Soil Amendments Need Continued Study

Finding the right mix for your course requires understanding the underlying soil

BY JAMES MURPHY

Attempts to manipulate and improve soil profiles are an age-old quest. Until the advent of synthetic chemicals, particularly nitrogen fertilizers in the 1900s, animal and green manures were widely used and highly effective for improving soil and plant growth. In the management of golf course turf, amendments can be useful for enhancing soil and plant growth, subsequently producing high-quality playing surfaces.

Desirable soil characteristics for golf turf include adequate fertility, water retention and adequate pore space for plant growth and vigor. Good drainage to remove excess water is also crucial to producing healthy turf. Moreover, the soil surface must be sufficiently firm and stable to support traffic from play and maintenance equipment.

Those familiar with fundamental properties of soil recognize that using amendments to supplement one or more of these soil characteristics may harm conditions for other necessary characteristics. For example, amending soil so that it is firm and stable will often reduce drainage and pore space of the soil, while enhancing water infiltration and percolation with amendments often reduces nutrient and water retention.

Understanding which properties need to be improved for specific soils provides the basis to make decisions regarding amendments. Furthermore, it's often difficult to sort out the veracity of claims associated with the seemingly endless amendments on the market unless superintendents have a fundamental understanding of soil properties. The effectiveness of an amendment depends on its own characteristics, the amount added to soil and the existing soil properties. Many well-established soil amendments, including liming materials and fertilizers, are required by law to provide minimum data on product characteristics so that proper use of the material can be readily determined. Unfortunately, many other amendments have no such requirements. As a result, there is limited information on the characteristics of the materials, making it difficult to assess how useful they would be as amendments.

THE EFFECTIVENESS OF AN AMENDMENT DEPENDS ON ITS OWN CHARACTERISTICS, THE AMOUNT ADDED TO SOIL AND THE EXISTING SOIL PROPERTIES

In such cases, it is critical that a laboratory test the amendments and soil to evaluate whether an amendment will provide the desired effect(s). Testing data will also provide insight as to how much material is needed to achieve the desired results.

A Rutgers University field study evaluated the effects on the establishment of creeping bentgrass putting greens of sand-based root zones containing various amendments. Root zones were comprised of predominately medium-sized sand (which conformed to USGA guidelines), amended with inorganic and organic amendments. Root-zone mixtures (by volume) included the medium sand mixed with sphagnum peat (at 5 percent, 10 percent and 20 percent ratios), reed sedge peat (at 5 percent and 10 percent ratios), loam (at 2.5 percent, 5 percent, and 20 percent ratios), clay-based porous ceramic (at a 10 percent ratio) and nutrient-charged clinoptilolite zeolite (also at a 10 percent ratio). As expected, initial turf establishment was improved on both organic and inorganic root-zone mixtures with greater nutrient retention. However, greater nutrient retention in inorganic mixtures did not improve turf performance compared to nonamended sand by the end of the grow-in year.

Further study is needed to determine why greater nutrient availability in inorganic mixtures did not result in better turf performance at the end of the grow-in year. It's possible that water availability could be involved in limiting nutrient supply from the inorganic mixtures, since turf response on the inorganic mixtures became similar to the nonamended sand plots as irrigation intensity was reduced. Longer-term study of these root-zone mixtures will verify the persistence of turf responses, especially considering that some of the better turf establishment and performance occurred on mixtures having a capillary porosity considered unacceptable (greater than 25 percent at 30-centimeter water tension) by USGA guidelines.

Murphy is a professor in the Department of Plant Sciences at Rutgers University.

It's not all paradise for superintendents who tend turf in Hawaii. They have their share of weed problems.

Aloha Goosegrass

Hawaiian superintendents find cure for problem weed

BY NANCY HOLBERT

Problem

Two Hawaiian superintendents experienced extensive problems with goosegrass. One of the superintendents said he had never seen a goosegrass infestation so bad.

Solution

Both superintendents tried – and found success in – a new sulfonylurea herbicide from Bayer Environmental Science.

The trade winds that blow across Hawaii and the blue waters of the Pacific Ocean may play well in tourism brochures but can create headaches for weed-control programs. Just ask Victor Nemeth, superintendent at Kauai (Hawaii) Lagoons Golf Club. Nemeth ran into a problem with Sencor-resistant goosegrass on an 18-acre driving range.

"Goosegrass has always been a problem," he says. "MSMA on its own won't take it out, so we'd tank mix it with Sencor to get the control we needed. Then we ran into resistance."

