warm-season turf species that were hopefully more pleasing and required less care. For example, centipedegrass and zoysiagrass are generally known to require less maintenance than either bermudagrass or St Augustinegrass. In Florida, where population growth is a matter of great concern, we must be diligent about the conservation and use of our water resources. In some communities such as Volusia County, Fla., residents are issued \$25 fines for violating water restriction guidelines, reports the Davtona News-Journal. Water restrictions are commonplace in Florida and the continued reliance on a single species or a single cultivar within that species may be imprudent, particularly if it requires heavy water use. Historically, continual monocultures eventually developed problems. The breakdown of resistance to chinch bugs in certain varieties of St. Augustinegrass is a familiar example. Routine chemical treatments are now required to maintain superior turf quality in chinch bug-infested regions.

We believed there should be a wider set of choices for warm-season lawns. Of the many breeding lines we tested, two lines seemed to routinely stand out from the others and met our selection criteria. The first is Ultimate Flora Zoysia, a new medium-textured genotype of zoysiagrass taxonomically known as *Zoysia japonica* Stued. It is essentially a "Meyer-type" zoysiagrass with some distinct differences. Ultimate has a finer-textured leaf blade than either Meyer or the more recently developed Empire zoysiagrass. In comparison to the standard St. Augustine variety Floratam, all of the current zoysiagrasses have a more refined texture. And surprisingly, Ultimate felt softer to the touch.

Aesthetics aside, we wanted to exploit the well-known interspecific differences among the warm-season turf species. In general, the zoysiagrasses have been ranked "better" than the St. Augustinegrasses for drought resistance/wateruse-efficiency, shade tolerance and wear tolerance. Based on these general differences among these two species, some of our selection criteria were satisfied at the outset of the project. In addition, zoysiagrass is not a preferred host for the chinch bug.

Marketability to sod growers was also a consideration in the decision to release this grass. There are a number of fairly popular zoysiagrass varieties that are used in residential landscapes. These range from the classic and now 50-year-



old variety known as Meyer, to some of the newer varieties developed in Texas, Florida and the Carolinas. In comparison to many of these "Meyer-type" zoysiagrasses, Ultimate not only had the finer leaf structure noted above, but also produced fewer seed heads and exhibited a deeper green color in our tests. Although, "beauty is in the eye of the beholder," we felt these traits provide us with a strong contender for the Florida market and hopefully beyond.

Another feature prompted us to consider the release of this genotype. From a commercial production standpoint we found that Ultimate had a faster growth rate than the standard varieties. So far, this trait has allowed sod producers to more quickly grow in their fields and produce a marketable crop in less time than it takes to grow in other "Meyer-type" varieties. This was confirmed in our small plot studies where it took only 10 months to attain full coverage.

Our second landscape variety is Hammock Centipede, which is taxonomically known as *Eremochloa ophiuroides* (Munro) Hack. Centipedegrass has long had the reputation as the "Lazy Man's Grass," so we decided to exploit this biological attribute and reflect it in our logo and variety name. Like most of you, we felt that less time spent with the lawn mower was a good thing. So this breeding program became somewhat of an emotional endeavor. Reasonable aesthetics along with reduced maintenance were a prerequisite for the selection of Hammock.

This genotype has exhibited a much deeper green color than the standard lime-green appearance typical of many centipedegrass vari-*Continued on page 62*  This Jacksonville, Fla., home was a test site for using Aloha Seashore Paspalum in a residential application. Shown here is Brian Speiser of Brian Speiser Irrigation, who maintains the grass at this location.



This Jacksonville, Fla., home was a test site for using Aloha Seashore Paspalum in a residential application.



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### Continued from page 61

eties. And like the other centipedegrasses, Hammock has required much less fertilizer and less mowing than the typical St. Augustinegrass.

However, the market acceptance of Hammock is considered the biggest challenge to the success of this variety. No centipedegrass has proven truly successful much further south than Orlando, and certainly no centipedegrass has ever been made widely available in southern Florida. Centipedegrass has been a success in northern Florida and throughout the Gulf and lower Southern states.

