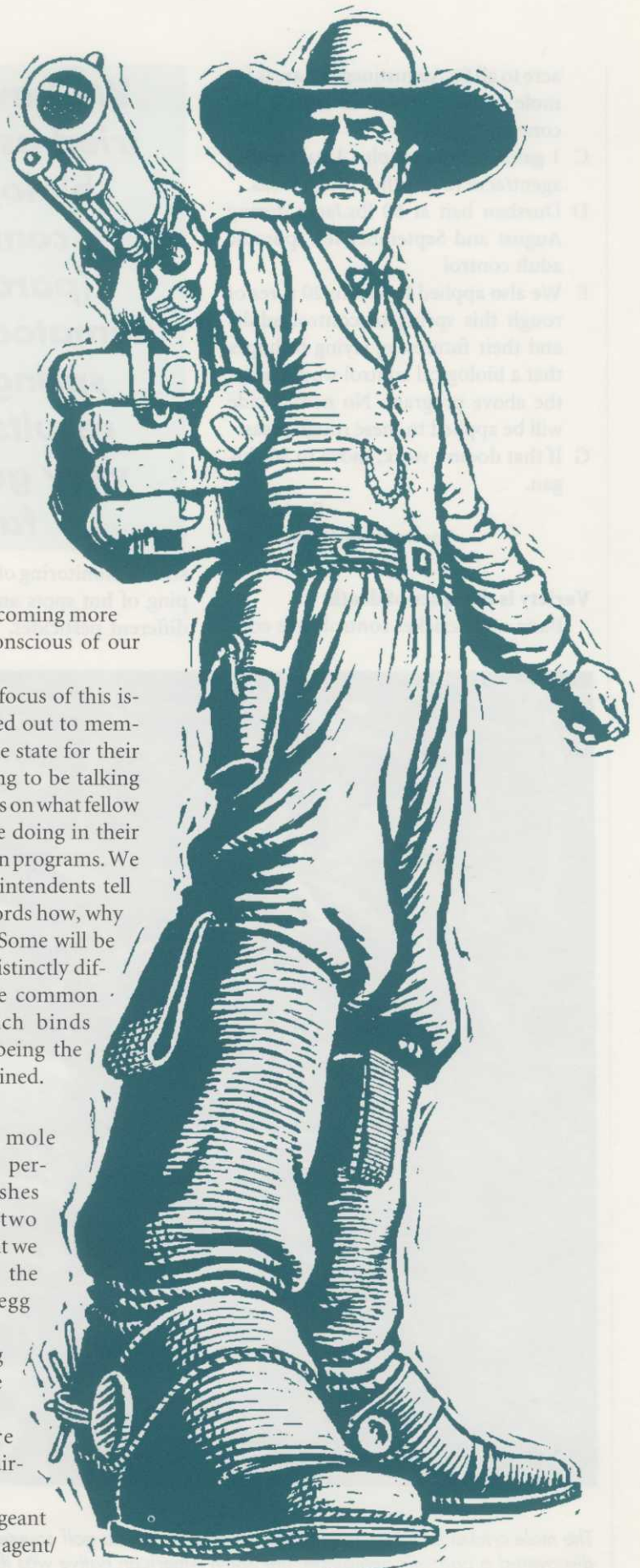
As the editorial focus of this issue, we have reached out to members from across the state for their advice. We are going to be talking the next few minutes on what fellow superintendents are doing in their chemical application programs. We will let these superintendents tell you in their own words how, why and what they do. Some will be similar and some distinctly different with the one common denominator which binds them all together being the level of success attained.

Soap Flush

We start our mole cricket control by performing soap flushes during the last two weeks of May so that we can observe when the majority of the egg hatch occurs.

After the egg hatch occurs, we apply:

- A 200 lbs./acre Mocap to all fairway-cut areas.
- B 6 lbs./acre of Pageant plus 1 gal wetting agent/



acre to all St. Augustinegrass areas for mole crickets as well as chinch bug control.

- C 1 gal/acre Oftanol plus 1 gal wetting agent/acre to all other rough areas.
- D Dursban bait at 50 lbs./acre during August and September for sporadic adult control
- E We also applied Proact to 20 acres of rough this spring to control adults and their future egg laying in hopes that a biological control would assist the above program. No nematocide will be applied to these rough areas.
- G If that doesn't work, move to Michigan.

