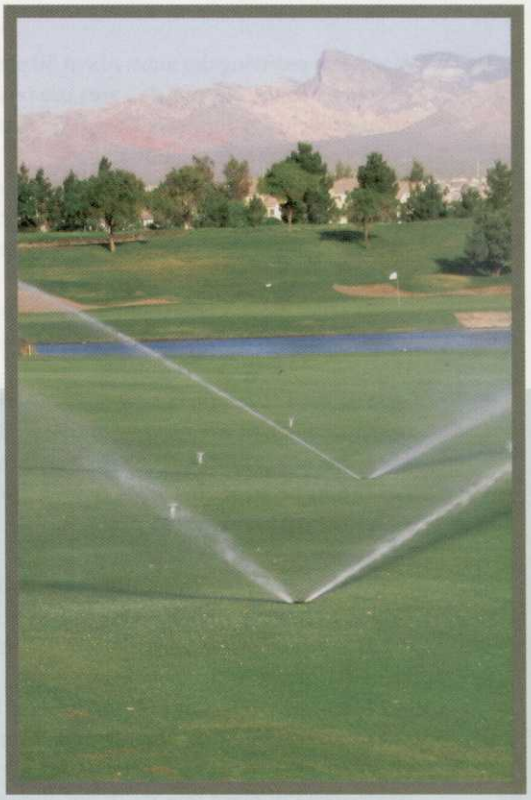

At the TPC Summerlin in Las Vegas, superintendent Dale Hahn went from paying $1.69 per 1,000 gallons of water to $2.33. Photos: Dale Hahn

The price of water is rising almost as fast as the cost of gasoline in some areas of the country. Just ask Dale Hahn, superintendent at the TPC at Summerlin in Las Vegas.

"We've gone from paying $1.69 per 1,000 gallons of water to $2.33, and our water budget has increased from a half million dollars a year to almost $900,000 in five years," he says. "We figure $30 of every round goes toward water."

Of course, not every superintendent has to deal with such challenging financial issues. Yet more superintendents are facing tightening governmental water restrictions, especially in drought-plagued areas of the country such as Georgia and Florida.

"We went to a level four restriction this year because all our drinking water for the Atlanta area comes from lakes and rivers and officials were getting nervous because of the severe drought," says Mark Esoda, superintendent at Atlanta Country Club. "What that did was ban all outdoor watering with a handful of exemptions."

Esoda was restricted to watering only greens, despite the fact he draws irrigation water from ponds located on the grounds of the property.

"It seems we have a one-size-fits-all policy, and that doesn't really make sense," he says. "My ponds are full, but I can't use the water. The guidelines should be more site specific."

Keeping the course at the Atlanta Country Club green in the face of such severe water-use limits is a losing battle, Esoda says.

"We're already seeing browning on slopes and under trees," he says. "We're trying to protect the course the best way we can and still allow our members to play golf. That's always the goal."

Esoda limited golf carts to paths to help reduce stress on the thinning fairway turf and raised mowing heights. And a little help from Mother Nature is always appreciated.

"We got lucky last week and had two-tenths of rainfall each on two nights," he says. "In some areas of the state, superintendents are very nervous. Bermudagrass goes dormant and always comes out of the winter worse than it goes in, so we don't know what the ultimate effect will be."

Georgia officials made certain exceptions to the water restrictions in some areas, such as allowing watering coursewide immediately after applying pesticides and fertilizers.

Florida is another state hit hard this year by a lack of rainfall, which resulted in water restrictions in some areas of the state. Mark Jarrell, superintendent at Palm Beach National Golf Club in Lake Worth, Fla., faced a 45-percent reduction of his overall water use in late spring because of the drought. The restrictions were softened in late summer, but some areas around Naples continued to be on a 30-percent reduction of their allowable water use.

"I've heard several courses in the Naples area that normally overseed cancelled it because they're afraid they won't have enough water," Jarrell says. "We had it tough for a while, especially in April and May. Most people stopped watering the roughs right away."

