



They champion

The PGA Golf Club
extolls the roll on its new
ultradwarf bermudagrass greens

BY LARRY AYLWARD, EDITOR IN CHIEF

Pardon Bud Taylor if he drops to his knees and plants a smooch on one of the new greens at the PGA Golf Club. Yes, Taylor, director of golf at the club, adores the recently renovated greens that much.

It has been almost a year since the PGA Golf Club's two golf courses in Port St. Lucie, Fla., were rebuilt and reseeded with Champion ultradwarf bermudagrass. Taylor is happier than a man who just scored a hole-in-one because the greens, which turn 1-year-old in July, are performing like a loaded Lexus. And when the greens are good, the golfers are content, which makes Taylor's job that much easier.

"When the greens are good, the hot dogs taste better, and the whole golfing experience is better," says Taylor, who's in his 11th year at the club, operated by PGA Golf Properties.

It was superintendent Dale Miller's idea to reseed the greens with Champion. Miller was hired by the PGA Golf Club to head the renovation, most of which has been completed. Miller, who left the club in March, says he has participated in about 30 golf course renovations throughout the country, mostly in the South. He has a toolbox full of his favorite gadgets to use in the process. When a course's greens require an overhaul, Miller grabs a bag of Champion ultradwarf bermudagrass from the box.

Champion, released in 1995, was the first ultradwarf cultivar in the country. It has been planted on 335 courses in 16 states, according to Champion Turf Farms, the Bay City, Texas-based breeder and marketer of the variety. "The nice thing about Champion is that it rivals bentgrass, but it's a Southern grass," Miller says.

The PGA Golf Club celebrated its 10th anniversary last year and made the announcement it would invest several million to redo the Tom Fazio-designed North and South courses, whose names were changed to the Ryder Course and the Wanamaker Course, after the renovation. Miller made the case that Champion should be used to renovate the greens. After hearing him out on the variety's benefits, the PGA Golf Club's brass, including Taylor, agreed with him.

Miller might know Champion better than most superintendents. He first used the variety on greens in the mid-1990s when he was the superintendent at Barton Creek Resort & Spa in Austin, Texas. That was almost two years before any other courses began using it, he says.

"I was rolling the dice a little bit at Barton

Champion

Creek when I put it in," Miller admits, saying he knew little about the variety then.

But now that he has used Champion on several courses, Miller believes it's a safe bet to achieve first-rate greens. He calls Champion a reliable variety that provides quality conditions throughout the year.

"I've carried Champion with me from golf course to golf course that I've renovated," Miller says. "And time and time again, every

place that I've helped renovate has had the same excellent results."

Miller says Champion can endure southern Florida's searing-hot summers as well as the region's cool winter nights. He is impressed with Champion's wear tolerance, which is attributable to its high density.

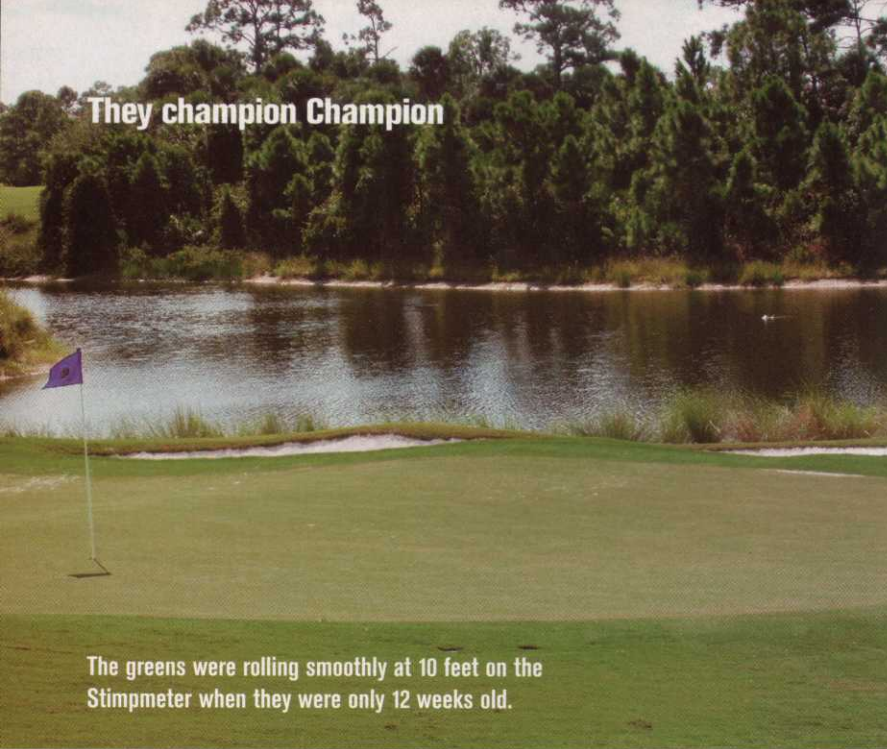
"It withstands traffic probably better than any grass I know," Miller says.

Continued on page 30



Bud Taylor (left), the PGA Golf Club's director of golf, is smiling because the club's new greens are performing admirably. At right is Dale Miller, the superintendent who suggested Champion bermudagrass for the renovation.

They champion Champion



The greens were rolling smoothly at 10 feet on the Stimpmeter when they were only 12 weeks old.

"I don't miss trying to sell a golf course that's transitioning in or out of overseed."

