

Looking for answers

Opinions vary, but researchers agree biostimulants are another tool for fertility programs

B iostimulants remain an elusive commodity in a golf course superintendent's fertility program arsenal. However, at least they've escaped the "snake oil" reputation they carried a decade ago.

The reasons for this mystery are many because several questions surround biostimulants. First, what are biostimulants? Simply, they're materials in minute quantities that promote plant growth and metabolism. The greatest benefit is increased stress tolerance from heat, drought, ultraviolet light and even some diseases. They do this partly by stimulating root growth and partly by promoting antioxidant activity and stimulation of primary metabolic processes.

The dilemma is that there are many biostimulants on the market. Which ones work, and which are ineffective? And, because many superintendents put several products in their spray tanks to save application time, which product provide the most benefit? Finally, how much do year-to-year weather conditions factor in?

POSITIVE RESEARCH

Gordon Kauffman III, Ph.D., is an agronomist with Grigg Brothers Foliar Fertilizers, headquartered in Albion, Idaho. His doctoral thesis at Penn State University examined the constituents of selected biostimulants and how the products function to improve turfgrass

performance under environmental stress.

"Field studies can be highly variable," he says. "The best method is to study these products in a rigorously controlled environment. Current research, which examines physiological responses, shows biostimulants can enhance root growth. Using visual examinations such as top growth or color can be more difficult to determine effectiveness."

The results of Kauffman's study support evidence for a positive growth-regulating effect from biostimulant application.

"The fact that certain biostimulants promote growth similar to the growth hormones auxin and cytokinin means it might be altering the plant's hormonal balance to favor more normal metabolism during stress," he says. "Applications of these biostimulants improved the heat tolerance associated with photosynthetic efficiency and overall quality of perennial ryegrasses."

Biostimulants can improve turf's physiological fitness, says Geoff Simril, senior technical manager for Milliken Turf Products. Scientific research conducted by Virginia Tech shows seaplant extract can increase plant antioxidant levels and make turf more stress tolerant. Research also shows seaplant extract can increase the turf's photosynthetic rate and capacity, making it more efficient by manufacturing its own food and increasing carbohydrate reserves.

"The scientific evidence of the benefit of seaplant extract is overwhelming, so it makes

good agronomic sense to incorporate quality seaplant extract in any greens management program," he says.

Kauffman recommends using biostimulants as a supplement to a sound fertility program. For best results, they should be applied in foliar form sequentially prior to the onset of stress to make the plant more tolerant. They're also effective as a granular application prior to the onset of stress. He urges superintendents to follow two simple steps when considering which biostimulant to use:

"First, understand what's in the product," he says. "Biostimulants fall into three categories, including humic substances, hormone containing products and amino acid containing products. Secondly, know what you're applying and always use a quality supplier. The product should be backed by some sort of research, either from a university or an independent firm."

VALID SKEPTICISM

The skepticism superintendents have for some biostimulants is well placed because of limited research, says A.J. Turgeon, Ph.D., a professor of turfgrass management at Penn State University.

"Years ago, the initial reaction to plant growth regulators was negative," he says. "Now, today's (plant growth regulators) play an integral role in a golf course's turfgrass management program. Superintendents should take



the same approach with biostimulants. Take a small quantity of the product and apply it to several different test sites on the course. Observe the results to determine if there are significant differences. Only then will they gain confidence in these products.”

Turgeon cites research by Xunzhong Zhang, Ph.D., and Richard Schmidt, Ph.D., of Virginia Polytechnic Institute and State University, which showed antioxidants play a significant role in alleviating oxidant stress, usually induced by drought or high temperatures. Additionally, turfgrasses with high levels of antioxidants produce better root and shoot growth, maintain higher leaf moisture content, and lower disease incidence in normal and stressful environments.

One of Zhang’s and Schmidt’s conclusions states: “During the past 10 years, we have evaluated many kinds of biostimulants for use in the turfgrass industry. These products exert beneficial influences either through hormonal effects or by raising antioxidant levels. Although biostimulants can be synthetic chemicals, naturally occurring organic materials are excellent sources of biostimulants. For example, humic acid and seaweed extract are two commonly used turf biostimulants.”

INFORMATION NEEDED

Clark Rowles, CGCS, of Nakoma Golf Club in Madison, Wis., has views that sum up the position of many superintendents. Rowles used

Biostimulants exert beneficial influences on turfgrass either through hormonal effects or by raising antioxidant levels.
Photo: David Wolff

Clark Rowles, CGCS, says biostimulants can provide certain benefits, but it was difficult for him to tell year in and year out whether they worked or not because conditions weren't consistent. Photo: David Wolff



biostimulants for a number of years but recently his fertility program has moved away from these products.

"When I frequently used biostimulants, I was at a facility with multiple courses," he says. "There was an opportunity to do one thing on a particular course and something else on another. Biostimulants can provide certain benefits, but it was hard for me to tell year in and year out whether or not they worked because conditions were not consistent.

"We had a hot year in 1995 with excessive humidity, and many guys were losing grass," Rowles adds. "I was sitting on 90 acres of bentgrass and didn't lose much turf. Was it a product I was using that contained biostimulants that made the difference, or was it timely applications of fungicide or the fertility program I had going on? That's where university research can be more beneficial than what we do in the field because we don't set up the experiments looking at the science end. We apply a variety of products and hope they work in conjunction with other products to provide us a benefit. Superintendents don't want checks on their golf courses such as leaving an untreated 10-foot-by-10-foot square in the middle of a fairway or the

corner of a green. Their job is on the line, so they won't do it. Universities take various areas and let them become stressed or even die, but on a golf course, that can be unacceptable."