> "It seems we have a one-size-fits-all policy, and that really doesn't make sense. My ponds are full, but I can't use the water."
> - MARK ESODA

TIGHT RESTRICTIONS

Golf courses receive their irrigation water from a variety of sources, ranging from recycled effluent to runoff to on site ponds and lakes to wells and private and public water companies. Generally, a golf course in Florida can expect rainfall to amount to about 40 percent of the total needed each year. That number varies throughout the country, with the Southwest receiving the least and the Northwest and

Northeast receiving the most. About 50 percent of courses in the Mesa, Ariz., area use recycled effluent for irrigation, says Gregg Thomas, superintendent at Mesa Country Club.

"Some courses don't have the infrastructure to allow use of effluent or recaptured water, and they're buying water," he says. "My gosh is that expensive."

For water use at Mesa, Thomas must complete a water withdrawal form required by the Arizona Department of Water Resources.

"You need to tell them how much water you use, how much of your usage is from reclaimed water and down the line," he says. "Each course has a yearly average they must meet, and if the department sees repeated overages, they can fine a course."

Geoff Haynes, superintendent at Maderas Golf Club in Poway, Calif., has a uniquely local water-use problem. It seems one of the club's wells affects a nearby homeowner's well.

"When we pump the well in question for a week, we can lower the homeowner's well by about 10 feet," he says. "As a result, there's a trigger-level in place that we're not allowed to breach, or we have to shut down our wells."

Additionally, Haynes must monitor the club's monthly groundwater production through the use of data-loggers (sensors) that have been placed in each of the wells. The sensors take hourly information readings, which are collected via a laptop and sent to a hydrologist monthly. The situation causes a juggling act during the summer months.

"We're striving to meet the turfgrass' need for water and also respect the trigger-level so that we can continue pumping groundwater," he says.

Water-use restrictions are becoming so tight in Nevada some courses are removing turf as a way to reduce their consumption. Others have incorporated more native areas.

"There's a golf course down the road that's in the process of removing 90 acres of turf," Hahn says. "It just makes sense from a financial standpoint. Plus, the state will pay you $1 per square foot of turf removed to conserve water."

Hahn, whose course draws water from a recycled water plant a mile away from the club, says the Southern Nevada Water Authority conducted an aerial survey of golf courses in the Las Vegas area to determine what the department felt was a fair usage level according to the amount of turf each had. Hahn's course is allowed to use 6.3 acre feet of water per irrigated acre.

"Some courses were using as little as three acre feet per acre and others were as high as 10 acre feet," he says. "They drew a line at 6.3, and that was the figure we had to live by. There's talk it might be lowered to 6.0.

"The Authority was very fair and open-minded setting up the regulations," he adds. "They met with every superintendent and took our input and adjusted the acreage that needs to be watered accordingly."

But some don't view governmental regulations in such a favorable light.

"The golf industry is an easy target when water gets tight," says Joel Jackson, a spokesman for the Florida Golf Course Superintendent's Association. "I've seen studies that show golf courses in Florida use three percent of the daily consumption of the state's water supplies. The general public uses 30 percent, and half of that is on lawns."

Golf course superintendents are the first to get fined and the only ones who have to report water use daily, Jarrell says.

"Golf is an $8-billion-a-year business in Florida, but the public perception is that water a golf course uses gets wasted," he says. "The fact is every golf course is a positive recharger of the water supply. I have 159 acres of turf, and in an average year with 54 inches of rain, 227 million gallons of water will hit my ground. A small percentage will run off, and some will

At the TPC at Summerlin, superintendent Dale Hahn's water budget has increased from $500,000 a year to almost $900,000 in five years. Photo: Dale Hahn

To maximize water allotments and prevent overwatering, some golf courses need upgraded irrigation systems. Photo: Dale Hahn

evaporate, but a majority will go into the ground water supply.

"If it rains at 1 a.m., I go to the course and turn the irrigation system off," he says. "I'll be driving to the club in a rainstorm, and there will be water bubbling up on lawns from sprinkler systems that are left on."

SPREAD THE WORD

Jarrell and others will continue to take their arguments for more site specific and enlightened water regulations to government agencies and the public. Thomas and other superintendents in the Mesa area are conducting an aggressive educational campaign to inform the public about their concern for water conservation.

"We'll be at various tournaments throughout the region this winter and at different industry events educating the public," Thomas says. "The project will allow us to get the word out that golf in Arizona is a $3.4-billion-a-year business and we use two percent of the state's water. That was according to an Arizona State University study in 2004. But the perception is that we waste water. We're good citizens and want to tell that story."