BUD TAYLOR

Continued from page 27

According to Champion Turf Farms, the variety makes "a profusion of lateral stems, which provide very rapid recovery from injury."

The PGA Golf Club needed a durable variety to withstand the traffic from the organization's 1,300 members, not to mention the number of tournaments played on the courses. With Champion, the club was able to hold two tournaments only 13 weeks after the greens were seeded, a testament to the variety's sturdiness, says Taylor, adding that no bermudagrass variety has impressed him more.

The PGA Golf Club's clientele is impressed, too, Taylor says. "The people who have been here before notice a significant change," he adds.

An issue in the turfgrass selection for the greens renovation was whether to overseed. Champion made that decision easy because it's more cool-weather tolerant than other bermudagrass varieties and retains its color in the fall and winter. Hence, it does not require overseeding, which has given the club a leg up on the competition, Taylor says.

Not having to overseed gives the PGA Club an advantage at a time of the year when other golf courses close for overseeding. So there are no transition periods to worry about. Instead of overseeding in October and November, the club will have favorable turf conditions, rather than the in-between kind of conditions that most golf courses have at that time of year, Taylor and Miller say.

Not having to overseed not only makes superintendents and their maintenance crews happy, it pleases directors of golf like Taylor. Let's just say golfer complaints are down significantly in Taylor's department now that overseeding is a thing of the past.

"I don't miss trying to sell a golf course that's transitioning in or out of overseed," says Taylor, noting that guest concerns were always "significant" when overseeding was involved. "It was always a concern because we were at the mercy of the weather," he adds, noting that there is little margin for error in Florida when overseeding.

Last fall and winter, Taylor says the greens held their color well and playing conditions were as consistent as they have ever been. The greens retained their color, even after being frosted on a few cold winter nights.

It takes Champion-seeded greens about one year to mature, Miller says. That said, they grow in desirably quickly. The greens were rolling smoothly at 10 feet on the Stimpmeter when they were only 12 weeks old.

Before planting Champion on the Ryder and Wanamaker courses, the PGA Golf Properties tested the variety on the greens at the PGA Country Club, located a few miles from the PGA Golf Club.

"We did somewhat of an experiment at the country club," Taylor says. "We knew from the response that we received there — the rave reviews — that it would be a home run [at the club's courses]. The greens continue to mature and get better at the country club, and we expect the same results at the golf club."

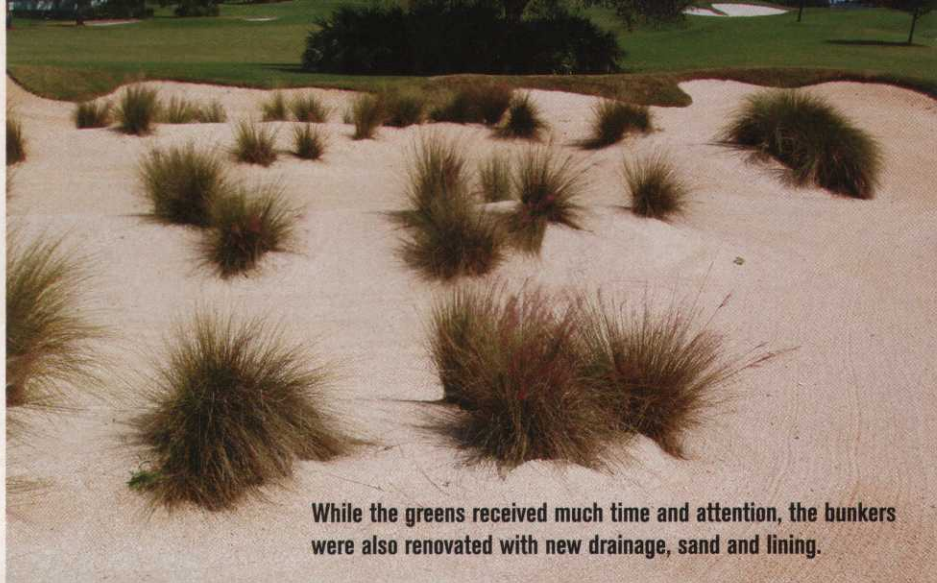
Like many varieties, the biggest challenge in maintaining Champion is keeping it healthy in this golf course world of low-as-you-can-go cutting heights to appease the demand for faster greens, Miller says. But Champion can handle the low heights better than other varieties, he maintains.

"It's not unheard of to see Champion go significantly lower than one-eighth of an inch," he adds.

Miller remembers in the early 1990s when superintendents began "pushing the envelope" and mowing greens at one-eighth of an inch to speed up ball roll. The decision came back

Continued on page 32

They champion Champion



While the greens received much time and attention, the bunkers were also renovated with new drainage, sand and lining.

Continued from page 30

to haunt some of those superintendents with sick turf, Miller adds.

That's when Champion was introduced.

It's easy to get Champion greens rolling at 10 feet on the Stimpmeter, Miller says. And 12 and 13 feet are never out of reach. "That was unheard of 10 years ago," he adds.

Champion also displays excellent disease tolerance, despite heavy traffic and low mowing heights, Miller says. That said, Taylor says the maintenance crew is careful when it manages Champion, which when injured will take longer to recover. Hence, verticutting and grooming practices are light during the hot summer months.

Keeping Up With the Competition

The greens are as smooth as LeBron James sailing through the air on his way to the hoop. The bunkers are as handsome as Leonardo DiCaprio in a tuxedo.