It's human nature for superintendents to look for a magic bullet that will give them an edge. Biostimulants always will be popular because there's the perception they do something, Rowles says.

"If you look at a product label, there's a certain amount of fertilizer in it, primarily some form of nitrogen," he says. "The biostimulant might not be the primary ingredient based on percentages of ingredients in the product. Is the biostimulant itself causing the benefit, or is it the fertilizer attached to it causing the response?"

Rowles' fertility program includes biostimulants. He has found calcium and silica in the biostimulant package improves his turf conditions the most.

"Calcium seems to provide some benefit for shaded turf," he says. "I spray it as a foliar product, but I can also get it through various granular products. And, some fungicide programs provide significant benefits to the plant. One group of products, in particular where the active ingredient is phosphorus acid, seems to

stimulate the plant's own defense mechanisms. With the advent of new fungicides and the potential to handle disease pressures better, we're not allowing the stressors to get to the plant as has been the case in the past. So, does that mean we need to supplement turf health with biostimulants? I don't know we need to."

Because application time is at a premium, superintendents tend to put multiple products in the spray tank – fertilizers, fungicides, growth regulators, insecticides and even biostimulants. The only products Rowles applies separately are those that need to be watered in immediately or products containing herbicides.

"Many people in this business are doing so many things at one time they don't really know what's working for them," he says. "How do we know it's not that little tickle of nitrogen that's causing a response in the plant? I can't say biostimulants don't enhance the turf's ability to handle stress, but if I don't have stress, they're not necessarily needed, and therefore are they a valuable product to use?"

Kevin Cavanaugh is a former Florida golf course superintendent who's now vice president and director of golf operations of Floratine Products Group. He used biostimulants extensively



on his golf courses.

"From first-hand knowledge, I know superintendents want root mass and density to predispose their turf to the strong stresses of weather and low heights of cut," he says. "I used the benefits of biostimulants to obtain a healthier and stronger plant to be better able to do my job."

However, superintendents face a dilemma, Simril says.

"Their goal is to grow a healthy plant, but players care most about surface conditions like speed, roll and color," he says. "Extremely low mowing heights necessary to provide that surface compromise their agronomic goals. Biostimulants, like quality seaplant extract and fulvic acid, play an integral part in giving the plant what it needs and the players what they want."

CRITICAL RESEARCH

Rowles references biostimulant research conducted by Frank Rossi, Ph.D., of Cornell University, saying Rossi found that areas receiving an adequate amount of N-P-K perform as well as plots with biostimulants.

"It seems like the best plots contain fertilizer, so where's the benefit coming from?" Rowles asks. "Do biostimulants make the fertilizer more

efficient? That could be."

In his research, Rossi summarizes that the results of three years of evaluation of organic and microbial products (also known as biostimulants) have offered insight into various aspects of product performance. In general, the results of the study show the performance of most of the biostimulants isn't consistently or substantially different from traditional fertilizer applications.

"However, a few product lines appear to offer nitrogen-use reductions," Rossi states in the report. "Yet, in years of high disease pressure, some of these treatments break down and allow increased disease levels.

"Much more needs to be learned about these products and programs," the report states. "This study has shown that although there are some differences, in general, traditional fertilizer applications provide acceptable putting green turf. Nonetheless, where resources allow, there might be circumstances in which incorporating certain products and programs would be beneficial."

ANOTHER USEFUL TOOL

Some turf experts agree biostimulants have a place in golf course fertility programs. Douglas Soldat, Ph.D., is an assistant professor of

Because many superintendents put several products in their spray tanks to save application time, it can be difficult to determine which biostimulants provide the most benefit. Photo: David Wolff

turfgrass and urban soils at the University of Wisconsin-Madison. While biostimulants can increase stress tolerance under specific conditions, he says superintendents shouldn't apply these products indiscriminately. They should be tested initially on various spots around the course.

"From the research I've seen, superintendents have to decide if the small benefits are worth the price," he says. "However, there's no question biostimulants can be another tool in a sound fertility program."

Biostimulants give added protection against the rigors of stress, Kauffman says.

"Research has shown there's a synergy between fungicides and biostimulants," he says. "They're another tool in a superintendent's toolbox; that's how I view these products."

While an intern at Augusta National, Cavanaugh helped test various biostimulant products to determine their effectiveness.

"We were able to talk to the people who developed the products to build a fertility program that was right for the course," he says. "Superintendents first should identify what they want to achieve on their surfaces. Then contact biostimulant companies to find out how to use natural growth hormones in the proper ratio. Finally, call superintendents who use biostimulants and then try them on your course

Still, more is being learned about seaweed extract as an important biostimulant, Turgeon says.

"We're in the beginning stages of this research," he says. "In the future, there will be more information about specific formulations. However, it's known that an application of antioxidants before the onset of stress and then applying them regularly through this period provides beneficial results, particularly on bentgrass greens." **GCI**

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moss

control

IMPLEMENT THE RIGHT
MIX OF PRODUCTS AND CULTURAL
PRACTICES TO KEEP THIS PEST AT BAY

By John Torsiello

The Scots have a phrase, says Matt Nelson, senior agronomist with the USGA's Northwest Region.

"They say, 'Moss is a sign of poverty in the soil,'" he says. "That saying dates back hundreds of years, and it still applies today."

While poor or undernourished soil is a significant cause of moss outbreaks on golf courses, the reasons the insidious green pest takes root are varied.

Moss thrives in areas that receive a lot of moisture, little sun and scant airflow. It's especially a

nuisance in the Northeast and Northwest regions of the country that often experience damp, cool springs and autumns.