Education also extends to club members and customers. Esoda says superintendents should always tell their members what they're dealing with. Jarrell concurs.

"Member expectations have gone through the roof when it comes to the look of the course," Jarrell says. "You have to make them aware of water restrictions and that your course can't always be as green as they expect 365 days a year."

A LITTLE HELP

Superintendents employ various methods to maximize their water allotments. Almost all use wetting agents that allow water supplied by irrigation and rainfall to soak into the ground more effectively and reach the roots of the turf where it does the most good. Others have updated their irrigation systems, and some have gone high tech.

"You have to upgrade your irrigation and computer controls," Hahn says. "We've got a small weather station that allows us to closely monitor conditions and fine-tune our watering. We read our usage meters once a week and adjust our watering accordingly. A course that makes $100,000 a year can lose all of that by overwatering. When water becomes more expensive and is tightly restricted more ... an expenditure on a new, state-of-the-art system makes sense."

Thomas says he doesn't know of anybody who isn't using wetting agents.

"At some of the higher-end courses that have PGA Tour events and private clubs, they use wetting agents wall to wall," he says. "Everyone has a computer-controlled irrigation system and weather stations to help them closely monitor and adjust their water usage. We also reduce the depth of our watering to conserve."

WATER SURPLUS

But not all superintendents worry about water use. In fact, Bob Wolverton, superintendent at Bayonne (N.J.) Golf Club, is in the opposite position.

"The city of Bayonne has a surplus of water, and it wants us to use as much as we can, which is nice for us," Wolverton says. "We have lost some big industrial sites down here, and the city dropped almost 4 million gallons of usage a day because of it."

Bayonne's developers attempted to find other sources of water but ended up with no appreciable results.

"We can't drill wells because we bring up brackish water," Wolverton says. "We will try to keep our water usage less then 25 million gallons this year, and we do that by using as little water as possible to keep the course alive through the summer. But one of the reasons we built a course in the links style was because we wanted to keep it firm and dry."

Bayonne doesn't benefit greatly from rainfall because the water filters quickly through a sand cap under the turf.

"I can have a one-inch rain event and then be syringing by the afternoon," Wolverton says.

DOWN THE ROAD

With greater variations of weather patterns and urban sprawl into arid sections of the country, water will likely become an increasingly precious and well-guarded commodity.

"There's talk of reducing our water usage," Hahn says. "If it gets much tighter, we'll have to start removing turf."

Jackson is sure water regulations will get more stringent, and to combat that, the industry might see greater turf reduction on courses in the near future.

Haynes recommends superintendents educate themselves about their course's average annual water requirements then make sure they thoroughly understand the restrictions in place and how they might limit consumption or production abilities. Superintendents then should be able to author a plan about how to continue providing their course with the necessary amounts of water. **GCI**

John Torsiello is a freelance writer based in Torrington, Conn. He can be reached at jtorsiello@sbcglobal.net.

DIGGING IN THE DIRT

Many golf course maintenance practices are based on feel, while others require scientific test results to make proper decisions. A common scientific test is a chemical soil test, which measures the content of elements in the soil.

The common elements are macronutrients – nitrogen, phosphorus, potassium, calcium, magnesium and sulfur – and micronutrients – iron, copper, manganese, zinc, boron, molybdenum and chlorine. A soil test – along with pH; conductivity; the calculated distribution of calcium, potassium, sodium, and magnesium (base saturation); and cation exchange capacity – provide the basis for fertilizer and amendment applications to soil. Chemical soil testing is standard operating procedure, and many superintendents spend money on such tests.

Most chemical soil tests address about 13 of the 16 to 20 essential elements for plant survival. Other important elements that aren't normally tested for are carbon, hydrogen and oxygen. Some estimates of carbon content in soil come from organic matter testing. Hydrogen is related to pH levels, but you don't think of applying hydrogen to soils as an essential element. Elemental hydrogen rarely occurs in nature. Rather, hydrogen occurs as organic compounds with carbon, and there are no specific deficiency symptoms for hydrogen. Chemical soil tests don't address oxygen levels in the soil. From a nutrient standpoint, oxygen is a major component of organic compounds. It's the oxygen content in soil that drives most chemical reactions that are necessary for life functions. Without oxygen, nothing happens.

