Gray water on the green

Golf course superintendents help scientists decide between rose-colored glasses and a jaundiced view for recycled water.

BY DARCY MEEKER

When contaminants showed up in groundwater near drought-ridden Tampa, nobody knew where they came from, but there were lots of instant theories.

One possibility was the treated effluent ("gray water") used as irrigation water at a number of sites including some golf courses. Some sticky questions are at stake. Is gray water bringing those contaminants with it? Is it changing soil bonding characteristics so that materials leach through more rapidly? Or is the data flawed?

The FGCSA moved quickly toward the only cure for fear: true truth and real reality.

Cooperators are Florida's Department of Environmental Regulation, the Department of Agriculture and Consumer Services which licenses pesticides, and the U.S. Geological Survey.

"The purpose of the study is to poke around in the gray water area a little more. We'll compare golf courses with similar soil types and management practices, where the only difference is that one uses recycled effluent and the other doesn't," said Tom Latta, chairman of external affairs for the Florida Turfgrass Association.

"The objective is to replace questions and fears with data and answers so we don't have to work on fears and speculations, but can answer with hard scientific fact."

Latta listed two ideas that need to be investigated.

"One idea is that, as you apply pesticides to soil and turf, you build up communities of organisms which break down these pesticides. Gray water may have some ingredient which kills these organisms and prevents breakdown of those pesticides."

Another hypothesis is that gray water may gum up the soil. Sites in the soil which normally bind the pesticides may be pre-empted by components of gray water. Soil that used to filter out pesticides would then allow the chemicals to pass through.

"The important thing to remember in all of this," Latta says, "is that this is a research project which is trying to develop some insights on some theories, but the theories may not be proven, and even the concern may not be confirmed. The data may be flawed. The monitoring wells that were in place are in place because of the need to monitor effluent. They're not designed for highly sophisticated,

sensitive, groundwater monitoring studies."

Latta said, "What we may be seeing here are problems of sampling technique or well installation, rather than pesticide leaching."

Other data Latta has seen from sandy soils show very little evidence that pesticides leach.

"So far, in my exposure to the data, there's very little evidence of pesticide moving below the root zone. Soil is a good filter, but you can saturate the sponge. If you irrigate much heavier than you should, you can wash the pesticides down through the absorptive layer before they can be absorbed."

Turf management is urban agriculture, Latta said, and it's especially important to make sure it is environmentally compatible since high concentrations are nearby.

Chip Lewison, golf course superintendent at Dunedin Country Club, is cooperating in the project.

"They want to collect good quality data to help set future standards. We provide background information on maintenance, use and levels and so on as a guideline as to what we (the golf industry) are doing or not doing to affect groundwater contamination."

Lewison said, "What I've been trying to do is talk with some area supers who have monitor wells on their courses — what they are testing and what some of the results might be."

Lewison said the data surfacing within the last 18 months has brought the subject to light, but golf course superintendents had discussed the subject in Anaheim, Calif., in January, 1989.

"We knew it was going to become more of a problem and decided we'd better start collecting data, and keep ourselves abreast of people who are against pesticide usage and so on. We want to avoid the scare tactics some people are using and we want to see if we're doing something that is harmful."

Lewison pointed out that most of the products used on golf courses can be bought by homeowners at garden stores. "We buy in larger quantities, and we're trained and certified — we get four to eight hours of classes and testing every year. That's the difference between us and the homeowners."

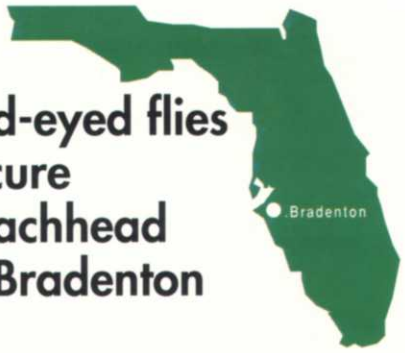
Mark Jarrell, super at Palm Beach National GC, says he has been doing testing for some time and turf seems to be insurance against groundwater contamination.