Environmental conditions aggravated the problem.

"We had trade winds of 15 mph to 20 mph and irrigation coverage was poor at best," Nemeth explains. "The 328 bermudagrass we had on the range started to die off, and common bermudagrass contaminated the turf. To compound the problem, a hurricane dampened tourism, forcing staffing restrictions and a move from chemical to mechanical weed control. There definitely was opportunity for the goosegrass to move in."

The goosegrass took advantage aggressively.

"I'd never seen goosegrass like this anywhere else," Nemeth says. "About 80 percent of the driving range was infested, to the point that it was almost smothering itself."

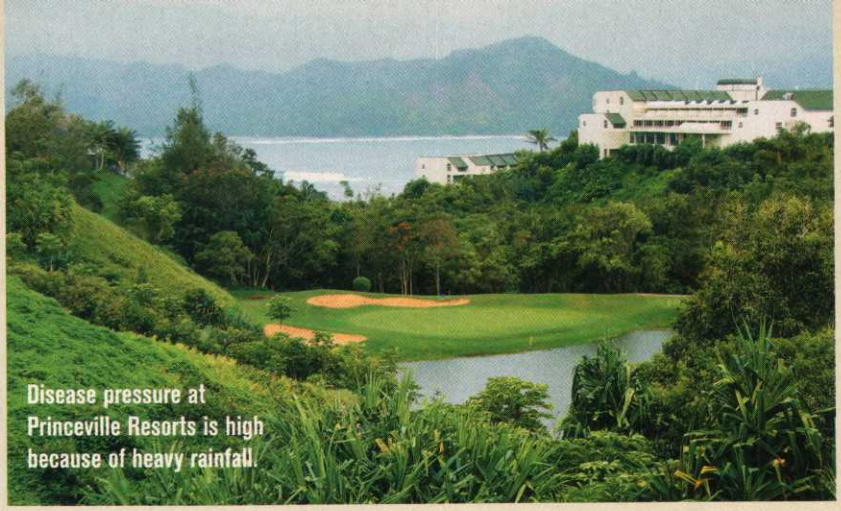
Thankfully, Nemeth found an answer to his problem in a postemergent application of Revolver herbicide. Introduced in 2003, Revolver selectively removes unwanted cool-season grasses from warm-season grasses, as well as sensitive warm-season grasses such as goosegrass.

Victor Nemeth said he had never seen a goosegrass infestation so bad.

PHOTOS COURTESY OF BAYER ENVIRONMENTAL SCIENCE

The sulfonylurea product contains the active ingredient foramsulfuron and is registered for use on tolerant warm-season turfgrasses, including numerous cultivars of bermudagrass and zoysiagrass. Besides controlling goosegrass, Revolver also controls *Poa annua*, *Poa trivalis*, perennial ryegrass, bentgrass, bluegrass, tall fescue and henbit. It also suppresses centipedegrass.

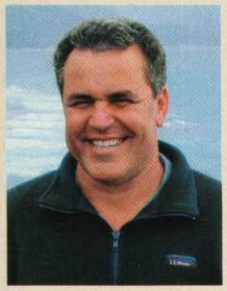
Nemeth made two applications of Revolver at .6 ounce per 1,000 square feet rate seven to 10 days apart. The first application was mixed with MSMA; the second was Revolver by itself.



Disease pressure at Princeville Resorts is high because of heavy rainfall.

"The control we received was impressive," Nemeth says. "We first tried it on the driving range where we hadn't sprayed the goosegrass in two years. We started seeing the effects of the application in two weeks. There was a dark browning of the leaf, then the growth slowed, and we received complete effectiveness in about six weeks. We also got good control of *Poa* with spot treatments on the fairways."

Damian Baptiste, assistant superintendent at Kauai's Princeville Resorts, reports similar experiences with Revolver. With 20 years of experience as the pesticide manager at the Robert Trent Jones course, he's also had problems controlling *Poa* and goosegrass in his 328 bermudagrass greens.



Damian Baptiste said Revolver also help control *Poa annua* on his course's bermudagrass greens.

"The course gets a lot of rain, and soil temperatures go below 65 degrees," Baptiste says. "The bermudagrass doesn't grow, opening a hole for the *Poa* and goosegrass. The pressures were heavy, especially on greens and tee surfaces. Some of our bermuda putting surfaces were 40 percent covered with *Poa* during the winter months."