Moss, as well as its cousin algae, is most likely to attack greens that have been stressed because of extreme weather conditions or damaged during maintenance. Moss can work its way into putting surfaces often unnoticed, and once established, can be difficult to control and eradicate.

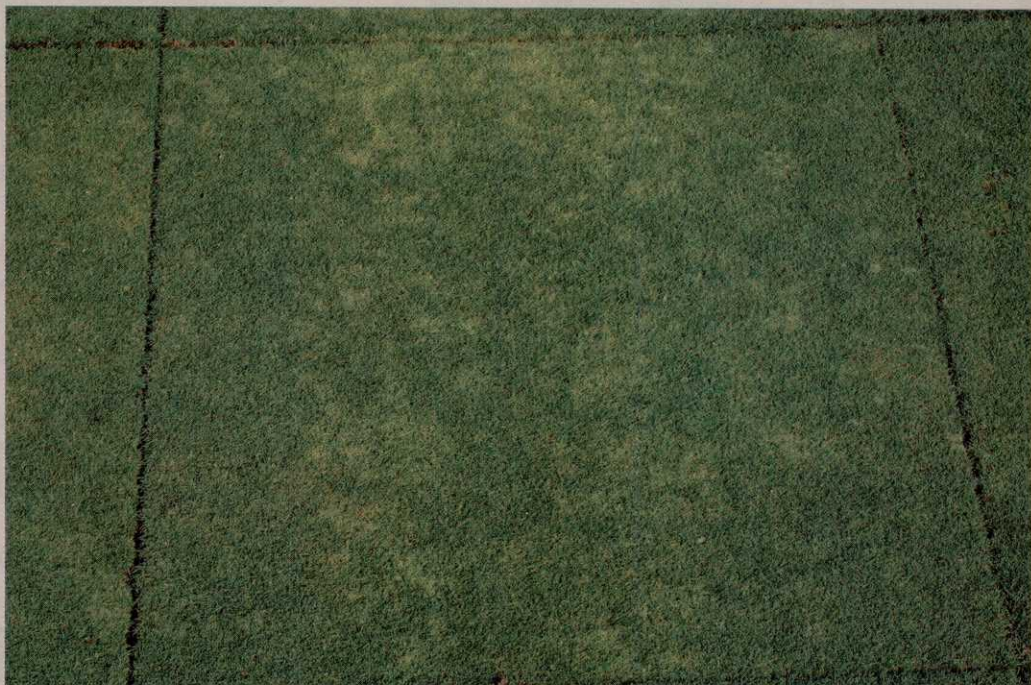
One of the most common invaders is silvery thread moss, which causes unsightly surface conditions and can take over a green if left un-

checked. It can even go into a state of dormancy, further complicating successful management.

A PROBLEM PEST

Moss has become an all-too-common problem on putting surfaces recently. Researchers cite several possible reasons for this unfortunate phenomenon. One is the demand for faster greens, thus lowering the height of cut, which might result in thinner canopies that can become stressed and more readily populated by moss spores.

Copper products can control moss infestations successfully; however, phytotoxicity can occur when copper products are applied at high rates.
Photo: University of Rhode Island





Another reason is the removal of mercury and other heavy metals from pesticides two decades ago. Mercury is known to have a significant impact on moss development, and controlling it was believed to have been a positive side effect when using mercury-based products.

"It's speculation, but heavy metals seemed to do a great job killing moss and algae, even though almost no superintendent put them down for that purpose," says Nathaniel Mitkowski, a professor at the University of Rhode Island who has conducted extensive research about moss problems on golf courses. "It was a secondary benefit."

Peter Landschoot, a professor of turfgrass science at Penn State University, concurs.

"An increase in moss and algae problems is largely a reflection of the changes in cultural practices of superintendents," he says. "When we started getting away from heavy metals and

the residual levels wore off, we began to see more moss on greens."

The moss problem has become more acute during the past 10 years, says Patrick O'Brien, director of the USGA's Southeast Region.

"I believe it's due to lower mowing heights on greens, which opens them up to stress and damage," O'Brien says.

Moss seeks open areas in the turf damaged by unrepaired ball marks and mower cuts, Mitkowski says. When the moss moves into the canopy, it outcompetes grass for nutrients and eventually will crowd out the blades if not eradicated.

"Even if it goes dormant, it doesn't die and can keep coming back in the same area," he says. "We have seen it take over entire greens."

Moss is really nasty stuff, says Bob Wolverton, golf course superintendent at Bayonne (N.J.) Golf Club.

When superintendents started getting away from using heavy metals and the residual levels wore off, more moss began appearing on greens, says Peter Landschoot, a professor of turfgrass science at Penn State.

Moss has been around for millions of years and has good survival mechanisms, says Peter Landschoot. Photo: Penn State University



"I had a problem at the course I worked at prior to coming here," he says. "We're seeing more of it because of lower mowing heights on greens, because all you need is a little thinning of the turf, and moss or algae pokes its head out of any little void. And that opens the way for it taking over a green."

Ryan Wycoff, superintendent at the OGA Golf course in Woodburn, Ore., can relate, too.

"There can be a million moss spores in the green canopy," he says. "You can easily see quarter-size patches of moss. But if you get down and look, there are tons of spores that will spread if given the chance. It's quite a problem in Washington, Oregon and down into California."

One of Eric Strzepek's main objectives when he took over as golf course superintendent at the Shenandoah Golf Course at Turning Stone Resort in Verona, N.Y., a year ago was to eradicate moss from the greens.

