

PART TWO OF A THREE-PART SPECIAL SERIES

Plant Health Report

They are two of the golf course maintenance industry's biggest buzz words: plant and health. And, yes, they go together like spaghetti and meatballs. That's why *Golfdom*, in partnership with BASF Professional Turf & Ornamentals, has embarked on this plant health series.

PART TWO of the series focuses on fungicide management in accordance with plant health. Editor and Chief Larry Aylward spoke with golf course superintendents and other experts on how to get the best out of fungicide programs as the programs relate to plant health. His story begins on page 32.

THE FINAL STORY in the series, which appears in May, looks into the future and examines how superintendents will manage turf in 2025. We'll speak with superintendents and other experts to get their thoughts on how plant health will best be achieved 15 years from now.

PART ONE, which ran in March, covers the modern concept of plant health and turf-disease management — from cultural practices to fungicide use — and what golf course superintendents should do to achieve the highest success rate to control diseases such as dollar spot and anthracnose, among others.

PHOTO BY: MIKE KLEMM

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Rooted in Science

After reading the March column, you're now aware of research at BASF that reveals plant health benefits, which can help golf

course superintendents and other turf professionals better manage stressed turfgrass. You may be wondering what this means to you and asking yourself,

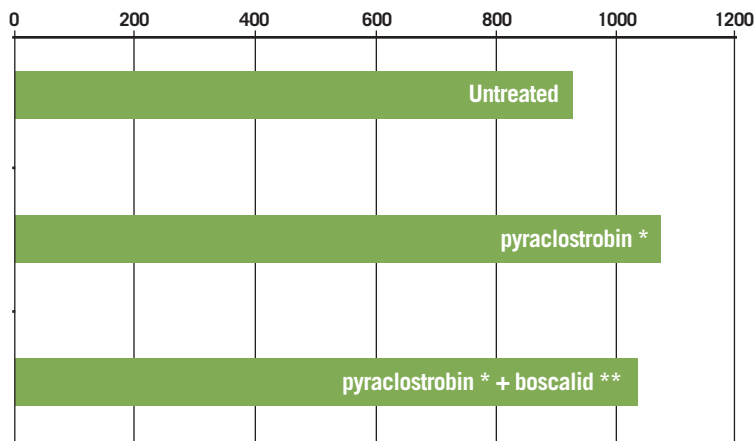
"How can I go from research to my real world?"

Research across the United States has demonstrated that pyraclostrobin effects in turf are not easily documented above ground — the turf is green, has good chlorophyll content, is healthy and looks like any other turf. The big differences are occurring below ground where we don't usually look.

When turfgrass goes through drought stress, current research shows that the pyraclostrobin-treated turf has deeper roots and more roots compared to turf that is untreated. This holds true for both pyraclostrobin alone (a new liquid formulation which is pending EPA registration) and when combined with boscalid.

Bentgrass varieties A-1, Penncross and Colonial were grown in United States Golf Associ-

BENTGRASS TOTAL ROOT LENGTHS (CM) UNDER DROUGHT STRESS



* new liquid formulation pending EPA approval
** pyraclostrobin rate reduced in combination

6 US trials: A-1, Penncross and Colonial creeping

ation specification sand mix under greenhouse conditions. Bentgrass was either treated with fungicide or left untreated, then exposed to normal irrigation or reduced irrigation to simulate drought. The turf was continually mowed at greens height to simulate normal maintenance practices.

When root samples were pulled from the sand cores, the total length of the roots and the volume in centimeter/cubic meter (cm/m³) were significantly increased when pyraclostrobin was applied under drought-stress conditions.

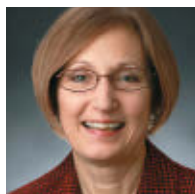
TifEagle bermudagrass was also evaluated and a similar response was observed when it was stressed with short days and drought.

With both turf types, more roots were present following a pyraclostrobin application, and this difference in root growth

became greater as the turf plants were stressed. Pyraclostrobin-treated plants under stress had similar root lengths and volumes compared to untreated-unstressed plants.

Superintendents understand the value of having healthy roots. Deeper, healthier roots can sustain a turf plant during any stress that comes along — the plants are able to tolerate the stress better and recover more quickly. Turf managers know that developing a strong root system in spring can help them through the summer months — now pyraclostrobin can also help through those tough summer months not only by providing excellent disease control, but also by providing longer, higher volume turf roots. ■

Renee J. Keese, Ph.D., is biology project leader for BASF Turf & Ornamentals.



BY
RENEE J.
KEESE

Editor's note:
In May's column, look for how BASF is connecting science to superintendents.