Baptiste applied Revolver to two greens as well as fairways and rough. Greens received .4 ounce per 1,000 square feet in three applications.

"We'd tried a number of different controls in the past but nothing took care of both problems," Baptiste says. "Our low temperatures and cold soils demand control that picks up both of our main problems with one product. It's something we've needed." ■

Nancy Holbert is a freelance writer from Yardley, Pa.

Drainage Done Right

New technology allows superintendents to do system renovations without disrupting play

By Frank H. Andorka Jr.,
Managing Editor

You dread answering the phone after a hard rain because you know golfers will complain about the swamp on the right side of the 14th fairway. It pricks your conscience because you know you need to do something about the drainage on that hole. The standing water is not only aesthetically irritating, but it provides a breeding ground for mosquitoes and other bugs that wreak havoc with your players' games.

Still, the thought of asking your owners or members for money to renovate the drainage makes you wince. After all, drainage is underground and out of players' sight, meaning that convincing them it needs to be fixed is nearly impossible. Not only is it out of sight and out of mind, but the idea of tearing up the course to add more pipe — taking holes out of play and reducing revenues — makes drainage renovations a difficult sell.

Fortunately, drainage technology has improved to the point where it's no longer an either-or proposition. It's become less invasive and cheaper than it was 10 years ago, meaning less aggravation for golfers and fewer lost revenues for the clubs. With enough foresight and planning, superintendents can enjoy two-pronged victories — improved drainage *and* steady revenues, which might make the prospect of picking up the phone after a hard rain less daunting.

The WaterWick system is gaining support because its installation disrupts turf so little, according to the company.

WATER WICK

Changing landscape

Fifteen years ago, petitioning the green committee for a drainage fix meant asking it to close the course holes while big machines moved dirt and dug deep trenches, says Dennis Hurley, president of Turf Drainage Company of America, a Marrero, La.-based drainage provider.

"If you needed to collect water 4 feet deep to be effective, you had to use a trackhoe to grade the pipe to the relief," Hurley says. "The closure of the course meant a major loss of revenue. You can't do that in today's competitive golf market."

Arnold Plowman, vice president of sales for Varicore Technologies, based in Prinsburg, Minn., says courses whose budgets have been squeezed during the recent economic downturn want minimally invasive drainage solutions so they can keep revenues flowing into the club's coffers.

"They're trying to find options that allow them to get the best performance at the lowest

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Drainage Done Right

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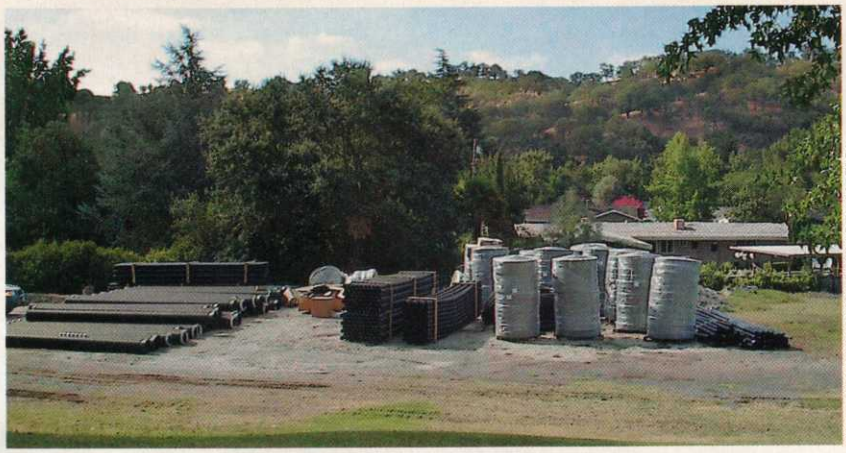
installed price," Plowman says. "Seldom do courses have the luxury of closing down entirely to do a traditional drainage system renovation."

He also says golfer expectations have increased over the years and that any standing water on the course — even in out-of-play areas — is not tolerated.

"These days, golfers expect a higher level of playing conditions, and superintendents are straining to meet those expectations," Plowman says. "Better drainage helps them do that."

Tom White, vice president of Water Wick, says that many of the country's nearly 17,000 golf courses are old enough to need renovations in many places on the course — and drainage is an important part of the process.

"Three-quarters of those courses have push-up greens, which are notoriously prone to drainage problems," White says. "If you have to choose between fixing the drainage and rebuilding greens at $30,000 to $60,000 per green, fixing the drainage is the less expensive option."