"Because of the desire to keep the course open, which led to a lack of proper aeration of the greens, moss took over, and we had greens

that were 40- to 50-percent infested. It's been an uphill battle for the previous superintendent and myself. But we've gotten a handle on it through the use of chemicals, a change in cultural practices, proper aeration and new mowers for some of the greens."

While moss and algae can pop up anywhere, most courses in southern regions of the country don't seem to be greatly affected.

"It isn't a big problem on the Southern courses," O'Brien says. "You don't see it much in climates where you have temperatures warmer than 90 degrees in the summer for long periods of time. It's tough for moss to survive in those conditions."

"We do see some in the transition zones, say in the Piedmont area of North Carolina," he adds. "It's become a bit of a nuisance problem in that area."

Moss and algae problems on greens have become fairly common complaints recently among Northwest superintendents, Nelson says.

"Mostly it's on the greens, which leads me to

believe it's a result of lower cutting heights," he says. "We hardly ever see it on tees or the fairways where the grass is kept at higher heights."

The worst moss problems occur in the Northeast and the Northwest, areas where there are cloudy conditions, mist and rain, Landschoot says.

"We're seeing it become more of a problem in the transitional areas as well," he says.

A PLAN OF ATTACK

So what can superintendents do to combat moss? Anthony Williams, golf course superintendent at Stone Mountain (Ga.) Golf Club, which is in the northern part of the state where moss can be a problem, has never seen the troublesome pest on his course. He believes there's a relatively simple explanation – basic good agronomy.

"It's a general rule of thumb that if you have conditions that give grass the best opportunity to thrive, then you'll have healthier stands of grass that can resist things like moss and algae," Williams says.



The protonema stage of moss on velvet bentgrass putting greens appears as black discoloration and might be mistaken for algae. Photo: University of Rhode Island

Williams and his staff are aggressive with turf management, aerating and topdressing greens often to insure the upper layer of turf is in a healthy state.

"The key is preventing moss and algae because once it takes hold it becomes a problem," he says.

Several chemical products on the market appear to work well for moss and algae in controlled tests, agronomists say. Among them is Quicksilver herbicide, which has been shown to control moss on putting greens without serious turf injury. Junction, a copper hydroxide turfgrass fungicide/bactericide, has been shown to be effective on moss preventively and curatively.

Iron sulfate has been used to control moss for many years, and TerraCyte, a granular algaecide/fungicide labeled for moss and algae control, has been shown to be effective. Interestingly, Dawn Ultra appears to do something other than clean dishes. Testing has demonstrated that when applied during cool or warm weather in 14-day intervals, the detergent has controlled moss in some instances. Baking soda can be useful, too, for spot treatment on affected greens, researchers say.

"Quicksilver has worked very well for us," Strzepek says. "We're using the product to prevent moss right now, but we've used heavier rates in the past to eradicate the problem. We've also used iron sulfate and have seen some reduction in moss with that."

When dealing with minor incursions of moss and algae, removing the affected area by hand or

spot treatment with herbicides or other products is an effective way to deal with the problem.

"We have one green on an island here, and we stay on top of it, so that when we see moss we remove it culturally," says Lane Heil, golf course superintendent at the Shawnee Country Club in Shawnee on Delaware, Pa.

Brad Smith, golf course superintendent at Fieldstone Golf Club in Greenville, Del., says there's a little algae here and there on the course.

"Shade removal around greens ... can be a big help in preventing moss and algae."

- NATHANIEL MITKOWSKI

"After a big rain, that's when you'll see it the most, and you need to take care of it right away," he says.

The timing of moss and algae treatments is crucial and varies from region to region.

"There seems to be little efficacy if you go out in the middle of the summer and treat for moss in the Northeast," Mitkowski says. "It's much better if it's done during the fall."

Wycoff treats his greens preventively with Junction during the winter and TerraCyte during the spring when the turf begins to grow more quickly.

CULTURAL PRACTICES

A study about moss problems by Landschoot

and Joshua Cook, also of Penn State, states that while chemical control strategies can suppress or kill moss, these measures should be coupled with changes in the cultural conditions that allowed moss to encroach upon the green in the first place.

Low nitrogen levels, overly aggressive mowing practices and too liberal irrigation all might be adjusted fairly easily, according to the report. Other causes of moss encroachment – poor drainage, disease problems, shade, traffic and poor air circulation – represent more challenging issues.

"Shade removal around greens, especially the old push up putting surfaces with no drainage, can be a big help in preventing moss and algae," Mitkowski says.

Wycoff believes raising the height of cut on greens and rolling putting surfaces once or twice a week more than normal to maintain their speed is another way to prevent a thinning of the canopy that can lead to incursions of moss and algae.

Carefully handling mowers on greens also is good preventive medicine.

"We have some very undulating greens that were being damaged by fixed-head mowers," Strzepek says. "We acquired a Toro Greenmaster Flex 21 that hugs the hills and prevents

the gouging that can foster problems on the green."

Even superintendents in the Sun Belt states should remain vigilant for moss and algae.

"I've seen silvery thread moss thrive in environments full of sun, which seems odd," Landschoot says. "But moss has been around for millions of years and has good survival mechanisms. It's wise for superintendents to look out for it, take care of it quickly if they see it, and keep an eye on the affected area to make sure it doesn't come back." **GCI**

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CHANGE IT UP

SUPERINTENDENTS TWEAK THEIR TURFGRASS
MANAGEMENT PROGRAMS TO IMPROVE CONDITIONS



BY T. R. MASSEY

On the surface, golf courses are colorful palettes of greens and browns with bright spots of richer hues mixed in as accents. Behind the scenes, however, golf course superintendents constantly must strive to strike a balance between maintenance practices and the stress of keeping a huge tract of land in proper bloom.