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GETTING WITH THE Fungicide Program

It's not just about spraying a disease when it rears its ugly head. It's about implementing a schedule that's part of the plan to achieve plant health

John Gurke and his golf course are tight, like family. Gurke is the longtime superintendent of Aurora Country Club near Chicago. He and the course have been through thick and thin. Gurke cares about his course's health like it was one of his kids (OK, maybe we're exaggerating, but you get the picture).

Gurke realizes the course's lifeblood — its turfgrass — has been entrusted to him. So he does everything he can to make sure the turfgrass is as healthy as Jack LaLanne. And if it is, Gurke feels like he's doing his job.

"If I'm not walking that course every day and getting down on my knees and smelling the turfgrass and sticking a probe in it, then I don't have a real good grip on whether I'm doing a good job or not," Gurke says.

Other superintendents can relate to Gurke's passion

for plant health. They have implemented yearlong plans to make turf more vigorous to tolerate stress better.

Of course, a major part of their plant health goals are their fungicide programs. Gurke and the others just don't just spray away when a turf disease rears its ugly head. Their fungicide programs are deeply rooted in various factors, from a course's history to a course's microclimate to a chemical's efficacy to a course's maintenance budget.

The latter is a huge factor these days, considering the weak golf economy. According to a recent *Golfdom* survey of nearly 600 superintendents, 65 percent said they cut their maintenance budgets in 2009. When those superintendents were asked to cite the categories they cut to reduce their budgets, 42 percent said pesticide applications. That was the third choice after labor (92 percent) and fertilizer applications (55 percent). However, when the same superintendents were asked: In order, rank the areas of your budget you're most likely to cut if asked to do so, only 4 percent said they would be "most likely" to cut pesticides.

According to a *Golfdom* survey last year on fungicide use, more than half of 350 respondents said budget constraints were impacting their choice of fungicides in 2009. Dan Walter, superintendent of Blue Ash (Ohio) Golf Course, says the first

thing he thinks about with his annual fungicide program is his budget.

"That has become more of an issue the past few years," Walter adds.

Hence, Walter says he orders most of his pesticides early to take advantage of companies' early-season selling programs.

Even if superintendents don't purchase their products earlier, they should develop their fungicide action plans early in the golf season, says turfgrass pathologist Barb Corwin, owner of Turfgrass Diagnostics LLC in Hallsville, Mo. It's not just a matter of good economics to have a solid fungicide plan in place. It's simply good planning, Corwin says.

"You'd be surprised at how many superintendents don't have plans in place," she adds.

Having a grand plan

Tom Athy, the certified superintendent of Omaha (Neb.) Country Club, says he learned the importance of planning long ago. As part of a solid fungicide plan, it's important to understand the different chemical classes and their modes of action, Athy says. They also need to understand the microclimates on their courses, which could impact disease and control.

Corwin stresses the importance of disease identification in a fungicide program and choosing the proper product to treat disease.

"The No.1 thing is superintendents need to make sure

they know what disease they need to control," Corwin says. "Disease identification should be at the top of their lists."

That's because it's often not a disease that superintendents might be treating. It may be a physical injury, such as bruising to the turf.

If it's a disease, superintendents need to know what fungicides are available to treat it, Corwin says. If the disease is brown patch, there are several fungicides with different active ingredients labeled to treat it.

Once a fungicide is chosen to treat the disease, it's vital that superintendents know the spray volume and

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“If I’m not walking that course every day . . . I don’t have a real good grip on whether I’m doing a good job or not.” JOHN GURKE



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nozzle type for droplet size in which to apply it.

“For fairy ring, for example, the fungicide needs to be placed in the upper inch or so of the soil profile,” Corwin says.

Corwin notes the importance of proper application overall.

“Make sure you have the right spray volumes and nozzles, so the fungicide is applied correctly,” she says.

Superintendents should never make assumptions about disease or what fungicide should be sprayed to

control it. They need to practice certainty in these cases.

“There are diseases that can take superintendents by surprise,” Corwin says.

Corwin also doesn’t believe a turf disease will hit 18 greens simultaneously or within a few days, what with the difference in air movement, shade and other factors on greens. Hence, she has never subscribed to the thinking that all 18 greens be treated for dollar spot even if only one of the greens gets the disease. But Corwin admits she has met opposition from superintendents on this

matter, and she understands where they’re coming from.

“Superintendents sleep better if they go out and put fungicide on all 18 greens,” she says. “They don’t want to take the risk.”