TURF DRAINAGE COMPANY OF AMERICA

VARICORE TECHNOLOGIES

Smaller projects mean less space taken up for materials (above). The Varicore drainage system (below, right) requires less digging because of its tall and thin piping system.

Evaluate the problem

Dave Davis, president of David D. Davis Associates, a Crestline, Calif., irrigation consultancy, says he often sees owners and

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green committee members blame puddling problems on the irrigation system without examining the underlying drainage issues. He urges them not to separate the two issues when considering how to fix them.

"Drainage and irrigation renovations need to be coordinated," Davis says. "Not all the standing water you see on a course is the result of poor irrigation. Sometimes there's a lack of drainage or poor drainage that's causing the problem instead."

The soil structure also plays an important role in how well courses drain, Davis says. Superintendents should evaluate what's underneath their turf before implementing drainage upgrades.

"There may be underlying issues that may affect the way the turf drains," Davis says. "You may have a soil that's too compacted to let water infiltrate it, or you may have a sandy soil that water rushes through without stopping. Unless you know exactly what your soil is going to do with water, you'll never be able to design an effective drainage solution."

TURF DRAINAGE OF AMERICA

Using a trencher (left) to install a siphon system like the one manufactured by Turf Drainage of America means completing the installation by putting sand over the top of the pipe (right) is less labor-intensive.

So what's new?

Davis says he's seen several new drainage trends on golf courses. He says more courses are installing drainage systems that mechanically pump water away from the surface. A vacuum pump at the end of the pipe draws water into a catch basin instead of relying on gravity to do the work.

"They're fast," Davis says. "If you have a course where you need to move water off a spot quickly, underground drainage that uses a pump is the way to go."

Another hot trend — especially in areas where water shortages are common like the Southwest and West — is a drainage system that saves water for future use, Davis says. The system consists of pipes that lead to trays buried in the ground. The trays collect the water and lock it into the soil profile, making it available for plants to use in the future when external water use is limited, he adds.

"This is a trend I'm clearly seeing in California and the Southwest, where the water situation is becoming increasingly dire," Davis says. "Drought conditions are bringing with them restrictions on how golf courses can use water, and systems that allow superintendents to recycle water are important steps forward."

White says his company's WaterWick system is gaining support because its installation disrupts turf so little. Superintendents (or WaterWick contractors) slice veins into the turf with a special patented machine manufactured by the company. The veins also provide permanent aerification. Then the machine vibrates gravel into the newly created slits, creating a conduit for the water to leave the surface and disperse through the soil beneath.

The drainage veins can be placed as close as 1 foot apart, which allows superintendents to do more drainage per square foot than they would get from more traditional systems where the pipes have to be placed farther apart. He adds that the system costs $5,000 to $6,000 per green to install. A full course installation can be spread over a period of years.

"It dries the greens immediately," White says. "We clean up the area with a leaf blower, and you're ready to put golfers back on the greens. You lose no rounds with our system."

Varicore's Plowman says his company's system minimizes disruption by getting away from using traditional round pipe that must be buried deeply. Round pipe is a holdover from agricultural drainage systems that doesn't apply well to golf course applications, he says. The Varicore pipe — 6 inches tall and 1 inch wide — is tall, narrow and strong enough that it only needs to be installed 12 inches to 18 inches below the surface, cutting nearly in half the depth that traditional drainage