*Fred Klauk
Tournament Players Club
Ponte Vedra Beach*

Variety is the spice of death

Basic mole cricket control here con-

We have also tried using the biological control (parasitic nematodes) this spring and results look very good so far.

sists of monitoring of in-star stage, mapping of hot spots and the use of many different pesticides. We have also tried

using the biological control (parasitic nematodes) this spring and results look very good so far.

Pesticides used to control the mole crickets include Oftanol, Crusade 5G, Pageant DF, Orthene T/O and Dursban Baits. In the fall, winter and spring Orthene and Pageant are used most. These treatments area always spot treatments, pesticides are always applied early evening. Late spring, early summer we apply Oftanol and Crusade to fairways and roughs. These pesticides are on a rotating schedule. One year Oftanol in fairways, and Crusade in the roughs, the following year they are rotated. These treatments also are our grub control products. Summer program consists of the use of Crusade, Pageant and Orthene, these are spot treatments only. Baits are



TOM BENEFIELD, FGCSA

The mole cricket is one species of exotic wildlife that no golf course wants to attract. Until University of Florida researchers discovered a parasitic nematode, the South American native was thought to have no natural enemies.

seldom used, but when applied it is in the fall, winter or spring, and always on or near the full moon.

*Robert Bittner
Club at Pelican Bay*

Decided to experiment

In 1990 and 1991 the course was treated with Oftanol granule with moderate to good success. In 1992 we decided to experiment with some other products since we were concerned with other courses that were experiencing problems with Oftanol after the third year. In 1992 we also began the mapping and monitoring mole cricket activity during the months of February through May. Last year we ended up using Oftanol on half the course with the remainder divided between Pageant and Mocap. As a check we also did not apply any preventive pesticide control onto one of our fairways in order to monitor damage activity. We did end up doing some post-damage control with Orthene and baits in late August on this hole.

In 1993 we are applying Crusade on one third of the course with two-thirds of the fairways being done with Mocap. We are also applying the material to tee tops and the slopes of greens and tees. In preparation for this chemical treatment we renovated the fairways by aerifying and scalping the turf to allow for better penetration. Our application date was scheduled for the first week in June.

*Kevin Downing
Willoughby Golf Club
Stuart*

Twice a year

During the last four years at the Waterford GC we have been treating the course twice a year. We make an application in May to treat the spring nymphs. The fall application in late August.

The spring application consists of Oftanol coated fertilizer, which has consistently produced excellent results. Although last year I tried an application of Crusade which proved to be disastrous.

I have used different products for the fall application. During 1989 and 1990 I had a custom application of Nema-cur 3EC applied. In 1992 I used Orthene and Gama-mean. This year I am planning to use Mocap granule through slit injection

As a check we also did not apply any preventive pesticide control onto one of our fairways in order to monitor damage activity. We did end up doing some post-damage control in late August on this hole.

custom application.

Throughout the year I spot-treat trouble areas with Orthene, Sevimol, Pageant DF and bait.

*James B Miller
Waterford Golf Club
Venice*

Map previous year's activity

The mainstay of my program is the mapping of previous year's high mole cricket activity. This allows me to pinpoint those areas where pressures are most likely to occur.

Start the program June 10 through June 20. Treat small nymphs 2-3 weeks after 80% of eggs have hatched. Use residual product on all irrigated turfgrass. If products are sprayable do at night, early morning (most ineffective if product dries on leaves).

Mid-June to Mid-July. Use mapping records from previous years, locate and respond to past problem areas and areas where pressures have not dropped from initial treatment. Treat with alternative residual products until pressures are satisfactory. Treat weekly, flag areas to improve cost effectiveness.

Mid July through September, 3/4-inch

Monster Program. Baits are extremely effective if applied late, preferably after late afternoon showers and applied that evening from 7 to 10 p.m. Most effective using small rotary spreader and utility vehicle. Contact spray, some good, some bad, results never consistent. Soil moisture must be high same as bait, possible problems with overall weight of sprayer (when very wet). Still use some residual products usually out of frustration, when all else fails.

September through May. Usually pressures are down with the exception of "flighting." Typical scene very dry, cool, consistent weather, but with sudden temperature fluctuations and rainfall, it looks like a B-52 bombing run. In morning, use contacts and contacts and contacts, no baits. Adults usually do not eat so consequently baits are usually ineffective.

