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Harmony In Growth



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**

David Wolff is a freelance writer based in Watertown, Wis. He can be reached at dgwolff@charter.net.

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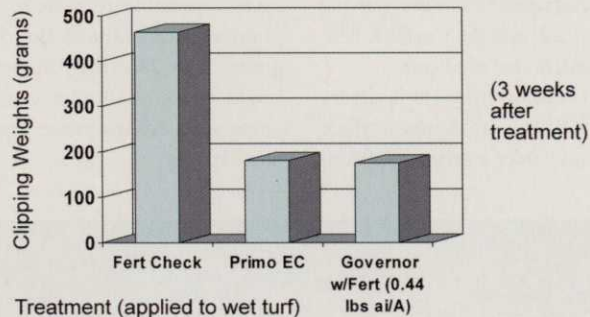
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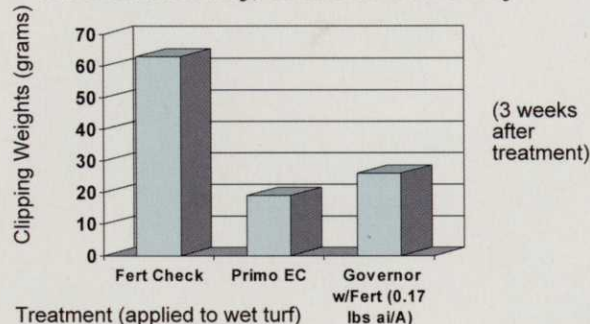
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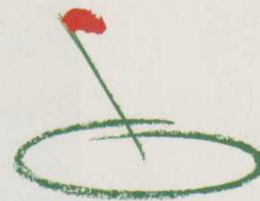


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moss

IMPLEMENT THE RIGHT
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PRACTICES TO KEEP THIS PEST AT BAY

control

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.

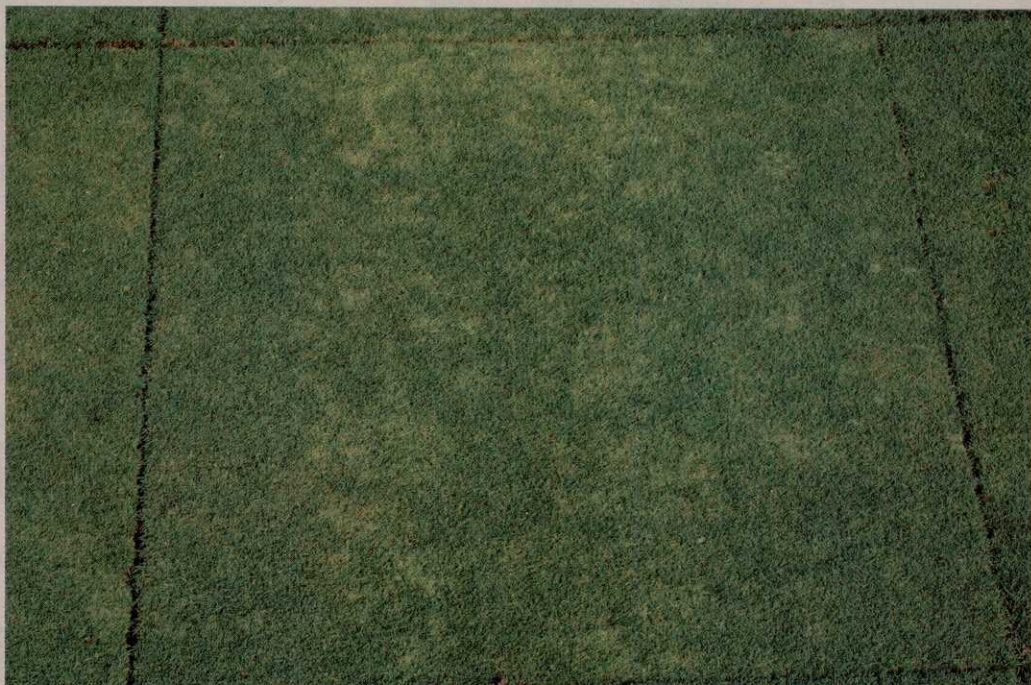
One of the most common invaders is silvery thread moss, which causes unsightly surface conditions and can take over a green if left un-

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.

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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.

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

"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.

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**

CULTURAL PRACTICES

A study about moss problems by Landschoot

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

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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