"We're trying to do our part to make sure our use of products and materials is going to be for the benefit of everybody and not end up causing problems for other people down the road. We've put a lot of money and research into research."

Jarrell cited a study of golf course effects on groundwater in Cape Cod. Some 19 wells on 30-year-old golf courses were tested for 17 turf chemicals. Of these, seven were not found, one was at 20 percent of the health advisory level (maximum healthy exposure) and the rest were 6 percent or less of HAL.

DER officials wanted to wait until a formal report was ready to comment.

Red-eyed flies secure beachhead in Bradenton

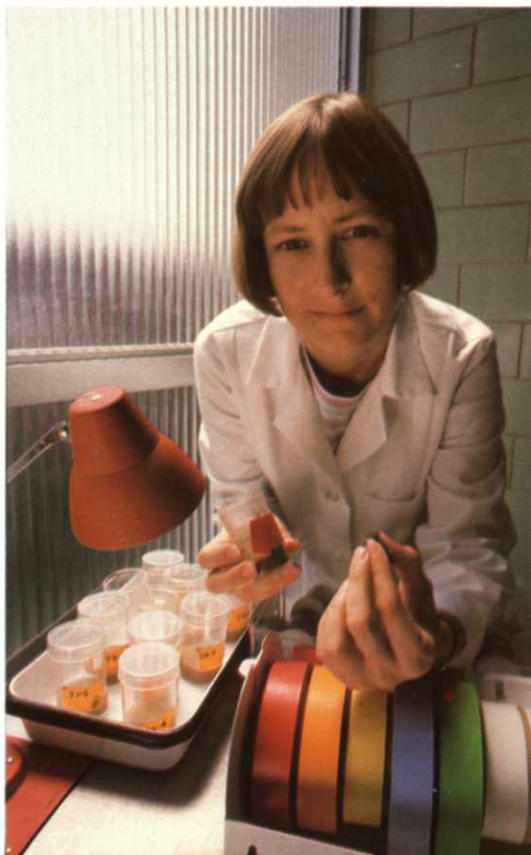


Some golf courses near Bradenton have busy little silent partners helping them control mole crickets, those brown burrowers who cost Floridians over $40 million per year, browning out golf courses, lawns, pastures and vegetable fields.

In October, 1988, entomologists from the University of Florida's Institute of Food and Agricultural Sciences released a biological control agent at the IFAS Research and Education Center in Bradenton.

The result: "red-eyed flies," *Ormia depleta*, a natural enemy from mole crickets' native chomping grounds of

IFAS biologist Sue Winewriter



Brazil, have prospered in their new Florida home.

"Descendants of those flies are now abundant and they occupy an area of at least 78 square miles surrounding the IFAS station," said Howard Frank, director of the mole cricket bio-control research at IFAS.

Red-eyed flies respond to the mole cricket mating call and lay living larvae on or near that scourge of Florida turf. The young burrow into the mole cricket and kill it as they grow.

Howard Frank

Before the experiment could begin, of course, it had to be demonstrated that the fly would not attack any other Florida creatures, and the proper permissions had to be obtained from U.S. and Florida departments of agriculture.

IFAS biologist Sue Winewriter invented the techniques which allowed her to rear *Ormia depleta* in the lab. It was a first, not only for this species, but for its close relatives, too.

Flies showed up in Manatee County and northern Sarasota when Frank's colleague Tom Walker and grad student John Amoroso set traps to measure the spread of the fly. It is not known how far north and south the fly can establish populations. It comes from a moderate climate in Brazil, though, and the IFAS scientists hope the fly can cover the Sunshine State.

Nematodes meet nemesis in battle with bacteria

Nematodes, worms so small they look like fuzz, are a big problem for golf courses in Florida, but an IFAS scientist thinks he's on the trail of some even smaller organisms that can give the tiny worms a big problem of their own.

"It's exciting, but we're a long way from being there," says Donald Dickson, an IFAS nematologist, studying nematode nemeses — two

bacteria and one fungus — with a $16,980 grant from the Florida Turfgrass Association. "Florida has a higher rate of infection than any place I'm aware of, except maybe Hilton Head and New Jersey, because of the sandy soils. We have a thousand golf courses and 90 percent are using nematicides on golf greens to control nematodes."