*Jeff Hayden
Gainesville Golf & Country Club*

Early to mid June

Our ongoing program is to spot-treat problem areas with Orthene, Dursban, Crusade. We monitor by soap flush.

Big treatment last five years has been early to mid-June when we have the highest population of nymphs. Last year Crusade was very successful and we will use the same plan this year. Prior years, Oftanol was used with varied results.

Spot treat year-round after this application. Some control from Nema-cur in August. Also treat for grubs, which helps knock back populations.

*Mark Henderson
Atlantis Golf Club
Lake Worth*

Constantly monitor

My main plan of attack for the control of mole crickets is to constantly monitor the golf course and spot treat the active areas. The only wall-to-wall application of pesticide is made when the newly hatched crickets, in the nymph stage, appear in early June.

This blanket application when the crickets are at their most vulnerable stage goes a long way in keeping damaging populations from occurring. Then, by watching the areas that we know will show the first signs of fresh activity, the



spot treatments will keep the larger crickets under control. I've had excellent control of mature crickets with Orthene and Pageant and, for the young crickets, Oftanol and Crusade have worked well.

The constant monitoring of the course, and being flexible with your control program is essential. As with all pesticides, proper calibration of your spray equipment, keeping your spray equipment in top condition, adjusting the pH of the spray water and following label instructions will ensure a much more effective control program. The use of parasitic nematodes to control mole cricket populations is starting to show real promise and will probably be part of my overall

program in the near future.

Peter Bass, CGCS
Palma Ceia CC
Tampa

Drop back and punt

Drop back and punt! Actually this is the mole cricket program at Grand Cypress.

May 20 through June 15 - after soap flushes to evaluate the nymph development, Oftanol is applied with fertilizer at a 2 lbs. rate per acre on all areas except greens.

In mid-June an application of Triumph at 1.5 oz/1000 sq. ft. is applied to greens and tees.

In mid-July we inject fairways with 75 lbs./acre of Mocap

Remainder of cricket control is done with Orthene. We divide the golf courses equally with the superintendent, assistant superintendent and spray technician each covering six holes. Orthene is applied as needed at a 5 lbs./acre rate. All applications are made between 8 p.m. and 6 a.m. The evening and early morning applications assure that the crickets are near the surface.

Tom Alex
Grand Cypress Golf Club
Orlando



They turned the tide at English Turn

BY PAUL BAKER

(Exclusive to the Florida Green)

There's a lot of sand on the back nine at English Turn. Of course, there's a lot on the front nine, too. In fact, there's a lot of sand everywhere at this five-year-old, Nicklaus-designed course just outside New Orleans — 400,000 cubic yards of it, to be precise, spread two feet deep over its entirety.

That layer of sand, claims Golf Course Superintendent David Hicks, helps make English Turn one of the best-drained PGA-Tour stops on the continent. That's no small feat considering that total rainfall for the course approached the 100-inch mark last year.

Carved from a low-lying, marshy woodland on the west bank of the Mississippi, English Turn was specifically built with drainage in mind. Native clay, excavated from a surrounding moat-like lagoon, was used to elevate the course and shape its slopes, hills and spectator mounds. Sand, pumped from the bed of the Mississippi, was layered on to help channel water off the course in a hurry.

But as convenient as good drainage makes the 18-hole course for members and tournament players, all that sand makes a mountain out of Hicks' mole cricket problem. "English Turn is a perfect habitat for the insect," he said.

To combat the subterranean pest, Hicks uses slit application to apply granular insecticide/nematicide below the thatch layer where mole crickets are most active. He adopted the innovation from superintendents in Florida.

Mole crickets are the single most destructive pest of turfgrass in the South. When nighttime temperatures begin to rise in the spring, they burrow just beneath the surface to feed on tender roots and stems. They damage turf by feeding directly on turfgrass, and the insect's burrowing also causes further

stress on turf by drying out the soil.

Not only is mole cricket damage unsightly, it's expensive. Severe infestations often mean resodding. It's not surprising then that in 1991 Georgia, Florida and Alabama alone spent more than \$60 million to combat the pest.