Spin control

There’s also the matter of rotation in a fungicide program, which Gurke says is elementary to a solid fungicide program. Superintendents must rotate fungicides so certain turf diseases won’t become resistant to them.

There’s a method to the madness when it comes to

the practice. Experienced superintendents realize there are vital components to consider in fungicide rotation.

Gurke says his turf disease challenges have more to do with anthracnose and brown patch. So his challenge there is to find a reliable rotation of products to thwart off those diseases.

Gurke says his rotation program differs from greens to tees to fairways. The fungicides most prone to resistance are the ones he uses the least. “I might use them once or twice a season,” Gurke says. “I rotate around the chemis-

DOWN WITH DISEASE

Superintendents take various approaches to managing disease on cool-season turf

By John Walsh, Contributing Editor

Whether it’s dollar spot, anthracnose, snow mold, brown patch or pythium, golf course superintendents have their own ways of combating these diseases. Budgets and the uniqueness of each course are significant factors.

Dollar spot is one disease Jeff Corcoran — along with many other superintendents managing cool-season turf — deals with annually.

“Once it takes hold, you’re always chasing it weekly,” says the manager of golf courses and grounds at the private, 36-hole Oak Hill Country Club in Rochester, N.Y. “A good preventive plan is better because you end up using less product. We take

a preventive approach. However, we can take a curative approach in the fall because the weather doesn’t favor dollar spot as much then, and the disease doesn’t cause any significant damage.”

Scott Brickley has attacked dollar spot in the spring with boscalid with great success. The golf course superintendent at the public, 18-hole Bunker Hill Golf Course in Medina, Ohio, applies it only once in the spring, and that typically gets him through the year. “We might get a small outbreak in the fall, but we can accept that,” he says.

Ted Cox combats dollar spot on bentgrass/*Poa annua* greens with a preventive program. The superintendent at



Scott Brickley discovered a successful program to combat dollar spot at his Ohio course.

tries apt to cause resistance.”

On the other hand, Gurke uses the fungicides least prone to resistance most, such as chlorothalonil, which he says offers strong contact control of several turf diseases.

Gurke never tank mixes the same systemic products from one spray to the next. He also avoids using DMIs from July through mid-August.

“They can get a little hot and cause some phytotoxicity,” he says.

Gurke also believes resistance is less apt to occur if fungicides are sprayed at longer intervals. Ten applica-

tions of the same product will not be at risk of resistance as much as 20 applications.

“If you’re spraying every two weeks between applications regardless of conditions, you’re setting yourself up for resistance more than if you’re spraying every three to four weeks,” he says.

Walter says chlorothalonil has become the cornerstone of his fungicide program. Walter witnessed resistant strains of dollar spot on his course’s fairways in 1996. He sprayed propiconazole at the highest rate at three-week intervals, which led to the re-



Scott Kincaid (left) and Dan Walter of Blue Ash Golf Course have put a lot of thought into their fungicide program over the years.

sistance. Walter then had to eliminate a few fungicides from his rotation.

At the time, Walter also began using chlorothalonil, known to offset resistance better than other fungicides.

He uses it every two weeks on fairways and greens.

Walter also tracks his fungicide use from a contact and systemic approach. Contact fungicides control disease by

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the public, 36-hole Running Fox Golf Course in Chillicothe, Ohio, applies propiconazole in spring and alternates chlorothalonil and iprodione throughout the summer.

“Every now and then dollar spot gets ahead of me, so I use a higher rate of what I already use,” he says.

Weather is a big factor that determines how Bill Hamilton treats dollar spot, which isn’t a significant problem for him. If Hamilton, the superintendent at the 36-hole Silverado Country Club and Resort in Napa, Calif., sees a couple of patches of dollar spot, he looks at the weather report, which will determine whether he’ll apply a fungicide.

“In the past, I’ve taken a cup cutter and removed dollar spot without applying a fungicide,” he says.

Brickley had a problem with anthracnose when he arrived at Bunker Hill 15 years ago. He learned what greens were susceptible, then removed trees to open up air movement and created programs to combat anthracnose. Originally, he used thiophante methyl, a curative fungicide. Then he changed the program to more of a preventive one — more of a summer stress program — that includes chlorothalonil and fosetyl-aluminum. Now, anthracnose is a secondary disease.

More than dollar spot or anthracnose, Hamilton’s main concern disease-wise is snow mold. With the wet northern California weather, snow mold rears its ugly head regularly.



A good preventive plan is the best way to control dollar spot in the summer, says Jeff Corcoran.

Hamilton treats greens and tees only with PCNB (pentachloronitrobenzene) around Thanksgiving because he’s in the process of converting the cool-season turf in the fairways to warm-season turf.