The PGA Golf Club's Wanamaker and Ryder golf courses look like they just received an expensive makeover. They should, because they're fresh off a multi-million-dollar renovation. The courses, known as the North and South before the renovation, reopened last fall with new names after being closed for six months.

The PGA Golf Club, located in Port St. Lucie, Fla., debuted 11 years ago. It is the only public PGA facility in the country. When it opened, the PGA's goal was to provide a world-class golfing experience. Ten years later, the PGA decided it wanted to take that experience to another level. Last May, while celebrating the club's 10th anniversary, the PGA brass announced plans for the renovation, which was headed by Tom Fazio's design team, the courses' original architects.

"Our goal has been to keep pace with the changes that are necessary in all golf facilities," says Brian Whitcomb, vice president of the PGA of America.

Ten years might not seem like a long time, but it is in the ever-changing, got-to-stay-up-to-date golf business. Rounds might be flat across the country, but competition is at a premium, and golf courses are still battling for wallet share. And South Florida is a very aggressive and very competitive market from a standpoint of new development.

One of the renovation's goals was to provide a facility that's enjoyable for all golfing skill sets because it's open to the public, but to retain its championship characteristics for the talented PGA members who play the club and for other top-caliber players who play in the club's national tournaments.

— Larry Aylward

While the greens at the PGA Club received much time and attention as part of the renovation, other course areas weren't overlooked.

The bunkers were a primary component of the renovation. The club has about 250 bunkers on its two courses — almost 350,000 square feet — and many are maintenance intensive because of their high faces. The bunkers would wash out after heavy rains, and it would take up to 10 staff members three or four days to repair them at a cost of almost \$7,000.

The bunkers were completely renovated with new drainage, sand and lining. The bunkers' faces were modified to let less water enter them during storms. Now that the bunkers have been renovated, it takes about five staff members four hours to repair them at a cost of about \$800 after a heavy rain.

The course's drainage was also improved.

"We improved infiltration into all of the catch basins," Miller says, citing organic buildup in the soil as a hindrance to drainage.

Another component of the renovation involves the PGA Golf Club's 10-year deal with Jacobsen to be "The Exclusive Turf Equipment Supplier to PGA Golf Properties" and "The Official Turf Equipment Supplier to the PGA of America." The club's equipment fleet includes fairway mowers, triplex mowers and walking greens mowers. Another reason Jacobsen was selected is because it's a leader in electric technology. Taylor and others believe electric equipment would benefit the maintenance operation in myriad ways, from reducing gas consumption to using quieter equipment.

And by going electric, the new Champion greens will be safe from the threat of hydraulic leaks posed by gas engines. ■

The Bridges at Santa Fe features G6 putting greens.

Tried and True

Newer bentgrass varieties boast lower inputs than older types

BY DAVID FRABOTTA, SENIOR EDITOR

Speculation that newer bentgrasses could require more intense maintenance practices might have slowed early adoption, but those who ventured into the A and G varieties appear pleased with their performance, and so are their members.

"They're a lot easier to maintain than people would have you believe," seasoned superintendent Mike Hathaway says about his G6 putting greens at The Bridges at Santa Fe in California.

The As and Gs emerged through natural selection on Augusta, Ga., golf courses. (Many speculate they came from the par-3 course at Augusta National, hence their names, A for Augusta and G for Georgia.) They've evolved presumably from Penncross, the 62-year-old variety that spawned many new cultivars and is still the most widely used bentgrass today. The specific details on where and how they came to exist are trade secrets.

But there's no secrecy surrounding their development. Dr. Joe Duich of the Pennsylvania State Turfgrass Research Center and

breeding program collected samples and brought them back to his experimental putting green in University Park, Pa. Once he tested them there, he conducted field tests at Pinehurst Golf Club (which eventually selected G2 on all its courses) and the cultivars became commercially available to superintendents in 1997, a full 10 years after Duich began gathering samples from around Augusta, says Bill Rose, president of Tee-2-Green, which markets and distributes the Penn As and Penn Gs.

Today, hundreds of courses don A and G varieties, which were ultimately selected from trials for their canopy density, color, disease resistance, heat tolerance, upright growth and tolerance to low mowing heights.

"There is no doubt that the new bentgrasses, with the density of the turf and the ability to mow them lower, has brought a higher quality to putting surfaces," says Steve Merkel, agronomy manager for Landscapes Unlimited.

Some of the maintenance hallmarks for the As and Gs include lower fertility requirements, less-frequent irrigation and lower overall water

Continued on page 36

Tried and True

Equipment advances supplement traditional cultural practices to help control thatch.



Continued from page 34

consumption. Many superintendents also cite fewer disease problems, partly due to better disease resistance compared to older bentgrasses and partly due to maintenance practices.

Cultural practices, mainly topdressing and aerification, haven't posed the challenge that skeptics thought they would, either. For the most part, managing organic matter is similar to older bents despite the denser canopy of

the As and Gs. And some of the early problems reported in these varieties likely stemmed from cultural practices held over from the older bents.

"The perception used to be that they were high maintenance, but all the problems people were having were being created by what they were doing," says Chris Gray, director of golf course operations at The Marvel Golf Club at Kentucky Lake.

Foliar feeding

As many in the turf maintenance industry continue to debate benefits of granular or root feeding versus liquid feeding, most A and G turf managers gravitate toward spoon-feeding foliar nutrients.