By selecting and evaluating our centipede germplasm in southern Florida we were fortunate to find a breeding line that was adapted to the unique climate and soils of this region. At some point we believed we had found a genotype that differed significantly from other centipedegrasses and the adaptive range of this species could be extended. It could also be viewed as a suitable alternative to the St. Augustinegrasses that dominate southern Florida.

### Golf and sports

For sports turf and golf course grasses, the situation is similar to the residential landscape.

In Florida and perhaps many southern states, bermudagrass is the primary species used on these surfaces. But again, bermudagrass has a reputation for high maintenance. Pest control, weed control, water use and mowing are all on the high end of the maintenance spectrum. And, unfortunately, shade tolerance and salt tolerance are not attributes of bermudagrass when compared to many of the warm-season turf species. But bermudagrass is truly one of the most beautiful turf grasses if inputs are not a serious issue.

In this breeding program our goal was to present the sod producers and consumers with a wider and more diverse array of varieties for their profit and enjoyment. And again, we simply exploited the well-known interspecific differences among the warm-season turf species. The general differences among bermudagrass, zoysiagrass and seashore paspalum are well documented and these differences also satisfied some, or at least gave us a head start on our selection criteria at the outset of the project.

PristineFlora Zoysia is an asexually reproduced genotype of Zoysiagrass. It is an "Emeraldtype" grass, and Emerald is a classic zoysiagrass variety that has survived more than 50 years in commerce. Emerald is a hybrid between *Zoysia japonica* Stued by *Zoysia tenuifolia*(L.) Merr and it is still considered one of the most attractive grass varieties.

Pristine Flora Zoysia was bred to fit the niches where bermudagrass struggles. Because the zoysiagrasses generally have better tolerance to shade and require less inputs than the bermudagrasses, we anticipate this variety will function nicely around the golf course tee boxes and other areas on the fairways where shade has become a problem. Although it should be realized that all grasses require some level of sunlight.

In comparison to the standard zoysiagrass variety Emerald, Pristine had some superior features that should influence its market acceptability. The seed head and flag leaf structure of Pristine were more refined than Emerald, but more importantly, the leaves had a finer texture than Emerald. On average, leaf length and leaf width of Pristine was 21 percent shorter and 19 percent narrower than Emerald.

Additionally, Pristine had a more intense green color than Emerald. These leaf and floral traits in combination appeared to convey a more aesthetically pleasing canopy. From a sod growers viewpoint, field plots attained 100 percent cover two months earlier than Emerald. This pattern of rapid "grow-in" has been repeated in the larger blocks of both Breeders Seed and Foundation Seed. This faster rate of establishment confers important agronomic advantages relative to harvest interval and crop maintenance that should also please many sod producers.

### **Sports paspalum**

Our second sports-type turf is Aloha Seashore Paspalum, which is a medium-fine textured genotype of Paspalum vaginatum Swartz. Presently, there are a number of seashore paspalum varieties that have proven to be suitable alternatives to bermudagrass on golf courses and sports fields.

In comparison to bermudagrass, seashore paspalum is reputed to require less water, less nitrogen and accepts higher salinity irrigation water. And salt has even been used as a herbicide on paspalum varieties, meaning less chemicals are needed for weed control. Aloha was developed, not just as another alternative to bermudagrass, but specifically to become a more environmentally friendly choice of turfgrass for use on sports fields and golf courses. It has many of the same properties attributed to the other paspalum varieties and a few more.

Aloha has a canopy morphology that is intermediate to Sea Dwarf and Sea Isle I. Like these varieties it appears to have the same versatility for use on greens, tees, roughs and fairways, as well as for use on ball fields.

Aesthetically, Aloha displayed a darker green foliage than either Sea Dwarf or Sea Isle 1. Additionally, we found Aloha had resistance to the green bug aphid, which has recently become a problem on some golf courses. We were also pleased to find that Aloha covered the research plots much quicker than either Sea Dwarf, Sea Green or Sea Isle I. This not only has implications for the sod producer but also for the recovery and recuperation of the variety under heavy use.