Although superintendents from the coastal Carolinas to Florida have been fighting mole crickets for years, the pest is a relative newcomer to southern Louisiana, where clay constitutes the subsurface layers of most courses. Mole crickets avoid clay because it is dense and difficult to tunnel through. But English Turn, with its cushy layer of river sand, seems to be an irresistible lure.

"Mole crickets are a sporadic problem on greens and around bunkers on most courses here, and they appear to be getting worse," Hicks said. "Luckily, we can draw on the experience of people in Georgia and Florida. We try very hard to stay abreast of new control techniques, and we use a lot of different tools and products to remain on the cutting edge."

Slit application is quite literally on the cutting edge of mole cricket control. The technique involves placing granular products below the surface with a device very much like a conventional overseeder. Coulters spaced 1.5 to 1.75 inches apart cut narrow slits about an inch deep in the sod. Precisely measured doses of insecticide are simultaneously deposited into the slits.

Developed in Florida just three years ago, slit application is quickly catching on throughout the South, and with good reason. According to Dr. Bob Dunn, a University of Florida nematologist, applying granular chemicals in concentrated subsurface bands is a very effective way to control highly mobile insects like mole crickets.

"Most moving insects will cross those bands many times



Timing is everything

Timing is the most important aspect of mole cricket control. Whatever you are going to do for mole cricket control, January through July are the most critical times!

Hatch - mid to late June in Ridge GCSA area.

January to May: Treat with Crusade, Mocap, Orthene and baits

August to September: spot treat only

We are interested in the new cedar slit injections for fairways. We believe this method will end up being less expensive due to the concentration of material in furrows.

We use Crusade on the roughs. Crusade is best on large areas.

*Buck Buckner
Orange Tree GC
Orlando*

Pray for us

Here at the Oak Bridge Club we have changed our school of thought. Instead of trying to predict when egg hatch is going to occur in north Florida and then going after nymphs, this year we went after the adults. Mocap was sliced in April 16 at 75 lbs./acre.

Normally in our area, egg hatch occurs mid-May to mid June. However, last year with an extended exceptionally cool

spring, egg hatch was occurring in late July! So who knows what "normal" is anymore!

By going after the adults, we hope to have better control over the population on site. Later on if we do get some egg hatch or fly-ins, we hope to be able to spot treat those areas.

Pray for us. We should know the "state of the mole cricket" by mid July and hopefully we can deliver a positive address.

*Eddie Snipes
Oak Bridge Club
Ponte Vedra Beach*

Please See WE ARE, page 54 ➡

Slit application is a very good way to deliver the material precisely

➡ as they dig around under the thatch," he notes, "so they will encounter the material multiple times. Slit application is a very good way to deliver the material precisely to the area where it will do the most good."

"By depositing the material immediately beneath the growing turf," he continues, "you substantially reduce exposing it to wildlife, pets and people, and you reduce potential runoff problems. It also substantially lessens any odors which occur."

For the past two years, David Hicks' mole cricket program has included two slit applications per season. "We treat the tees and the fairways at the beginning of June and during the middle of August," he said. "That gets us through our worst months, which are June through September in New Orleans. It does a good job of keeping them out of the fairways." Hicks spot-treats troublesome areas in the rough and around bunker facings.

In addition to controlling mole crickets, slit application provides other benefits as well, Hicks said. "It's a good cultural practice, very much like verticle mowing. You cut through the thatch, and that helps create new growing points." He adds that the slits heal quickly, usually within a week to 10 days.

Slit applications also help control nematodes, particularly the sting, lesion and root-knot species that feed on roots. By controlling both nematodes and mole crickets, the product allows turf to grow more vigorously, thus enhancing its quality.

Like the majority of superintendents who have adopted slit application, Hicks contracts with an outside company to provide the service. Contracting the work out made him a little nervous at first, he admits.

"I can't stress enough how important it is to build a high level of trust with the person who is actually going to be running the machine," he cautions.

"We have gotten to the point where we put out our material at night with the lights one. That provides the benefit of allowing you to keep out of the players' way. But again, success depends on how comfortable you are with the operator. Obviously, you don't want to send someone you don't know to run this machine over your course in the dark."

"Attention to details makes the switch from conventional broadcast application to slit application smoother," he continues. "It's the little things, like deciding where to turn around. For example, are you going to turn around close to the green or stay a little farther away? We've developed a flagging system that establishes those boundaries, and that's helped a lot. Of course, we still always monitor the operation."