Denser canopies, lower mowing heights and desires to maintain consistent growth all contribute to the liquid feeding frenzy, says Cale Bigelow, Ph.D., a professor with Purdue University.

"It all comes back to trying to manage those growth flushes with the topdressing,"

PHOTOS BY: TIM CARPENTER



he says. "Matching those up is pretty critical."

By and large, superintendents are feeding A and G putting greens every seven to 10 days with low rates.

"I've broken it down to about 1/10 of a pound a week," Gray says.

His 3-year-old A1/A2 greens get about 4 pounds of nitrogen a year, compared to 6 pounds to 7 pounds with older varieties. He says the lower rates, in conjunction with more frequent applications, allows him to coordinate growing rates with his topdressing program and keep turf plants healthy while keeping stress levels low.

"It's lean and mean. You have a leaf blade that is substantially thinner than the older bents, so they really don't need the amount of nutrients like older bents," Gray says. "If you overfeed, then you are going to get a lot of thatch and you are going to get a puffy look to them because now you have a fat little grass plant that needs to go on the Atkins diet."

Similarly, Tim Carpenter, superintendent

at the Gaston Country Club in Gastonia, N.C., has pulled back to about 4 pounds to 4.5 pounds of nitrogen a year on his 3-year-old A4 greens. In addition, he uses about 2.5 pounds of phosphorous, 14 pounds of potassium and 24 pounds of calcium.

"Sand-based greens have prompted calcium to get a lot of attention for the overall vitality of the soil and nutrient exchange between the plant and the soil," Merkel says.

Potash gets its fair shake, too. At The Bridges at Santa Fe, Hathaway uses a 1-2-4 ratio, he estimates.

If nutrients are best used a little at a time, irrigation is just the opposite.

Water analysis

In an era where news crews conduct live broadcasts about freshwater conservation in front of water-spewing golf properties, superintendents will be happy to know that weekly deep irrigation works well with the As and Gs.

Continued on page 38



Tim Carpenter's weekly deep irrigation at Gaston Country Club forces roots deep into the soil profile in search of water.

Your window of opportunity for controlling grubs just got bigger.

ARENA™ is the only preventive and curative grub control product proven to provide maximum application flexibility.

Unlike other turf insecticides, ARENA™ Insecticide with clothianidin lets you apply from early spring to early fall and still get unsurpassed white grub control. Plus, ARENA offers proven performance against sod webworms, chinch bugs and other damaging pests. To learn more, contact your turf products supplier, log on to www.arystalifescience.us/arena or call 1-866-761-9397 toll free.

Always read and follow label directions. ARENA and the ARENA logo are trademarks of Arysta LifeScience North America Corporation. The Arysta LifeScience logo is a trademark of Arysta LifeScience Corporation. ©2005 Arysta LifeScience North America Corporation. ARN-043

Arena™

Putting You In Control™



Arysta LifeScience

Harmony In Growth

Tried and True

Core harvesting two to three times a year manages the thatch layer of As and Gs successfully despite their denser canopies.



Weekly deep irrigation can limit disease occurrence by limiting excessive moisture that can attract pathogens.

Continued from page 37

“If I had to pick just one major difference, then I’d have to say it’s with the irrigation practices because the As and Gs don’t like to be watered nightly,” Gray says.

Superintendents are giving newer bents a good soak, between 30 minutes to 90 minutes, generally one day a week. Then as dry spots appear toward the end of the week during hot months, hand watering with wetting agents is enough to maintain them until the next flush.

With that protocol, roots systems reach well into the 12-inch sand profile for the necessary root development that helps them thrive in hotter months. Also, disease occurrence falls due to limiting excessive moisture that might attract pathogens.

“Whenever you can only put down water that you absolutely need, then that’s your best-case scenario,” Gray says.

As a cumulative result of closely managing growth flushes, less-frequent watering and perhaps heightened disease resistance, Gray eliminated two to three fungicide applications.

“I really saved more money because I didn’t need to go out there and spray because I wasn’t putting the water on that would really bring the dollar spot, brown patch and, in the worst-case scenario, the pythium,” he says.

Cultural practices

Managing organic matter was an early concern for many of the newer, denser bentgrass varieties, so many early adopters augmented topdressing and aeration programs to combat suspected thatch layers.

“Some people were so scared that they got real aggressive and ended up shooting themselves in the foot,” Bigelow says. “They were topdressing too much during stressful times of the year and maybe dragging it in and causing some mechanical damage.”

So as it turns out, the thatch hasn’t developed measurably faster than older varieties, and the layer that has developed has been minimized by slightly more-frequent topdressing.

“Now we’re throwing topdressing on so much more often and so lightly that you don’t need to brush it in; you can just water it in,” Merkel says. “So the maintenance arsenal is about the same, superintendents are just doing it differently.”

Carpenter says the greens at Gaston regularly test between .3 percent and 1.5 percent organic matter.

“We had pretty high organic matter before we rebuilt the greens (in 2004) — up around 5 percent on some,” he says.

Part of the reason, Carpenter says, was that his predecessor reduced the size of aeration tines to quarter-inch pegs because golfers were complaining about play disruptions. But Carpenter went back to a larger tine to control the course’s thatch layer, and he punches the greens twice in the spring and once in the fall, which was the same protocol he used with PennLinks, the previous putting surface at Gaston.

“I have stepped up my topdressing program a bit,” he says. “Last year I put down about 35 cubic feet of sand per 1,000 (square feet) on my green. And that was basically 10 to 11 cubic feet from three aerifications. The rest was bi-weekly 1 to 2 cubic feet (per 1,000 square feet) topdressing to make up the difference.”