THE PROPER BALANCE

So how is oxygen in soil measured? Soil is a three-phase system consisting of solids, water and gas (oxygen and carbon dioxide). The measurement of these components is done through physical soil testing. The formation of soil and its characteristics depends on the combined effect of physical, chemical and biological processes. Theoretically, a healthy soil consists of a balance of these three phases. When out of balance, turfgrass plants suffer.

The understanding of the proper balance between solid, water and gas is reflected by the recommendations for putting green construction in which the demand for healthy grass is required even under the most extreme environmental conditions. The accepted method for building a new root zone was introduced about 50 years ago, specifying volume of 50 percent solid and 50 percent pore space. Pore space is equally occupied by water and air. Generally, this is accomplished by using a specific particle-sized sand with the addition of a specific amount of organic matter or other amendment. This is a good starting point for the optimum soil root zone, but over time, the percentage of each phase changes. It's beneficial to know how to measure the change and how to

BY JIM CONNOLLY

manage the physical property of the soil.

Total pore space is divided between two types of pores based on size; capillary (very small pores) and noncapillary (very small). Large pores are necessary for free drainage water and air movement, while small pores are necessary for holding moisture. As greens age, capillary pores increase as much as 60 percent at the expense of noncapillary pore space. Because roots grow primarily in large pores where there's free air and water movement, it's easy to see a reduction of large pores results in less root mass. Additionally, infiltration rates can decrease as much as 70 percent or more, resulting in wet greens, compaction and related negative influences on turfgrass health.

Another important observation is the formation of layers of organic matter or lenses of sand, silt or clay. Evaluating a putting green profile in each layer-inch increases the understanding of how a root zone changes in layers. Other physical parameters such as bulk density, sand particle size, silt and clay, change as a green ages. All these factors have a negative impact on turfgrass health because the measurements move further away from optimum.

PHYSICAL COMPOSITION

For years, turfgrass managers have known aeration and topdressing benefit turfgrass health. The frequency and intensity of aeration and topdressing is a guessing game unless superintendents have a way to measure the changes as a result of these practices. Most golfers know greens need aeration once or twice a year. But what if greens need three or more aerations, or there's a need to buy higher quality topdressing sand that costs 50 percent more than what's currently used? Or what if topdressing is needed more frequently? How do you explain increasing the budget by $100,000 to buy more sand and better equipment and hire more workers? Without a physical soil test that provides useful data, superintendents can't state with certainty or justify maintenance programs. Physical soil tests are equally important, if not more so, than chemical soil tests that are used to develop fertilizer programs.

The physical composition at the 1-inch depth in the green profile is different from the 2-inch depth and the 3-inch depth. Putting green soils age in layers and can be observed easily by studying a core sample or cup-cutting plug. Organic matter is highest in the first inch and is progressively less at deeper depths. The accumulation of fine sand from irrigation water or topdressing will be identified in a physical test in 1-inch increments.

TEST REPSONSES

The following factors are brief explanations and possible responses to a nondisturbed soil test result.

Infiltration rate. A new green should have infiltration rates of 6 to 12 inches. After several

Knowing your soil's physical condition is the key to plant health

ISSUE-BASED Solutions

Think about the most difficult day on your course. It's 100-plus degrees. You've been working for nine straight hours, with another three to go. Your neck stings with sunburn; your eyes with sweat. You're hungry; you're thirsty; you're tired.

Now, imagine how your grass feels.

There are so many issues facing your turfgrass that it can sometimes be difficult to know where to begin. Sure, it's easy to throw on a blanket solution that offers a quick remedy to a wide variety of problems – a generic fix. But your course isn't generic, so why should its treatment be?

Floratine Products Group, based in Memphis, offers issue-based solutions to turf problems. Working side-by-side with superintendents and turf professionals, Floratine uses scientific analysis to break down all parts of the problem to produce a targeted solution.

"Issue-based solutions means that we diagnose a problem and develop a plan to treat it," said Kevin Cavanaugh, vice president of golf operations for Floratine Products Group. "Once we start working on the issue, we see it through to the end, testing and tweaking the program to achieve the best possible results."