Making sure that the operator adheres to all health and safety precautions while applying the pesticide is critical as well, he said.

Although Hicks has had tremendous success with slit applying granular insecticide for mole cricket control, he cautions that the technique may not be for everyone. "It's for people who have a situation like English Turn, where large areas are vulnerable to mole crickets. If you just have a few pockets, you might want to start a good mapping program and treat topically. You have to tailor your program to fit your golf course."

Even after two years, Hicks continues to modify his program. This year, for example, he will rotate his chemical used to minimize resistance and to enhance his nematode control program.

"We've had a lot of success with slit application," he said. "We've found that getting the material through the thatch and right to the insect is a more reliable way to control mole crickets."

We are favoring more use of the environmentally safer products.

➔ (From page 37)

Map in fall

Fall - Mapping is done on existing damage from mole crickets.

Early Spring - Begin looking for damage; control hot spots with Orthene.

Late Spring/Early Summer - Soap flush suspect areas; use Triumph 4E to control nymphs on greens and tee tops, use Oftanol on green banks and tee banks, alternate Namacur and Oftanol on fairways and roughs yearly.

Summer/Early Fall - Use Mocap 10G and Orthene for control in infested areas.

Chris Hoder

Grenelefe Golf & Tennis Resort

Haines City

One thing is readily apparent in these testimonials. It seems that no one product is the answer by itself but rather a wide array of different chemicals works best. Formulations and techniques are being used at specific times in this life

cycles of the mole cricket. The results show that we are favoring more use of the environmentally safer products whenever possible.

The facts speak of the excellent job Florida Superintendents are doing of putting into action the theory of integrated pest control management. And when theories are put into real-life situations, we all reap the benefits. For you see mole cricket control in Florida is in a constant state of evolution of research and applied theories and it is the results of these theories put into practice that furthers the educational process so important in uncovering better solutions.

Our own commitments of time, money and energy to the different research projects on mole cricket control is proof that we are today and have been in the recent past striving to get the upper hand on this ugliest of Florida pests. The new biological controls we have been looking at in the laboratory are now be-

ing expanded in greater numbers in the field. Only time will tell if these efforts are our keys to a better tomorrow or if we continue our search.



Commercial version of UF's biocontrol catching on

In response to the concerns of turfgrass managers, the University of Florida undertook a groundbreaking program designed to identify the best methods for controlling mole crickets. With the support of the Florida Turfgrass Association, the UF researchers completed seven years of laboratory and field testing on the beneficial nematode, *Steinernema scapterisci*, which was the most promising control agent for mole crickets.

The beneficial nematode contains a bacterium that is lethal to mole crickets. Once the nematode enters the body cavity of the mole cricket, it releases the bacteria. The bacterium multiplies rapidly and kills the mole cricket within 24-48 hours. The beneficial nematode then feeds on the bacteria, reproduces and starts the entire cycle again. In fact, the nematode is capable of reproducing itself up to 80,000 times from a single mole cricket.

Like other biological controls, the nematode takes a little longer to work than traditional chemical treatments. However, the nematode is capable of living in the soil for 13 weeks even without finding a mole cricket host. If the nematode finds a host and reproduces, then the nematode offspring will kill additional mole crickets. This long-term effectiveness provides a much better chance of controlling mole cricket populations.

Also, the nematode is incapable of harming vertebrate

animals, beneficial insects or grasses. In fact, because the nematode only kills mole crickets, the Environmental Protection Agency exempts nematodes from its registration requirements.

The beneficial nematodes can be applied in several different ways. First, the nematodes can be applied through irrigation or fertigation systems. Second, the nematodes can be applied using a spray rig in the traditional pesticide application method. In either case, the nematodes are mixed with water at a rate of approximately 50 gallons per acre. The nematodes are applied to the moist soil surface and then watered into the soil.

In 1991, the UF researchers, along with the UF Office of Technology and Licensing began working with a group of graduate students to form a company to commercialize the nematodes. When the University of Florida received a patent on the nematode in November (US patent number 5,165,930), this new company became the exclusive licensee of the nematode technology.

To date the nematode has been applied to nearly 60 golf courses, 20 cattle pastures, and several county school systems, sod farms, municipalities and athletic fields. Turfgrass managers throughout the state have found the nematode to be an effective, environmentally safe method of controlling mole crickets.