The art and science of golf course maintenance is evolving constantly, from increased aerification to improved irrigation techniques to foliar feeding. Accomplished superintendents must stay current with trends not only in their regions of the country, but in the industry as a whole. Often, this requires them to change maintenance practices that have been going on for years.

POKING HOLES IN TURF

Dan Petersen is in his second year as the golf course superintendent at the Warren Golf Club on Warren Air Force Base in Wyoming, and he's bringing successful practices he's learned during the past 30 years to the operation. Although he's an employee of the U.S. Air Force, he's not in the military.

Most recently, Petersen was the superintendent at Ramstein Air Base's golf course in Germany

from 1997 to 2006. There, he was able to let his greens grow a little longer and roll them.

"That let us get the speeds we were looking for," he says.

Based on that experience, he pushed for a roller since he started at Warren.

"I was proactive," he says. "I started to aerify and bring in rollers and demo them for members and management. We finally went out and bought a roller. The ones that hook to greensmowers don't appear to be that effective to me, so we bought a separate one that operates as a separate piece."

The rolling creates the proper surface on the green and helps cover the holes created by aerification, Petersen says. His rolling program will start this year with a frequency of three times a week.

"That causes dramatic changes," he says. "I'm looking for nine to 11 Stimpmeter speeds, eight to 10 for everyday use."

But the real secret to improving greens is an aerification program, Petersen says. Aerifying the push-up greens at Warren, which are with-

out drainage, has resulted in dramatic changes, and they've become more manageable.

"We started aerification once a month last year," he says. "We're verticutting and power raking, too. They hadn't aerified anything for three years. There was a 3.5-inch thatch layer. We've reduced it some, a quarter of an inch of thatch already, maybe a half-inch, but it's going to take a while to get rid of this."

Aerification is where it's at for Jay Wagner, CGCS, at Cherokee Ridge Country Club in Union Grove, Ala.

"It used to be standard to do it two or three times a year, and now we do it monthly, March to October, maybe more," Wagner says. "We make quarter-inch holes but don't pull plugs. Then, we run a roller behind it. You don't notice it."

This new practice is making the course at Cherokee Ridge look better, and new technology is helping, Wagner says.

"There are better aerifiers with better tines now," he says. "We have four new ones."

When Petersen began aerifying regularly at

Warren, there was a noticeable difference immediately, he says.

"The turf responded like I was giving it first aid," he says. "I'm using shatter tines and needle tines. I'm verticutting on a regular basis and topdressing. We do something once a month."

More aerifying instead of less can give turf the space it needs to breathe and grow. During the summer, aerifying opens up the turf and gets air into it.

"We have bentgrass, and it gets hot and humid and the grass doesn't like it," Wagner says. "We've also installed some fans around the greens to keep the air circulating."

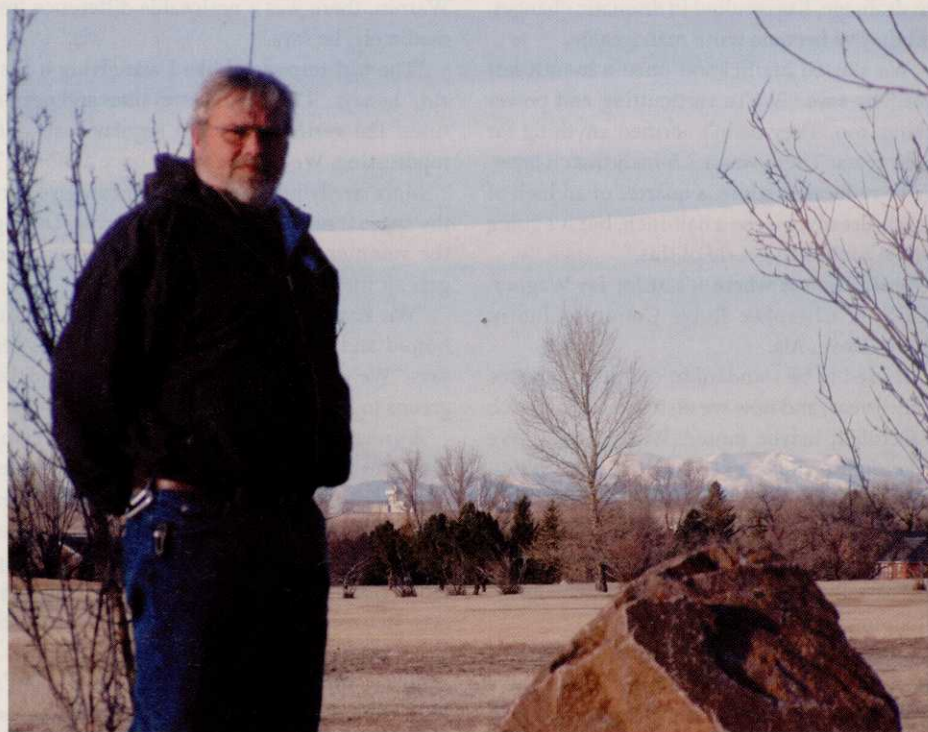
A greens and bunkers renovation was completed in 2002 at the private Cherokee Ridge, which built in 1992. Two years ago, Wagner began his aggressive aerification practice. In the spring and fall, he'll core. He's also topdressing more, timing that around the big aerifying projects. Between big projects, he uses needle tines to keep organic material from building up.