In a typical situation, a superintendent will identify an issue with their turf, then alert their Floratine representative. The Floratine rep and local agronomist will come in, look at the course and issues, and begin developing an action plan for treating the issue. Once the proper treatment is applied, the Floratine expert will continue to evaluate the treatment, often checking in every ten days to two weeks to do soil and tissue tests as needed.

"It is this process that hones our expertise and skills," said Cavanaugh. "Our strict attention to detail has allowed us to innovate new solutions that, while still targeted to a specific problem, can be used on a more broad-based level, to treat issues that are common to nearly every course."

THE FLORATINE FOURSOME

The newest addition to the Floratine arsenal of innovation is known as the Floratine Foursome.

The Foursome includes a package of four "mini jugs" containing Floratine products. Each mini jug contains one pint of product.

"We're often approached by superintendents who would like to try our different product offerings on a smaller scale," Cavanaugh said. "The Floratine Foursome gives them that opportunity."

The initial Floratine Foursome packages include four of the Floratine products best suited for battling heat stress: Renaissance, Perk Up, ProteSyn and Carbon K.

Renaissance is designed to ensure rapid uptake and availability of critical nutrients that are often deficient in turfgrass, promoting proper plant nutrition and delivering consistent, improved turf color and quality.

Perk Up, with its blend of calcium, simple and complex carbohydrates and naturally occurring, organic compounds, provides rapid relief to turf under photosynthetic and respiration stress. Perk Up includes elements required for wilt resistance and recovery, root growth and cellular strength.

Carbon K combines Floratine's proprietary Carbon Power technology, magnesium, and a low-salt, non-burning source of potassium to enhance the uptake, translocation and utilization of nutrients, ensuring proper cell function and chlorophyll formation.

carbonpower™

The new, improved formulation of ProteSyn adds Amino-Lok technology, providing key amino acids that sequester nitrogen for slow linear release and promote the linkage process toward mature protein synthesis. This makes for a stronger plant by enhancing the completion of photosynthetic activity and encouraging healthy cell division, respiration and energy conservation.

"These products are the cornerstone of our offerings and are a great introduction to Floratine products," said Cavanaugh.

Superintendents who want to try the Floratine Foursome should contact their Floratine representative.

ACTION PLANS FOR ANY PROBLEM

While the strength of Floratine lies in its ability to develop focused, issue-based solutions to specific turf problems, the company also recognizes that many superintendents and turf professionals face very similar problems, such as heat stress, aerification issues, fairway color, spring and winter stresses and increased traffic due to tournament play.

To address this, Floratine developed its Management Action Plan system. The MAPs combat these issues through the use of targeted, specific applications of Floratine products.

"MAPs are defined product solutions," said Cavanaugh. "Superintendents look to our MAPs as guides, helping them solve various issues while aiding overall plant strength and health."

Floratine currently outlines seven MAPs on its Web site, www.floratine.com, including:

- Aerification Recovery, which recommends Per "4" Max, PK Fight, Carbon N and Renaissance for rapid restoration of putting surfaces;
- Fairway Color, which combines Carbon N and Largo to boost color without excessive growth;
- Heat Stress, which includes Perk Up, Carbon K, Renaissance and ProteSyn for overcoming stress caused by high temperature and humidity;
- Mining, which utilizes Calphlex, Maxiplex and Pervade to enhance the availability of nutrients in the soil;
- Spring Start, which uses Per "4" Max, Carbon N, Renaissance, PK Fight and ProteSyn to overcome sluggish growth;
- Tournament Prep, which suggests Carbon N, Astron, Turgor and PK Fight to prepare for the added stress of tournament play; and
- Winter Strength, which adds Astron, Carbon K, Renaissance and Floradox Pro to get through the slow growth and dormancy caused by cold temperatures.

To help make the MAPs even more accessible and user-friendly, Floratine recently developed its new MAP Pack system.

The MAP Pack allows superintendents to easily identify and treat specific turf problems detailed in each MAP, combined with the ease of having each component of the MAP packaged together in one box, making each MAP Pack an all-inclusive solution pre-measured to cover one acre of turf.

"With all of the products needed to follow a MAP now packaged in one box, superintendents save time with a system that is even easier to use than before," said Cavanaugh.

With its issue-based approach, teamwork-driven service and industry-best expertise in treating a wide variety of turf issues, Floratine offers superintendents and turf managers a vast resource when it comes to managing their courses.