Now that agronomists have wrapped their brains around the best maintenance practices with some of the 10-year-old cultivars, the industry prepares for a whole new guessing game with the newest cultivars that inevitably will make their way to a golf course near you soon.

Among the most promising for putting greens are Declaration for its dollar spot resistance, Alpha for its genetic color and LS-44 for its overall visual quality and heat tolerance, according to results from the National Turfgrass Evaluation Program. ■



A Good Soak

Deep irrigation and hand watering will mitigate disease occurrences

BY PETER BLAIS

Irrigation is similar to most of the better things in life. Like pizza, beer and key lime pie, water on golf greens is best enjoyed in moderation.

“The recipe for disaster is still the same — overwatering,” said Bud White, United States Golf Association (USGA) Green Section director for the Mid-Continent Region. “Overwatering is the most common cause for wet wilt, disease and algae.”

Superintendents should water deep and infrequently to promote optimum turf health and playability, White explained. As summer stress approaches, deep watering has to be balanced with syringing based on a particular facility’s green construction, irrigation-system quality, water quality and environmental conditions.

There are no hard-and-fast numbers or schedules that apply to every course, according to USGA Green Section Florida Region agronomist Todd Lowe. The idea is to provide what is needed for plant growth.

“It is easy to over irrigate, creating soft playing conditions and making the soil more

prone to compaction and the turf more prone to disease,” Lowe explained. “Pythium thrives in saturated soils, and turf loss can occur from extended soil saturation. Anaerobic soils can also occur and black layer develops. Even less irrigation is needed on nonoverseeded bermudagrass in winter because the grass isn’t growing.”

Irrigation schedules usually change, not only over the course of the year, but also from year to year, according to USGA Green Section Mid-Atlantic Region Senior Agronomist Keith Happ. Each year is different, and adjusting to changing conditions is critical.

Last spring, for example, Pennsylvania was under a drought watch requiring a voluntary cut in irrigation applications. Fortunately, if there is a good time to allow the soil to dry, it is springtime in the Mid-Atlantic.

“In June we had rains and cooler temperatures,” Happ says. “Those who held off on regular irrigation cycles during the early spring benefited. You can always apply more water, but you cannot take it away.”

Continued on page 42



Never risk saturating main landing areas while attempting to irrigate the bordering areas of play.

Continued from page 40

Turf managers walk a fine line between too much and too little watering. Simply using what their eyes tell them when they look at the putting surface is not enough. Some level of discoloration is acceptable, especially when weather patterns are taken into consideration. But superintendents need to poke holes through the surface and take subsurface measurements for moisture content.

Superintendents' first priority should be sufficient irrigation to maintain plant health, which may often mean holding off on using overhead irrigation cycles until absolutely necessary. Replacing irrigation-system watering with hand-held irrigation to specific areas is a good practice, particularly in the spring, Happ says.

Former First Lady Nancy Reagan's advice to those considering using drugs was "Just Say No." Superintendents should offer the same retort to golfers who pressure them to over irrigate to soften the soil to make it more receptive to golf shots.

Also, consider the limitations of the current irrigation system. If it is aged, inadequate or requires upgrades, do not push it beyond its capabilities, experts say. Focus on center lines of play first and make an attempt to maximize playing quality. Never risk saturating the main landing areas while attempting to irrigate the bordering areas of play.

"It all comes down to being too wet," Happ agrees, when discussing the surest recipe for disaster. "Control is the key. With the dynamic weather conditions we face in the Mid-Atlantic region, it is important to monitor weather patterns as much as possible.

"Even if the turf manager has a system that provides the opportunity to irrigate wall-to-wall, it does not mean the system should be used every day," Happ adds. "All too often, there is outside pressure to use a newly installed system when the best strategy is to drag a hose to those isolated areas of concern. We need to continue to educate golfers about when turf needs water. Mid-summer days of high heat and high humidity are not times to be throwing heavy irrigation cycles."

Very occasionally, however, a situation occurs where it is virtually impossible to over water. Superintendents often refer to this a "Black Saturday" or "Black Sunday," according to David Oatis, director of the Green Section's Northeast region.

This unfortunate recipe for disaster usually occurs in July or August in the Northeast, when weak grass roots and a prolonged period of high humidity/high temperature is followed by a sudden drop in humidity. The dry weather kicks off a high demand for moisture with plants losing water through the leaves faster than the impaired roots can absorb it through the ground. Plants begin wilting, often by mid-morning.

"We had one of those days last year on the first Saturday in August," Oatis recalled. "The first week of August was one of the hottest and most humid on record. Then Saturday was low-80s, high skies, real low humidity and good winds. The turf wilted uncontrollably. That is one of those rare days superintendents cannot keep up with wilt using a hose. They need to turn on the sprinkler heads and let them run.

"Usually if you have wilt, you should chase it with a hose and syringe very lightly," Oatis adds. "But that was a day when massive amounts of water were being pulled out of the turf and superintendents could not keep up with the plants' demand for water. Those are the days that kick off disease, and courses lose grass to drought stress and traffic on stressed turf. They do not happen very often, but they are tough, tough days. They always seem to happen on Saturday or Sunday afternoons, when the superintendent might not be on site."