"It has improved turf quality," he says. "It's stabilized. It can get pretty sick looking at the

At Poppy Ridge Golf Course (opposite page), superintendent Todd Cook changed his fertility program and is using many more foliar applications with sulfates because it helps firm up surfaces and control silvery thread moss. Photo: Poppy Ridge Golf Course

At the Warren Golf Club, superintendent Dan Petersen is looking for Stimpmeter reading between eight and 10 for everyday use. Rolling the greens helps achieve this.





Dan Petersen increased the frequency he aerifies the push-up greens at Warren Golf Club to once a month to help reduce a 3.5-inch thatch layer.

end of the long summers that we tend to have. It was beneficial last summer when we had the hottest summer anyone could remember.”

Petersen wants to take his aerification projects a step further. A drill-and-fill machine is on order.

“The Air Force tries to renovate five courses a year,” he says. “If I use a drill-and-fill machine twice a year, I could save them a renovation. I’d change the soil composition. I used one at Ramstein and made dramatic changes. It really gets that sand down there.”

Petersen is considering a deep-tine aerification this year, too.

“I’d like to, but it’s harder to get the sand down in the hole,” he says. “The drill-and-fill is better. That’s the direction I’m going. I found a contractor to do the deep tining pretty cheap, and I’d like to do it twice a year, but you can’t do it in September because the holes won’t heal. There’s not a lot of healing time after that in this area of the country.”

PRECISE WATERING

In addition to punching holes in the turf, Petersen has to worry about his water supplies.

“It’s completely opposite of Ramstein,” he says. “In Germany, the course was like a cookie-

cutter in the middle of a forest. It rained and was cloudy all the time. We averaged seven inches of rain a week. Here, I don’t get seven inches a year. It’s been a learning experience. If my irrigation failed in Germany, Mom Nature watered. If it fails here, I’m out hand-watering.”

Brian Sullivan, CGCS, is in charge of maintaining the Bel-Air Country Club’s golf course in Los Angeles, another place where water is a premium. The easiest thing to do is install a good irrigation system, he says, noting that not everyone can afford a \$2.5 million system. But if one can, it’s the way to go.

“It’s been in the ground two years,” he says. “Our distribution uniformity is as good as you can get in the industry. We have enough heads that we can separate greens, tees, fairways and roughs.”

Sullivan has 3,000 irrigation heads at his disposal that allow him to target water to a specific area of the golf course and give it the proper amount of water. That way, one saves water, he says.

“If you’re not overirrigating, you eliminate a good deal of wet and dry situations,” he says. “So you have healthier plants without overirrigating.”

Superintendents working with irrigation systems that are 20 years or older might have distribution uniformity rated in the low 60s, Sullivan says.

“In a 10-minute irrigation cycle, you’d have to run water 14 minutes to be effective,” he says. “If I put in a component that’s 90 percent, that’s 1.1. That head could function with 30 percent less water. Now I’ve properly irrigated.”

Because there’s no off-season in Southern California, it was difficult for members to be without a golf course for four months.

“The Air Force tries to renovate five courses a year. If I use a drill-and-fill machine twice a year, I could save them a renovation.”

- DAN PETERSEN

“It’s never easy,” Sullivan says. “The amount of heads we have, near 3,000, it was four to six months, impactwise. But our membership is happy it’s installed.”

Most years, Sullivan doesn’t have to worry about a drought. But this year, starting last fall, he’s had only one inch of rain. Normally, one doesn’t have to irrigate a whole lot December through April.

“This year, we’re entirely dependent on the irrigation system, so it’s something that was really necessary,” he says.

At first, Sullivan thought the efficiency of his new system would save him money. It’s not uncommon for courses in the area to spend a quarter of a million dollars a year on water, he says.

“If you’re conserving 30 percent you’re saving money,” he says. “We are 15 to 20 percent more efficient. Of course, the price of water has gone up in the past two years, so I’m not sure exactly how much I’m saving.”

Water is a subset of a larger movement that Sullivan’s been aware of the past few years, and that’s environmentally sound maintenance practices.

“If you’re not on that bandwagon, you’re behind,” he says. “I’ve got it down to the recycling of cardboard. Our membership expects it.”

Every superintendent must embrace the fundamentals of water usage and other practices in integrated pest management, Sullivan says.

“Within the confines of that, we are stewards of the property,” he says. “You have to be environmentally conscious.”

FOLIAR FEEDING

Todd Cook, golf course superintendent of Poppy Ridge Golf Course in Livermore, Calif., says he’s

always mindful of the amount of chemicals he uses. During the past few years, he has changed his fertility programs.

“We use a lot more foliar applications with sulfates because it helped us firm up our surfaces and helped with silvery thread moss control,” he says. “We’re using programs developed by a consultant to get rid of moss and firm up putting surfaces at the same time.”

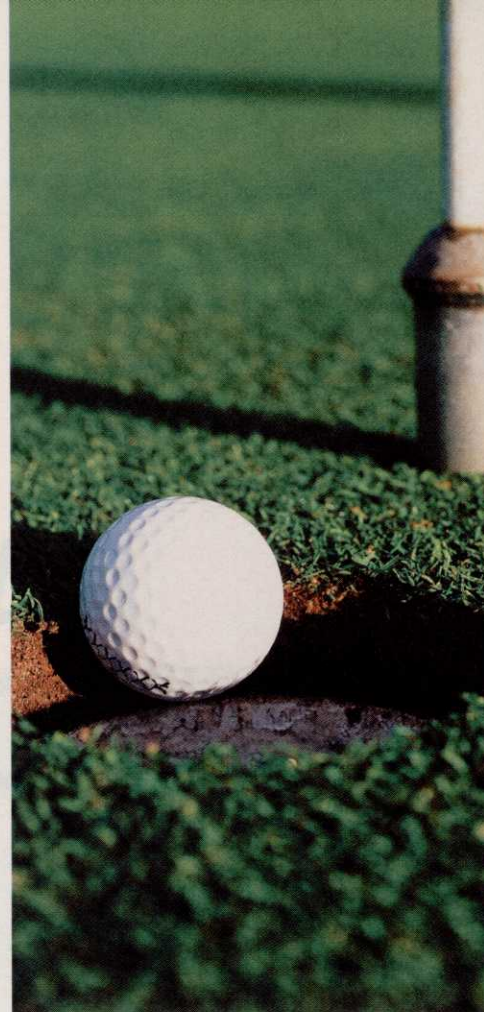
Before the past season, Cook mainly was using granular applications once a month but felt it wasn’t giving him the best bang for his buck.