“Right now, snow mold affects the *Poa* in the fairways, but I don’t care what happens to the *Poa* because I want to get rid of it,” he says.

The one PCNB application is enough for the year if the winter is fairly dry. If the winter is wet, Hamilton retreats the greens and tees and with iprodione, fludioxonil or polyoxin D zinc salt once a month through March, or even into April, because the weather still can be cold and damp then.

“Snow mold will do its thing regardless of the turf’s health,” he says.

Hamilton says he has no problems with summer diseases. He’ll get Waitea patch in the spring occasionally and take a curative approach. “We can see it coming because all my guys know how to scout,” he says.

On top of that, Waitea patch cleans up easily, Hamilton says.

“It’s more of an aesthetic problem to me,” he says. ■

Walsh is a contributing editor to Golfdom.

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BARB CORWIN

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killing it on the surface of the plant. Systemic fungicides are absorbed in the plant and kill disease from within. Walter mainly uses contact fungicides on greens. He rotates in DMI fungicides, which are systemic and last longer, about every second or third spray. Walter has discovered that newer DMIs, specifically strobilurins, offer excellent control for dollar spot.

“When I spray a strobilurin at a high rate, I know I’ll get three weeks of control out of it,” he says.

Walter doesn’t use the same fungicides from year to year, which also helps control resistance. This plan also gives him the opportunity to try new products in the rotation, Walter says.

Athy’s biggest turf disease threat is pythium in July and August. He relies on systemic fungicides, such as propamocarb and mefenoxan, to control it.

Athy says he uses fungicides he’s most confident in during times of highest disease pressure. He then rotates in other products gradually.

How does Athy gain confidence in fungicides?

Through use, for sure, but also through feedback from other superintendents as well as manufacturers.

Speaking of the latter, Athy commends manufacturers for introducing combination products to the marketplace. Several of the products contain contact and systemic fungicides.

“It’s helpful to have products like that in one solution,” Athy says. “Then you can attack a disease on two fronts at once.”

Athy is also impressed with many of the new fungicides, citing their low rates and toxicity.

“They’re much more user-friendly and there are less concerns about re-entry,” he says. “Those are the products you want to gravitate to.”

Athy sprays on a three-week rotation during the summer or high-stress period of the year. He elects to spray the highest amount of active ingredient the label allows to get the maximum time span out of it.

Athy has seen some superintendents spray the lowest rate and then try to stretch it. But they get burned because the product



If you notice that a fungicide isn’t as effective, then turf resistance may have begun.

loses its effectiveness.

How do superintendents know when disease resistance occurs? There are telltale signs, Athy says.

It begins with the length of control. If you notice a fungicide you’ve been using at a particular rate isn’t as effective for as long as it should be, then disease resistance has begun. When disease begins to occur, you know the product has lost its effectiveness.

“Then you have to get it out of the rotation for awhile,” Athy says.

Athy stresses that superintendents shouldn’t try to figure out fungicide rotation on their own. They should consult reference materials supplied by university researchers and chemical companies. They should also

keep up on trends and new research, which can reveal new rotation methods, not to mention link fungicides to other matters concerning plant health.

Regarding the latter, James Brosnan, Ph.D., assistant professor of turfgrass science at the University of Tennessee-Knoxville, says initial greenhouse trial work in newly established creeping bentgrass of PennCross and A1 indicates that pyraclostrobin-containing fungicides improve numerous facets of creeping bentgrass rooting. Brosnan emphasizes that this is only greenhouse research on newly established bentgrass and results on mature bentgrass could be dramatically different.

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Culturally speaking

While Athy doesn't take fungicides for granted, he doesn't hang his hat on them to control disease and other pests. He realizes the importance of sound cultural practices, especially when it comes to irrigation, to also control disease. He watches closely the correct time to water and how much to water, depending on the time of year. He's always monitoring leaf wetness.

Athy says fairway topdressing has helped control disease. He admits he thought fairway topdressing was "excessive" when he began the program a few years ago.

"But I saw the benefit of it after one year," he says. "And since we have the money to do it, I think it's a great tool to help keep the fairways dry, which cuts down on disease pressure."

Of course, cultural practices such as irrigation, aerification and fertility have their own set of methods for mastering. Just ask Gurke.

To offset injury on greens, Gurke has cut back on mowing. But knowing he still has to keep greens fast, Gurke is rolling them more often, which has also enabled him to raise the height of cut. He spoon-feeds the greens with one-tenth a pound of nitrogen every few weeks to help keep them growing.