Ultimately, there are no hard-and-fast rules. There are many ways to irrigate a green. "Irrigation philosophies are all over the map," said Chris Hartwiger, senior agronomist with the USGA Green Section's Southeast Region. "There are deep and infrequent guys, and there are daily-replacement guys. I've seen both work well. Ultimately, irrigation is an art." ■

Peter Blais is a freelance writer from Monmouth, Maine.

Turf M.D.

■ THE DOCTOR IS IN THE HOUSE

"Change is often rejuvenating, invigorating, fun ... and necessary."

— Lynn Povich, *journalist*

Spring is an annual ritual for cool-season turf rejuvenation. Maximum root elongation and production occurs in the early spring with the foliar growth following shortly behind. Middle to late spring should be the time creeping bentgrass and/or *Poa annua* greens are on full "go" reflected in the ubiquitous green color of the season. In the last 15 years "go" has been replaced with a "caution or stop," characteristic of the yellowish-orange symptoms of anthracnose.

Anthracnose, caused by the pathogen *Colletotrichum cereale* (formerly *Colletotrichum graminicola*) was associated with summertime stress on *Poa annua* greens and fairways 30 years ago. Signs of the disease were foliar in nature — primarily the presence of the fungi-fruited structure known as acervuli with setae (spines) in the leaf lesion. Often referred now as the foliar anthracnose, the pathogen primarily attacked *Poa annua* fairways.

On greens, anthracnose did not become a widespread problem until 15 to 20 years ago. A serious problem on *Poa annua*, it also became a disease of creeping bentgrass greens primarily in the mid-Atlantic and southeastern United States. Basal rot anthracnose attacks greens from early spring through the entire growing season. As the name implies, the pathogen attacks the lower sheaths of the turf plant, including the crown. The pathogen produces small black bumps, which are the acervuli. It was thought years ago that basal rot anthracnose did not produce setae, but this is not the case. Setae are often present in the later stages of anthracnose development.

Describing conditions favorable for basal rot development are frustrating. We are often comfortable in describing a disease through specific environmental conditions like ideal temperatures and humidity or leaf wetness. Unfortunately, basal rot anthracnose is not so easy. Given that basal rot anthracnose can occur from March through September (although now it seems to

Basal Anthracnose: Springtime Ritual

BY KARL DANNEBERGER



AGGRESSIVE
MANAGEMENT
RESULTS IN BETTER
OVERALL TURF
MAINTENANCE

occur year round), an additional component, stress, is needed to produce favorable conditions.

Stress that occurs because of management practices is extremely frustrating to golf course superintendents because it's hard to isolate one or more of the contributing factors. Basically, management practices implemented to increase green speed (frustrating?) enhance the potential for basal rot anthracnose. For example, a low height of cut is often targeted as the major culprit causing anthracnose. Although low mowing heights are a significant factor, anthracnose can occur at varying cutting heights. Factors associated directly with the mowing process — grooved versus solid rollers or the type of mower head (fixed, flex, or floating) — can influence anthracnose severity. Add a few additional factors to increase green speed like lower fertility levels, maintaining a moisture stress condition, untimely topdressing and verticutting practices, and anthracnose becomes a severe and chronic problem. How do you know when your management practices are too extreme? Not an easy question, but simply stated: It's when your fungicide program for managing basal rot anthracnose no longer works.

But basal rot anthracnose has resulted in some positive changes or rejuvenation in putting green management. Given its strong association with plant stress, providing a healthy environment around putting greens is a necessity. For example, some of the earliest aggressive tree-removal programs were instituted around *Poa annua* putting greens that had chronic basal rot anthracnose. These greens are healthier now growing under higher light and air-movement conditions.

Karl Danneberger, Ph.D., Golfdom's science editor and a turfgrass professor from The Ohio State University, can be reached at danneberger.1@osu.edu.



Any Way You

Agronomic objectives should determine aerification technique

Punch It

BY CHARLIE FULTZ
CONTRIBUTING EDITOR

Aerification is probably the most important cultural practice you can do to enhance and improve a turf stand. But with so many different methods and depths, which is the best for your facility? Before you can answer that question, you first must answer these questions:

- What am I trying to achieve with my aerification?
- Am I trying to modify my existing soils?
- Am I trying to control thatch and compaction issues?
- Am I trying to increase drainage and air/nutrient exchange?

After you answer those questions, others arise:

- Do I want to incorporate soil amendments into my aerification holes?
- What amendments do I want to put in if I do? Sand, porous ceramics, sand/peat mix?

Each question has a solution through various aerification practices that can achieve the goals you set.

Let's start with standard core aerification using tines from one-quarter inch up to one-half inch. This manner of aerification can accomplish many of the goals we have set. Cores are pulled and can be removed or ground back into the turf canopy. If removed, then amendments can be added and dragged in. With this practice, you get the following: thatch removal, compaction relief, increased drainage in the upper 3 to 4 inches of the profile, and increased air and nutrient utilization.

There are numerous machines on the market that do an incredible job of core aerification. One of the drawbacks of core aerification, however, is the heal-up time. On golf greens, it is the most disruptive, yet most beneficial, practice one can do. It also causes the most golfer complaints. But a practice that has found approval from golfers and superintendents in recent years is the use of one-quarter-inch tines on a smaller hole spacing. This allows the turf manager to achieve the above results with a shorter heal time and less disruption to the putting surface.