Already anecdotal reports have confirmed some of these research data in the test marketing phase of this release.

Throughout the development process, it has remained our goal to serve the plant breeding mandate given to UF/IFAS by our turf industry more than five years ago. My colleagues and I were asked to develop new grass varieties adapted to Florida and to diversify the genetic base upon which our turf industry relies.

In cooperation with our private sector partners we hope that these releases will serve the needs of the average Floridian and help sustain commerce and profit for one of our most important agricultural industries.

Brian T. Scully is professor of plant breeding at the University of Florida/IFAS Indian River Research Center in Fort Pierce, FL. He can be reached at Scullv@ifas.ufl.edu.

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Proper drainage is vital to maintaining healthy and functional greens, tees and fairways. Here's how to do it right

### **BY PETER BLAIS**

he three most important words in real estate are: location, location, location. Arguably the three most important words in golf course maintenance are: drainage, drainage, drainage.

The time-worn real-estate adage is a cliche. The parallel saying to golf course maintenance, however, reveals a basic truth.

"Drainage is the key to turf management," says Scott Cybulski, superintendent at Falmouth (Maine) Country Club.

That goes for greens, tees and fairways.

That said, adding drainage to existing greens is a touchy operation that most superintendents seem to believe is best left to specialists. Britt Pollock, superintendent at Northwood Country Club in Meridian, Miss., knew he had to do something to the push-up greens at his 75-year-old course after they endured several consecutive wetter-than-normal summers. Back-to-back summers with many rainy days often meant several days between mowings and mowers occasionally sinking into greens. The course's green committee was convinced it had to add new drainage, although members did not want to go to the time and expense of shutting down the course and putting in United States Golf Association (USGA)-spec greens.

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"I learned a long time ago that if you do not have to do a job like that in-house, do not do it," says Pollock, who contacted Marrero, La.-based Turf Drainage Company of America to complete the project. "It's too much trouble. It's easier to hire some good people to [do the job]."

Dennis Hurley, president of Turf Drainage, told Pollock that his company could remove the existing sod, add drainage, replace the sod and have a green back in play within 48 hours.

"We strip the sod from where the drain lines will be put in, mark each individual piece of sod [potentially hundreds] and estimate how much they might stretch," Hurley says. "We put in the drainage, replace the sod and the golf course can put the green back in play the next day."

Bud White, senior agronomist with the USGA's Mid-Continent Region, agrees that installing drainage on greens can be a tricky proposition.

"Ideally, sod should be lifted out carefully and then put back on greens in the same orientation it came out," he says. "Otherwise, the sod lines will always remain visible. They need to be aerified and topdressed to make them seamless with the rest of the green again."

Cybulski says he has repaired crushed

drainage pipe on his 20-year-old greens but done little else in terms of drainage work to putting surfaces.

Many Northeastern U.S. courses with older push-up greens have contracted with specialized drainage companies. Six years ago TDI International, through its re-

cently renamed subsidiary, XGD Systems of Stuart, Fla., added internal drainage to the fourth green at Rockrimmon Country Club in Stamford, Conn.

"It turned our worst green into a very playable one," says certified superintendent Tony Girardi. "It took about four days to do one green. They worked off plywood the whole time. They [dug] down 14 to 16 inches with a trencher, excavated all the spoils and took them off the green. They laid down a special

Superintendents are looking for drainage solutions that are less-invasive.

2-inch pipe and back-filled with putting green construction mix.

"Then they laid the 7-inch pieces of sod they had carefully removed, numbered and rolled up on the side. They put them back in the exact same order and tamped them all down. When they were finished, you could cut a cup and Continued on page 66

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### Let it Drain

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have the green playable that same day." Fairway and bunker drainage projects are more likely to be done in-house, White and others agree.