Gurke believes most disease outbreaks happen not as a result of not being

protected by fungicide, but because turf is in poor physiological condition. Gurke says superintendents are often their own worst enemies when it comes to plant health.

"We put sand on one-tenth of an inch of grass and then brush it around in 85-degree weather," he says. "That's not the smartest thing to do to keep turf healthy."

Walter has introduced several cultural practices, including topdressing and verticutting for thatch removal. He and his crew core aerify twice a year and deep-tine aerify three times a year during the summer months. Walter has also increased nitrogen fertility steadily for the past five years and applies nitrogen every seven days on greens at a half-pound an acre.

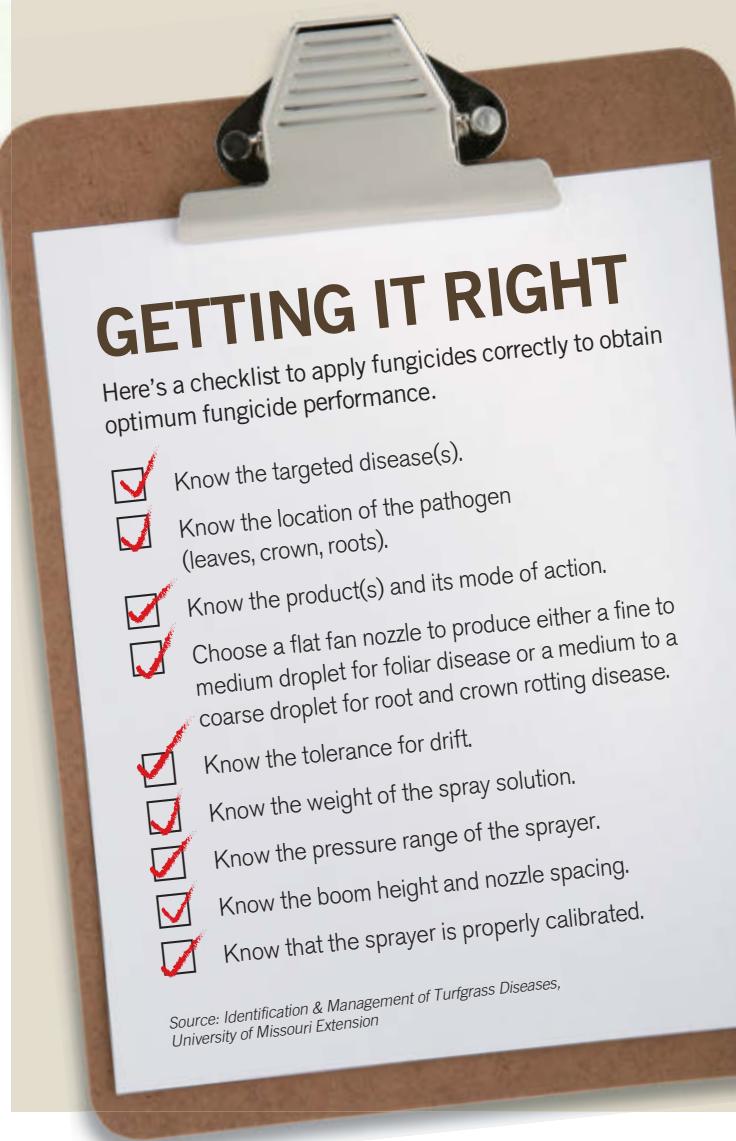
"I did get lean there for awhile when the trend was to go with less nitrogen," he says. "But that came back to bite me because dollar spot became worse."

Lasting advice

Athy, who has been a superintendent for 30 years, knows a lot of things about a lot of things, especially fungicide programs.

"A lot of the knowledge I have came from the school of hard knocks," Athy says. "You learn from experience — what works and what doesn't work."

For instance, Athy advises younger superintendents to take it slow with new fungicides while they're breaking



them into their programs.

"It's important to get a feel for how they perform," he says.

Gurke is big on keeping spraying records and using them. He keeps notes about good things and bad. For a superintendent who's starting a job at a new course, "there's no better starting point than history," Gurke says.

Of course, it all depends on why the new superintendent is there and whom he or she is replacing.

If the new person is replacing someone who retired after 30 years and was adored by members because he or she

had the best greens in town, then the new superintendent should probably stay with the old person's program, Gurke says. If the new person is replacing someone who was fired because of poor conditions, then the new superintendent may want to start at square one with a new fungicide program. But even then it wouldn't hurt to glance at the previous person's records to figure out what went wrong and if products were overused and resistance became a problem.

It's just another part of getting with the fungicide program. ■