Deep-tine aerification is another kind of beneficial aerification

turf managers use to achieve certain results. Usually tines range from one-half-inch to 1 inch and anywhere from 5 inches to 10 inches in length. Cores can be pulled, or solid tines can be used to open up the profile below the 3 inches to 4 inches that standard core aerification achieves. With deep-tine aerification, you achieve: compaction relief at a deeper level, improved drainage, pulling cores and thatch removal, increased drainage, and increased air and nutrient utilization.

This process has found more favor in recent years on older push-up greens. Course managers can delay the rebuilding of greens by going "deep" to help improve drainage and add soil amendments. One downside to deep-tine core aerification is the size of the core pulled, which will leave a larger mess and subsequent cleanup. Associated with this is a longer heal-up time due to larger holes on a wider hole spacing.

One practice finding favor the last few years is deep tining around Thanksgiving and allowing the greens to stay open during the winter. The philosophy behind this is to allow the natural freeze-and-thaw process, combined with the freezing and thawing of snow and/or water, to help alleviate winter compaction and improve drainage and airflow through the winter.

Another type of aerification that has gained favor the past five to 10 years is the use of subsurface injection aerification, which injects amendments, water and/or air into the root zone. The machines use air and/or water pressure to create a hole, which, depending on the machine, simply leaves the hole open or can inject materials into the profile.

One of the biggest pluses for subsurface injection aerification is that the playing surfaces are almost undisturbed after the machine finishes. Most golfers can't detect that the putting surface has been aerified. But this type of aerification certainly doesn't alleviate thatch problems.

A final aerification method that has also begun to gain popularity, especially during the summer, is the use of slicer, bullet or spiker tines. These tines are extremely effective at opening up a portion of the turf's canopy and thatch to allow air movement into the upper 1 inch to 3 inches of the soil profile. ■

Real-Life Solutions

■ MOSS CONTROL

Managing Moss

A new herbicide proves efficient in ridding greens of those problem clumps. But superintendents must also adhere to important cultural practices for moss control

BY LARRY AYLWARD

The golf course greens at Highlands Country Club are a haven for moss. The Donald Ross design is located in the mountains of western North Carolina, an area that receives about 85 inches of rain annually. Golfers love the temperate climate. But so does moss — a small, soft, nonvascular plant that grows in clumps on putting greens and causes superintendents pounding headaches.

“Moss is always a battle in this climate,” says Brian Stiehler, who’s in his fourth year as superintendent at Highlands.

Until recently, Stiehler had to improvise to control the moss on the course’s greens. He threw everything at moss but the kitchen sink, including a product he uses to wash dishes in the kitchen sink. Stiehler mixed a strange brew of Ultra Dawn dishwashing

soap, Listerine mouthwash and a wetting agent to control moss.

“It was bizarre,” he says of the unconventional concoction. “We used a whole arsenal of stuff.”

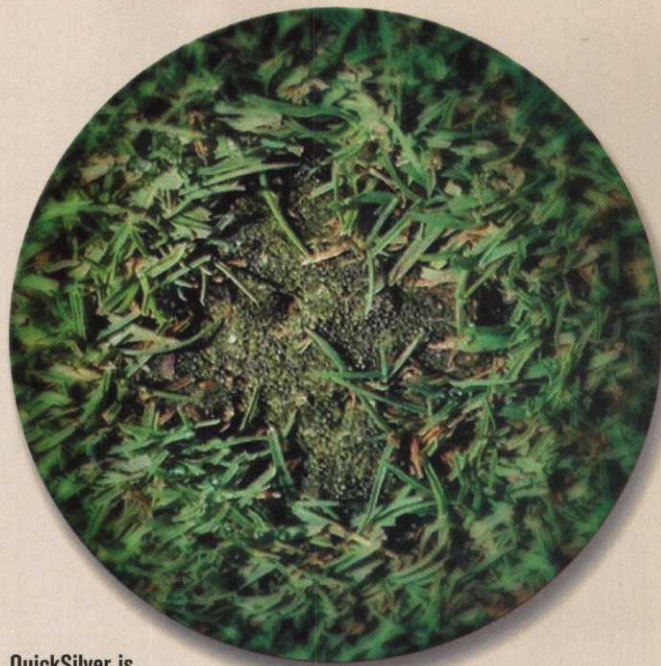
That stuff worked — to a degree. But Stiehler couldn’t achieve the moss control his course’s greens required.

Other superintendents have used Ultra Dawn alone or in combination with other products such as hydrogen peroxide to control moss. Still others, including Stiehler, have tried baking soda.

“The problem is that baking soda yellows the grass tremendously, and the grass takes awhile to recover,” Stiehler says.

While superintendents have gained some success with these unconventional items, none are registered with the Environmental Protection Agency for moss control (although that hasn’t stopped superintendents from using them). But a new product has surfaced that’s registered by the EPA for moss control. Philadelphia-based FMC Corp. introduced QuickSilver, a herbicide that’s making a name for itself in moss control.

During a question-and-answer session at the Ohio Turfgrass Conference & Show with several superintendents, United States Golf Association (USGA) Green



QuickSilver is gentle on most bentgrass varieties, according to FMC Corp., manufacturer of the product.

Section agronomists Bob Brame and Keith Happ touted QuickSilver when moss control was discussed.

QuickSilver, a carfentrazone-ethyl, works by effectively inhibiting a key enzyme in moss chlorophyll production, according to FMC. Fred Yelverton, Ph.D., a turf professor at North Carolina State University, said several years of research reveals that QuickSilver “appears to be the most consistent for controlling silvery thread moss over a broad range of environmental conditions.”