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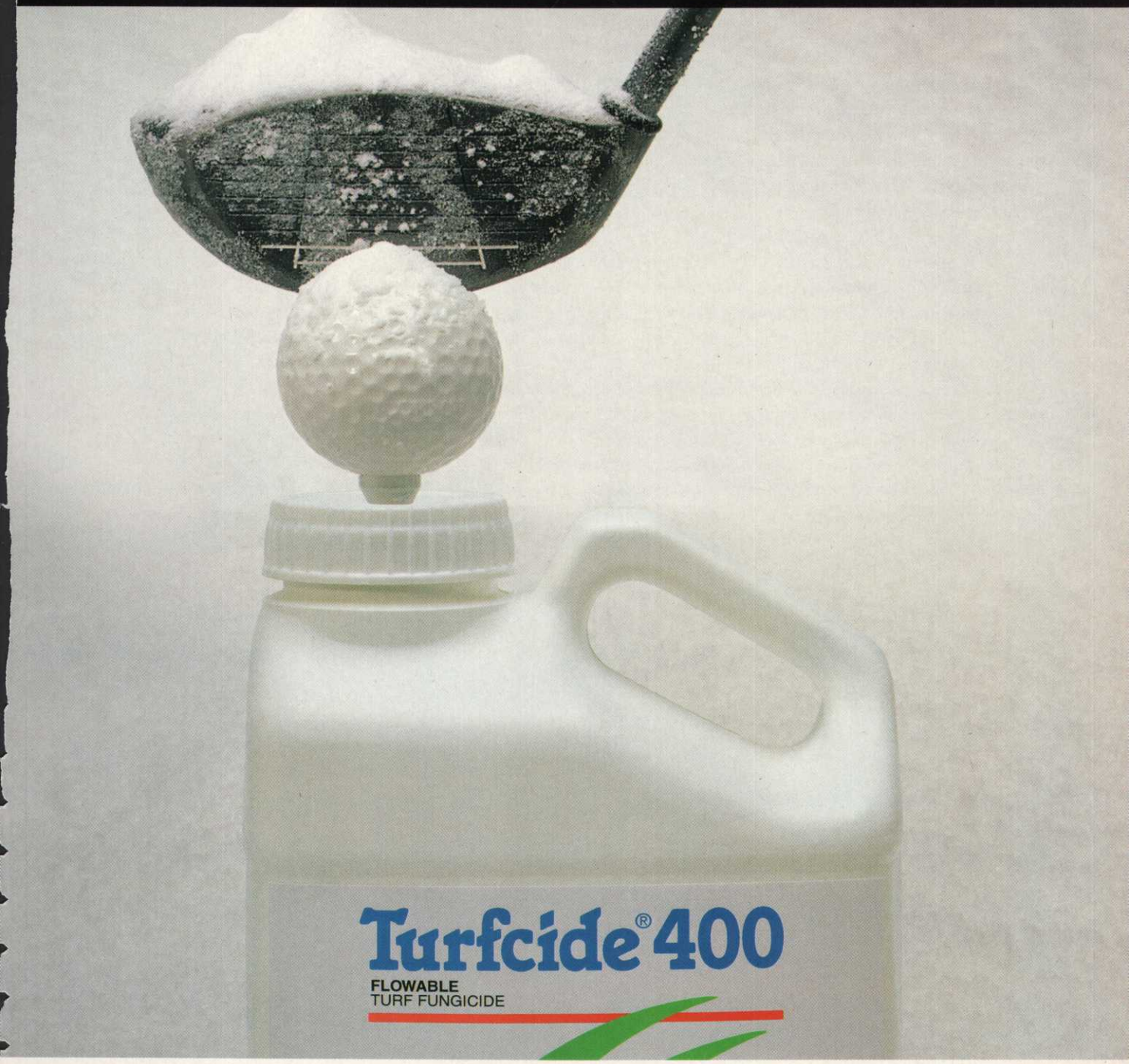

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Drainage Done Right

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pipe requires. So instead of using large earth-moving equipment, superintendents can use a simple trencher to dig the hole. Then superintendents can hook the Varicore system into existing drains.

"You can do smaller jobs more easily with our systems so you don't end up busting your budget," Plowman says. "You're not tearing up the course needlessly, and your recovery is much faster because the scars are so small."

Turf Drainage Co.'s Hurley says he has also seen an upsurge in interest in his siphon system. Conventional drainage systems must run pipe on grade. With a siphon system, superintendents can install pipe into an ungraded trench. The piping can even go up over mounding and other contours, so the cost of digging is minimized. Once the installer creates a vacuum inside the system, it will continually siphon water whenever water is in the system above the control level.

TURF DRAINAGE COMPANY OF AMERICA

Superintendents are looking for less invasive-drainage solutions to keep revenues flowing.

"When we do a drainage plan for a course, we choose the method that is best for them," Hurley says. "If conventional relief is less expensive, we use that first. We employ the siphon system in applications where it will be less expensive than a conventional relief, or it will allow us to collect water that could not be collected with conventional methods."

Davis says that no matter which system superintendents decide to use, educating golfers on the importance of having good drainage is the most important part of the process. Fortunately, more green committee members and golfers are educating themselves.

"The water crisis forced a lot of people to educate themselves about drainage, and they're becoming more proactive about it," Davis says. "Ultimately, that's a good thing for the industry. It will eventually make the superintendent's job easier." ■