“The foliar application actually is less than granular,” says Cook, a 12-year veteran who grew in Poppy Ridge. “The raw materials are less, and labor is probably a wash. Now, we’re putting on foliar applications every two weeks. Our greens have really improved. They’re a lot firmer and faster and more consistent.”

Opened in 1996 and designed by Rees Jones, Poppy Ridge is a sister course to Poppy Hills and owned by the Northern California Golf Association. It hosts some of the NCGA championships. But the one drawback to having firmer, faster greens is the loss of pin placements during competition.

“We have a couple of greens that are really undulating, so we’ve lost a couple of pin positions,” Cook says, noting the trade-off is worth it. “Only when the greens were brand new were the greens any better. This summer, we’re going to raise the mowing heights so we can keep the speed at a reasonable level. We have to work around the spots and not use them on our heaviest play days.” **GCI**

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TURFGRASS MANAGEMENT

At Salishan Spa & Golf Resort, Ryan Bancroft and his maintenance crew started fairway topdressing in 2000 on five holes and since have expanded the practice considerably. Photo: Salishan Spa & Golf Resort

GAINING ACCEPTANCE



SUPERINTENDENTS WEIGH THE PROS AND CONS OF FAIRWAY TOPDRESSING

BY MICHAEL COLEMAN

Topdressing fairways is gaining acceptance among more golf course superintendents these days, but not everyone is jumping on the bandwagon. With more pros and cons than the San Quentin Pro-Am, topdressing fairways has become a frequently discussed topic among superintendents. While accepted for years as a needed practice for greens, topdressing is becoming more popular on fairways with some superintendents.

At Saratoga National Golf Club in Saratoga Springs, N.Y., golf course superintendent Joe Lucas started a topdressing program for fairways last fall, after extensive research about the practice and materials.

"We're built on a very heavy clay soil," Lucas says. "During the wet time of the year, the playing surface is soggy."

Lucas talked with USGA agronomists and turf consultants and decided topdressing would improve the fairways at the public course. The pros and cons stack up for Lucas like they do for many superintendents. Reasons for topdressing fairways include:

- Quicker-drying turf;
- Enhanced turf appearance;
- Improved playability;
- Firmer turf; and
- A reduction of earthworm castings.

On the flip side, there are multiple negatives to consider:

- Labor cost;
- Material cost and storage;
- The need to raise irrigation heads;
- Scheduling hassles;
- A higher risk of disease; and
- Root problems.

DRAINAGE CONSIDERATIONS

Although New York isn't like the Pacific Northwest where rainfall is measured by the foot each year, precipitation can be significant in the Empire State. Lucas, who has been at Saratoga National since construction in 2000, says the course drains well but more sand helps dry the playing surface much more quickly.

Tony Girardi, CGCS, at Rockrimmon Country Club in Stamford, Conn., decided against topdressing fairways because drainage was the real problem. During 13 years at Rockrimmon, Girardi also has seen layering problems appear on greens because of topdressing. Layering can lead to problems if the roots stop growing through the layers. He didn't like the idea of dealing with that potential problem on fairways.

"You're going to raise fairways and crown them," he says. "At this point, it's not really clear what impact topdressing will have on surrounding areas and the transition zones in the rough."

Rather than building up sand to improve percolation and water removal, Girardi suggests honing in on the real source of excess water – ineffective drainage. Girardi believes many courses aren't looking at the entire picture of what's happening in the fairways when they begin topdressing programs.

"You're actually masking an issue you have with drainage," he says.

Still, many other experienced superintendents tell Girardi they're having success topdressing fairways.

Drainage was Bob Senseman's first target, too. Senseman, a certified golf course superintendent at Oswego Lake Country Club in Oregon, has made four applications since October of 2006.

Fairway topdressing has been going on for years at Oswego Lake.

"The program is most effective when you take care of the trouble spots with drainage," he says. "We're changing the program to one similar to putting greens in which we're doing lighter but more frequent applications of sand."

Consistency and firmness are types of playing conditions golfers at Saratoga National expect, and topdressing fairways and roughs helps Lucas meet those expectations.

"Happier golfers make for more revenue because they don't have to keep carts on the paths," he says.

The additional cart revenue is expected to help counter the \$35,000 of materials cost for four or five applications annually, although Lucas isn't sure how many the crew will be able to actually complete throughout the season.

"It's a tough process to complete because something's always coming up," he says.

CHOOSING THE MATERIAL

Many superintendents don't have the money or time to topdress fairways. However, if they decide to topdress them, they need to make sure the material they use isn't going to worsen turfgrass conditions, says Jason Henderson, assistant professor of turfgrass and soil science at the University of Connecticut.