Every fairway drainage line should have two components, White adds. First, the upper end should have a flush out so it can be cleaned on a regular basis. Second, drain lines should have a locator wire, usually a 14gauge piece of irrigation wire, laid in the trench so water locators can be hooked to it to find the drain line in the future.

Fairways are a combination of French drains and catch basins, depending on the application, White notes. Bunker projects generally involve a French drain line with fabric laid over it and then sand. Tees are basically the same as fairways, although the best way to drain tees is to laser level them as opposed to adding drain lines. Laser leveling tees usually costs about \$1.20 per square foot to level and resod.

"Drainage is simply a matter of getting materials in the right place and having the water fall on the pipe," White explains. "Some of the most important things are using proper gravel and qual-





When the Seminole Golf Club flooded a few years ago, it installed a siphon drainage system from Turf Drainage Co.





ity sand. You should not sod over French drains because sod can seal them off and they will not function properly. If you have to sod a French drain, the sod should be aerified the first grow-in season after sodding. Aerifying should be done a minimum of three to four times, the cores removed and the holes filled with sand to remove the surface tension the sod layer creates."

Many fairway projects can be completed with minimal disruption to play and revenue by performing work in stages, says Hurley, whose firm specializes in improving drainage at existing courses. "We provide an alternative to completely

closing down the golf course ... [instead] closing a hole at a time and then reopening it when the work is done."

Regarding fairway drainage, it's important to be able to define the problem first. Does it result from surface water or seepage? Surface water is anything that streams or puddles. Seepage is anything not seen on the surface but interferes with playability. Seepage can come from several different sources, such as one-time surface water that could not flow off the property or a high-water table associated with surrounding bodies of water.

"To get rid of surface water you have to design the right type of inlet collection system," Hurley explains. "You have to get as much water off the property through open inlets as possible. Water is less expensive to drain as surface water than seepage water. Once trapped in the profile as seepage water, you have to dig deeper and put in more permeable material in the profile. But if you just look at draining off surface water, your project will probably fail. There will always be seepage water that has to be designed for and removed."

White and Cybulski note that drainage projects are usually done later in the season — late summer and early fall in the Northeast, late fall and early winter in the mid-continent region — when the ground is driest and the impact on play is minimized.

Green committees rarely realize the man-hours needed to remedy a drainage problem or the burden it may place on a superintendent to perform the job in-house, Hurley says. When contacted by a superintendent, Turf Drainage first estimates the manhours needed to complete a pro-



Hurley described one instance when a committee planned to have its superintendent undertake a drainage project using four members of his own maintenance crew. The committee believed the workers could perform their mowing assignments in the morning, work on the drainage project in the afternoon and complete the project in a few weeks without having to pay them any overtime.

Under that scenario, Hurley estimated it would take the superintendent's crew 40 weeks to complete the job. Not only would the course be torn up that long, but the club would also have to pay rental fees on the excavators, trench compactors, harvesters and other equipment needed to finish the work. On the other hand, Hurley estimated an outside contractor, working full time on the project and using its own equipment, could complete the job in just nine weeks.

The greens committee eventually chose the contractor.

*Peter Blais is a freelance writer from Monmouth, Maine.* 





# Real-Life Solutions

BY THOMAS SKERNIVITZ, MANAGING EDITOR

# Bunker Liner Keeps Sand In, Contaminants Out



### Problem

Heavy rainfall washes out and contaminates the sand in your bunkers.

## Solution

The TrapMaster bunker liner, comprised of two layers of non-biodegradable polyester, allows water to penetrate its blanket layer, which encourages the sand to stay in place. Meanwhile, its spun-bond under-layer is porous enough to let water pass through but dense enough to keep sediment from rising and contaminating the sand. ifty-seven bunkers and there's nothing gone. With apologies to Bruce Springsteen, that's the tune superintendent Jamie Miller is humming these days at Tangle Ridge Golf Course in Grand Prairie, Texas.