Nematodes are sneaky little buggers which build up in January and February, destroying grass roots, and you may not see the results until May, Dickson said.

"Nemacur is all the golf courses have to control the nematodes with, and Dr. Ou, an IFAS soil scientist, has found microbes biodegrading

Don Dickson

Nemacur," Dickson said. The biodegrading microbes build up, giving each application a shorter life span. Nemacur can be used legally twice a year; it's expensive and there's no possibility to rotate because there's no other chemical out there.

"Factors that make good nematicides make chemicals environmental problems. DBCP was suspended in '77 and we're still picking it up out of the water; we're still finding EDB, banned in '83-84."

Dickson said that the FTGA-sponsored research into biological controls for pest nematodes is going well.

"In year one, we identified *Pasturia penetrans* bacteria specific to the lance nematode and to the sting nematode, the two major nematode parasites on turfgrass in the state of Florida. Now we are trying to ascertain if they will cross control."

Using naturally infected nematodes in their lab studies, the team follows population dynamics of the nematodes, taking samples every month. Other experiments track the bacteria and fungus which attack the nematodes. Also under evaluation: whether Temik or Nemacur cause nematodes to be more susceptible to the biologi-

cal control. Some past data seem to indicate that carbamate nematicides like Temik may do that.

The experiments are tough because it's not easy to grow the organisms in the lab. Some requirements are very particular, like maintaining 25 to 27 degrees Celsius.

Biocontrol harmless to good nematode

Grover Smart, the IFAS nematologist working on the mole cricket biocontrol project, says the biocontrol for sting and lance nematodes will not hurt the nematode which wears a white hat in the mole cricket wars.

"There would be some real advantages in doing the two of them together," said Smart. "For the most part, in controlling plant parasitic nematodes, we have used chemicals. At the rate the chemicals are put out, however, they will also will kill nematodes put out to control mole crickets."

Smart said FTGA cooperators in the mole cricket project are limiting their nematode sprays to greens. "The hope is that there will be enough infected mole crickets in untreated areas to keep the nematode populations surviving. Where we have put the nematode, in most cases, is in roughs where they would not be treated with the chemical nematicide."

Lakes doing well near golf courses

Numbers are being crunched this very minute for a final report on the $5,000 FTGA-sponsored research by Dan Canfield in the IFAS Fisheries and Aquaculture Department in Gainesville. The report is slated for fall publication.

The study of the fish population in Gate and Mountain lakes sampled fish with column nets, gill nets, shock and other methods. A smaller number of the fish were brought back to the lab to be weighed and measured.

Biologist Mark Hoyer said, "We pulled the inner ear bone (it's called

the *otolith*) to see how old the fish are and how fast they have grown." The bones have growth rings like a tree.

Hoyer commented that at least three or four largemouth bass were found weighing over 10 pounds. The largest was from Mountain Lake and weighed 13.1 pounds. Mountain, with 136 acres, had 17 species of fish; Gate, 17 acres, had 12 species, including a walking catfish.

Neither lake had a nutrient overload, he said.

Area residents feared intensively managing the lakes for tourist enjoyment could lead to eutrophication, but both lakes appear generally healthy from preliminary results, Hoyer said.

Where the REAL money is...

The USGA recently announced a $3 million commitment for turf research. Below are the budgets of 10 major environmental advocacy groups.

If those groups spent as much of their $253 million on environmental research as they do on legal fees...

Environmental Advocacy Groups

Organization	Membership	Latest Budget
Nature Conservancy	436,407	$88,021,000
National Wildlife Federation	5,800,000	69,017,000
National Audubon Society	550,000	32,573,730
Sierra Club	426,000	28,059,498
Nature Resources Defense Council	95,000	11,760,242
Wilderness Society	250,000	10,932,448
Environmental Defense Fund	100,000	8,530,454
Envir. Policy Institute/Friends of the Earth	42,000	2,500,000
Izaak Walton League	50,000	1,544,908
Environmental Action	20,000	958,028
Total	**7,769,407**	**$253,897,308**