If you need help with a specific turf issue, or if you'd like to learn more about Floratine, the Floratine Foursome, MAPs or the MAP Pack system, call Floratine Products Group at (901) 853-2898, or visit www.floratine.com.

Floratine

For the strongest turf™

years, infiltration rates could decrease to less than 1 inch. Infiltration rate results will tell you only how far from optimum you are but won't identify the reason why infiltration rates are low or high.

40-cm water holding percentage. The result gives an overall picture of how wet a green will remain after gravity removes free water. Ten to 20 percent is normal for a well-drained green. If the results are higher than 20 percent, the organic matter, clay or percentage of fine sand also might be high.

Bulk density. Low bulk density numbers can indicate high organic matter levels. If organic matter levels are normal, low bulk density might be an indication of thatch.

Organic matter. Organic matter content of a root zone only makes sense when tests are done at different depths. It's important to know where the organic matter is concentrated. A 4-inch homogenized soil sample might have an organic matter content of 3 percent, but 80 percent of this organic matter might be in the top inch of the green.

It's important to establish a baseline number for organic percentage in each inch of the soil profile to a depth of at least 4 inches. Once you know the organic matter percentage and where it's concentrated, an aeration program that specifies depth of aeration and size of tine can be established. For example, if the goal is 2.5 percent maximum organic matter in the top 2 inches and your levels are 5 percent, 50 percent of the green must be removed through aeration. The aeration hole size and spacing will dictate the percentage of the green removed by aeration. (See chart above.)

Aerification displacement chart

Tine size	1.25" x 1.25" centers	1.5" x 1.5" centers	2.0" x 2.0" centers	2.5" x 2.5" centers	5" x 5" centers
¼" hollow tines	3.14%	2.18%	1.23%	0.79%	
3/8" hollow tines	7.07%	4.91%	2.76%	1.77%	
½" hollow tines	12.57%	8.73%	4.91%	3.14%	
5/8" hollow tines		13.64%	7.67%	4.91%	
5/8" hollow vertidrain					1.23%
¾" hollow tines				7.07%	1.77%
¾" hollow vertidrain					1.77%
1" hollow tines					3.14%
1" hollow vertidrain					3.14%
7/8" drill & fill (7" centers)					1.23%
Graden verticutter (15 blades @ 1" spacings)	1 mm blade 3.93%	2 mm blade 7.87%	3 mm blade 11.81%		

Note: Quadtine setup – regular top eject on 3/8" & 1/2" hollow tines –not side eject
- 1/4" quadtines remove as much material as regular 1/2" hollow tines
- 3/8" minimum for ease of topdressing fill if replacement of material is required
- For double aerification make two passes at 37 degrees to minimize overlap

Source: International Sports Turf Research Center

Subsurface noncapillary porosity. For existing greens, achieving 50 percent solid and 50 percent pore space would be next to miraculous. Pore space should be divided equally between capillary and noncapillary pores for new greens. In older greens, achieving at least 18 percent noncapillary pore space will ensure enough large spaces for free drainage, oxygen/gas movement and root development. If noncapillary pore space is less than 10 percent, it could be because of high organic matter or poor particle size distribution.

Capillary or water porosity. Water will remain in capillary pores against gravity and can lead to waterlogged conditions. Clay and high organic soils can have capillary porosity higher than 38 percent. This condition usually results in less than 10 percent available pore space for drainage water. Soils that remain wet for long periods of time have trouble with supporting and

1. Black layer isn't always deep in the soil. Because of a deeper layer (sand), water infiltration and air content can be reduced dramatically close to the surface. 2. Organic matter is highest in the first inch and is progressively less at deeper depths. 3. Visual observation of a healthy green might not appear perfect, but a physical test revealed this soil to be near perfect. 4. An older sand green shows the build-up of organic, fine sand; silt and clay; large sealed air spaces; and the benefit of a single core aeration hole, which is fillled with roots. 5. Finer textered soil laid on top of sand is a detriment to turfgrass health. Photos: International Sports Turf Research Center

supplying necessary gas exchange and oxygen for biological and chemical reactions that favor healthy roots and plants.