One year after renovating the last of his 57 bunkers, Miller is quite satisfied with his new TrapMaster liner from TrapMaster Products. Gone are the days of losing sand to a moderate drenching and having to refill each eroded pit.

"With the old material, it didn't take much of a rain to where you'd be out there pushing everything back up by hand," Miller says. "But now we can get a pretty good rain, say threequarters of an inch or less, and have hardly any washing. The sand seems to cling to (the liner) up on the banks."

Another attribute is the elimination of pools of water that would allow sediment, from outside the bunker or even beneath it, to contaminate the pristine sand.

"Every time it washed, we wound up getting clay mixed in with our sand, and the sand turned brown — or browner — and it would tend to harden on top," Miller says.

The TrapMaster is comprised of two layers of nonbiodegradable polyester, meaning the product could last indefinitely. The upper blanket layer allows water to penetrate and drain evenly. In turn, sand fills the layer, keeping it in place, even on slopes with 60-degree angles. The spun-bond under-layer is porous enough to let water pass through but dense enough to keep dirt and rock from migrating upward.

In selecting a new liner, Miller ordered samples of everything he could find on the market. Because the native clay soils of Texas tend to expand and contract, he weeded out the solid-material liners and narrowed his choices to three products.

"We needed something that would flex," Miller says. "After I got to looking at the different types, I liked the open-pore kind of material that the TrapMaster and a couple other competitors offered."

The TrapMaster wound up being the least expensive of the three and, better yet, the heaviest, Miller says. "So we kind of got the best of both worlds," he adds.

Tangle Ridge spent \$200,000 on the 18-hole project, which was evenly divided between consecutive winter seasons. The cost included 455 rolls of liner to cover 4.5 acres of bunkers, as well as the labor, new sand and the gravel and pipe that were used to

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simultaneously install a new drainage system.

In the long run, Trap-Master customers such as Miller hope the liner will pay for itself in the form of fewer manpower hours to maintain bunkers. John Briggs, the superintendent at Fox Run Golf Club in Eureka, Mo., says the product has reduced his poststorm recovery time from two-and-a-half days to three or four hours; from a dozen or more workers to six.

"It used to take one day to just pump the bunkers out; and then another day with a bunker raker to push all the sand up into the high flash areas; and then a third day, after it had dried, to work the sand," Briggs says. "Now if any sand moves at all, you take a couple of shovels, throw it up, rake it out and you're good to go."

Superintendent John Anderson is confident that he'll recoup the \$164,000 he spent on liner, labor and an expensive brand of sand to renovate the 64 bunkers at Indian Hills Country Club in Mission Hills, Kan.

"We haven't had to shovel bunkers but maybe one time this year, and that was just around the edges," he says. "Before we had the TrapMaster put in, we'd have eight guys spend probably five or six hours a day pushing up bunkers and draining them out. It will definitely pay for itself over a number of years."

In the meantime, the bunkers are no longer slaves to the weather conditions. "Our bunkers were so inconsistent before," Anderson says. "Our members appreciate the consistency now. You get into a trap, and you know what you're getting into."

Installation of the 6-foot-by-50-foot rolls requires no special knowledge or training. Miller and Briggs had their own staffs perform the work, although Miller did hire three independent laborers.

"It was about a five- to six-man process with four different stages," Miller says. "We had a backhoe that we used to excavate the old material and reshape the bottom. Another fellow behind that did the trenching. Behind that, a third crew laid the liner. And a fourth group put the sand in. We finally got into a rhythm where we moved pretty smoothly."

Meanwhile, Anderson hired an outside contractor to reconstruct the bunkers at Indian Hills.

Anderson says he hopes to get at least six years out of his TrapMaster liner, maybe even 10. Miller is more ambitious, hoping to get 10 or 20 out of the material.

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A. 8.	Paid and/or Requested Circulation 1. Paid/Requested Outside- County Mail Subscriptions	32,873	33.310
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E.	the USPS Free Distribution	0	0
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I certify that the statements made by me above are correct and complete