Moss is a year-round threat at Highlands Country Club, but it usually occurs in the summer. “We see it most on undulating greens,” Stiehler says.

When Stiehler began using QuickSilver last year, he was able to place the Ultra Dawn dishwashing soap back in the kitchen cupboard. He uses QuickSilver about once a

month to keep moss in check. He usually tank mixes it with other chemicals. “I don’t have a problem with moss now,” Stiehler says.

Like many superintendents, Stiehler is skeptical of spraying any new herbicide on his course’s greens. Nothing against QuickSilver or any new herbicide, Stiehler says, that’s just the way most superintendents think when it comes to their golf courses’ greens. The greens are the bread and butter of their operations, so they must be cautious.

Stiehler tested QuickSilver on moss growing on the club’s croquet course, which he calls his experimental green. After a few tests, he was satisfied that the product was safe for his course’s bentgrass greens. “I have a good comfort level with QuickSilver now,” he says.

Stiehler says he supplements spraying with aggres-

Continued on page 48

Real-Life Solutions

Continued from page 47

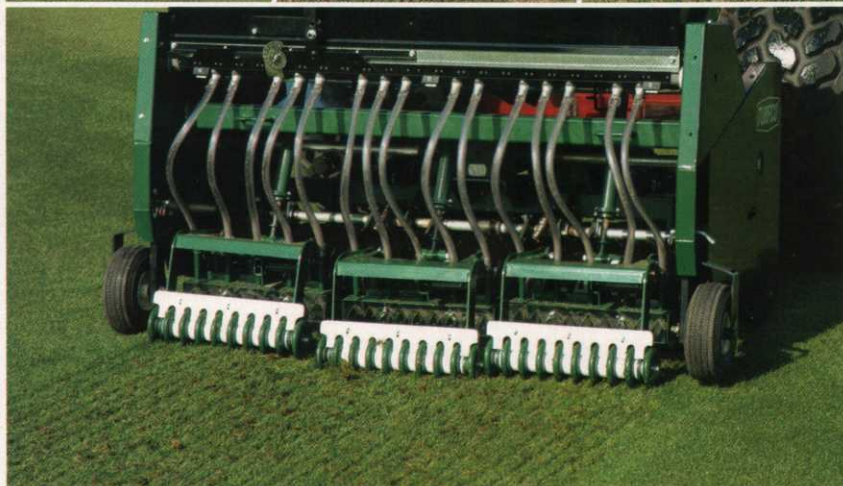
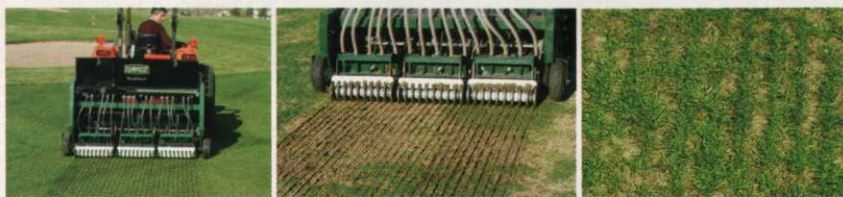
sive aeration and verticutting programs in areas where the worst moss occurs.

Cultural practices are vital to stop moss from reoccurring, says Brame, director of the USGA Green Section's North-Central region. Even if moss is eradicated, it can return like other turf

diseases, especially if wet conditions that foster the disease are prevalent.

The three most-important cultural practices to keep moss in check are fertilization, cutting heights and water management.

Fertilization has to be adjusted in many cases to prevent moss, Brame says. The specific amount of minor nutrients



The next wave in seeding is here!

- Patent-pending **floating heads** follow the ground contour—you won't miss the low spots and you won't destroy the high spots or sprinkler heads.
- Patent-pending **WaveBlade™ technology** creates a clean, optimal square slit while minimizing turf disruption.
- Patent-pending **seed delivery system** puts seed directly into the slit, reducing seed waste and increasing germination.
- Patent-pending **depth adjustment** allows for infinite, in-field adjustment to suit your specific needs. (No tools required.)
- Close **1-1/2" spacing** increases germination with fewer passes.

If you need to seed, you need to see the TriWave difference.

Call 1-800-679-8201 to arrange a **FREE DEMO** from your Turfco Distributor today!

www.turfco.com

TRI WAVE
60-Inch Overseeder

TURFCO®

THE LEADER. SINCE 1961.

A green infested with silvery thread moss.

The same green, 43 days later, after two treatments of QuickSilver.

in addition to nitrogen, phosphorus and potassium, is essential to control it.

"A deficiency in a minor nutrient could create a weakening and open the door for moss," Brame says. "So fertilization in terms of the 'total package' has to be considered."

Proper cutting height, which directly affects turf density, is also important. Greens mowed too close can cause turf thinning, and moss can take over the thin areas if the weather conditions are right.

Brame says proper management of water content in the upper soil profile is essential. Too much moisture held by organic matter and finer articles in the soil can spur moss development. Core aeration in the spring and fall, deep tining in the summer and a first-rate topdressing program will prevent moisture and hinder moss development.

But some moss is bound to break through, Brame says. That's why there's QuickSilver.

Stiehler is thankful he now has a reliable product in his toolbox for moss control.

"It's nice to know there's something out there," he says. "There was nothing for the longest time. I don't know what superintendents did 10 years ago if they had bad [moss] problems. I think that's when everybody got into making their own concoctions. But I don't think any of those have been that effective." ■