Particle size analysis. The proper distribution of sand, silt and clay for the construction of new golf greens has been documented by many soil scientists and golf associations. A physical test that mixes or homogenizes a 4- to 6-inch sample from a green doesn't help to identify how layers might form in the green profile. A PSA that shows the distribution in each inch of profile can provide several pieces of valuable information:

1. It shows the history of how the green has matured. Perhaps a clay layer exists at 4 inches that just happens to be about 10 years ago when superintendent "X" topdressed with soil. Or, perhaps the top inch has a high level of fine sand and high silt. When evaluating a sand supplier, you'll find topdressing sand is full of fines and silt.

2. Layers of dissimilar materials might reveal why infiltration rates are low.

Slicing or spiking can relieve low oxygen symptoms temporarily, increase infiltration and improve soil health without extreme disruption of putting conditions. Photo: Jim Connolly

3. The PSA results at 5 inches show the original green root-zone mix is perfect, but all the material between 1 and 5 inches is garbage.

4. The PSA shows that during the last several years of proper topdressing and aeration the top 4 inches has improved dramatically compared to the root-zone mix below 4 inches.

New golf courses spend thousands of dollars ensuring greens mix meets proper physical requirements. The same level of diligence regarding the physical conditions of greens should be carried out every year. Lack of data regarding the physical condition of greens soil is a cause of poor putting green performance. Physical soil testing is, perhaps, one of the least used and most valuable tools available to turfgrass managers. **GCI**

Jim Connolly is president of JCC, Ltd. A former USGA agronomist, he's a consultant and can be reached at jim@jccturf.com.

With the older greens at the Country Club of Buffalo, Jim Frank, CGCS, has adjusted the nutrition and aeration to the overall properties of the soil to match the turf's needs. Photo: the Country Club of Buffalo

BY STEVE AND SUZ TRUSTY

Fine-tuning turf

Superintendents adjust integrated plant management programs to improve conditions

Maintaining healthy turf at a certain expected level of conditioning requires much more than applying water, fertilizer and pesticides. Golf course superintendents increasingly adopt holistic approaches to turfgrass management. They combine basic turfgrass science with technological advancements and adapt cultural practices to weather conditions. Each golf course presents its own unique setting for that combination of science and art. Four superintendents share the adaptations they've made in their integrated plant management programs to improve course conditions.

BRING IT BACK

Hidden Valley Golf Course in Norco, Calif., overlooks the Corona Valley. The course design focuses on preserving the natural vegetation, dry streams and boulder outcroppings. Because the course was slotted for conversion into homes at one point, it received minimal care for three years.

In January of 2007, Iain Sturge was hired as golf course superintendent with the charge of returning the course to its former prime condition. Having served as an assistant superintendent seven years previously, Sturge realized it would be challenging, especially with a budget about 45 percent of the original $1.2-million budget.

The initial focus was to repair the pumping station and functionality to the irrigation system – 12 to 15 percent of the sprinkler heads weren't working. Resurrection of equipment to operational status came next followed by the turfgrass itself. The soil profile is about 90 percent dissolved granite, with some pockets of silty clay, which makes improvement difficult. Varietal competition added to the problem.

"When I arrived, the fairways ranged from 75 percent to 100 percent *Poa annua*," Sturge says. "We cut back on the water and allowed the *Poa* to die out with the heat. The course was originally 419 Bermudagrass, but a lot of common Bermuda was seeded in, so it's a mix now. We've pushed the Bermuda, lightly verticutting with hand rakes. We're topdressing only in the bare areas, using a 50/50 mix of composted cow manure and plaster sand, hand-raking it in. We'll skip overseeding with ryegrass to reduce stress on the Bermuda."

As for the greens, which are 75 percent *Poa* and 25 percent bentgrass, Sturge applies Primo and topdresses and verticuts them every two weeks.

Sturge, who has a small budget for chemicals, is fertilizing with urea, applying one-third of a pound of nitrogen every eight days.

"We're keeping the greens lean with very low nitrogen and lots of calcium," he says.

Sturge aerified the greens in May with standard five-eighths-inch coring, which disrupted play and lowered much-needed revenues. So, he used quadra-tining in October for much less impact on play.

"Next year, we're going to aerify with five-eighths-inch tines in July and again in August, rather than spring and fall," he says. "It's not the ideal time for the turf because temperatures can spike over 100 degrees for several consecutive days. But it's so hot, there's hardly any play, so we'll have little impact on the revenue flow.