Obviously, worsening turfgrass conditions isn't one of the goals of topdressing fairways, so superintendents should have any materials they're considering using tested by an accredited laboratory for an independent recommendation. The cost of topdressing is too high to just jump in and use material from the nearest quarry.

Lucas talked to many people before decid-



Before applying topdressing to fairways, Ryan Bancroft's crew uses a core harvester with a modified conveyor that picks up cores and transfers them to another vehicle. Photo: Salishan Spa & Golf Resort

ing which sand he would use. He took samples from all the suppliers in the area, and Brookside Laboratories examined them for particle size, infiltration and other characteristics.

"It probably took me two years of sampling before finding something I was comfortable with and that came at a good price," he says.

Lucas spent about \$9,000 for 634 tons of straight sand.

"It's a learning game," he says. "I'm just trying to figure it out for myself."

It took a while for Lucas to decide what to use because of long-term effects.

"I don't want to throw something out there that five to eight years down road could be hindering me," he says.

Negative outcomes are a possibility because the practice is so new in most areas, Henderson says. Once sand begins to settle into the turf after several applications, one starts to see changes in the infiltration rates and moisture levels.

Henderson is working on a study at the University of Connecticut that examines how various topdressing sands react with soil. His study includes USGA-spec sand, fine sand and course sand. He hopes to learn more about how each type of sand interacts with soil and what results might be seen in practical applications.

"The big challenge – the unknown right now – is once you've built up this layer of sand on top of this finely textured soil, how's it going

to change how that soil reacts to various soil moisture conditions?" he says.

CONCERNS

The uncertainty of the long-term effects of topdressing fairways worries some superintendents. Not everyone is comfortable with some of the risks posed by it. For example, during a storm, normal surface runoff occurs at a high rate. But with sand present after topdressing, water goes through the permeable sand to the root zone. Depending on the depth of topdressing, the soil might remain saturated, especially after a heavy rain. If a big rain is followed with extreme heat, it's a potentially lethal combination.

"You can literally cook the roots," Henderson says.

The possibility of extreme conditions causing havoc increases with a regular topdressing pro-

gram. Higher soil temperatures are detrimental in wet conditions – harsher than ambient air temperatures on the health of the turf.

"Do you essentially create the perfect storm scenario in which you get higher infiltration rates, but increase risk in terms of disease susceptibility and a lot of potential for direct injury kill?" Henderson wonders.

Henderson's concern is echoed by those in the field, such as Senseman, who recognize the potential danger.

"You put down a lot of sand, and you can fry things in a big hurry," says Senseman, whose budget for fairway topdressing materials is \$30,000 a year, which costs about \$15 a ton.

Another considerable drawback that becomes apparent as time progresses is the need to raise irrigation heads. Several superintendents that are topdressing expressed their concern about that problem. Unfortunately, that's one of the prices to be paid for the benefits of topdressing.

FULL STEAM AHEAD

While the negatives of topdressing can be daunting, some course managers begin to see the benefits slowly and continue to ramp up their programs. Ryan Bancroft, golf course superintendent of the course at Salishan Spa & Golf Resort in Gleneden Beach, Ore., has a staff of nine full-time employees and 10 part-time employees. Bancroft and his crew started topdressing in 2000 on five holes and then started applying heavier applications twice a year in addition to

The pros and cons of fairway topdressing

- Quicker-drying turf
- Enhanced turf appearance
- Improved playability
- Firmer turf
- A reduction of earthworm castings

PROS

CONS

- Cost of labor
- Material cost and storage
- The need to raise irrigation heads
- Scheduling hassles
- A higher risk of disease
- Root problems

Topdressing treatments are applied across multiple fairways to compare effectiveness of different topdressing frequencies. Photo: University of Connecticut



one light application. His topdressing materials budget for the year is \$55,000, and there's not much acreage neglected by his crew.

"We throw sand everywhere," Bancroft says. "It's on the fronts, it's on the greens, the tees, fairways and some of the high-traffic rough areas."

Bancroft favors topdressing to help percolate water and prevent thatch layers in the turf. The main reason he topdresses the fairways is because of drainage. The course receives 80 to 100 inches of rain annually. He's hoping to get close to six inches under the surface to improve

drainage and stretch the prime season.

At Salishan, nine holes close so the crew can aerify and then topdress. The process allows the crew to work a regular day, which reduces overtime and fatigue. It also allows nine holes to remain open each day and keep revenue flowing.

Ingenuity kicked in to help speed up things for Bancroft. His crew uses a core harvester with a modified conveyer that picks up the cores and transfers them over the bed where they fall into a transfer vehicle. When that vehicle is full, an empty vehicle takes its place to keep up the

pace. The process reduces the time required almost in half.

"I'm actually going to try a once-a-month application this year," Bancroft says, adding that he's planning for two moderate applications and four or five light applications. "We're just going to put a lighter amount down so it doesn't affect the golfers as much."

Senseman's crew is taking a similar approach – more frequent light applications.

"We have a program in which we're just sanding two to three fairways a day," Senseman says. "It takes us a week, and we wait three to four weeks and start over again."

While the drawbacks can be significant – some might not surface until the practice matures throughout the years – some superintendents stand by topdressing fairways as a sure way to improve conditions for demanding customers.

"The standard expectations for the golf course are continually being elevated," Senseman says. "Any kind of light-frequent topdressing you can afford to do is only going to improve the condition of the golf course." **GCI**

Michael Coleman is a freelance writer based in Kansas City. He can be reached at mike.coleman@comcast.net.



At Oswego Lake Country Club, Bob Senseman and his crew have made four fairway topdressing applications since October 2006. Photo: Oswego Lake Country Club