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Count on it.

With the announcement of the architect for the 2016 Olympic golf course in Rio de Janeiro, Brazil, the construction and establishment phase for the golf course will begin shortly. No doubt the excitement will be high over the next few years here and abroad on this interesting story. But I will be most interested in how the course handles the way turf and ornamental products are registered, labeled and used.

In the United States we accept that the EPA and state registration of a new product — especially a pesticide — can be an arduous process, especially for turf and ornamental products. However, we have a high degree of confidence that, once labeled, the product will work according to labeled directions and be considered safe (or low risk) to the user and the environment.

Globally, pesticide registration and labeling of agriculture products is a structured, well defined process. However, when it comes to the registration of turf and ornamental products, the process is often haphazard or non-existent.

It is extremely frustrating to go into a country that may have a pest problem and find that there are very few, if any, products labeled for turf. In many countries the product is available for agricultural use but there's no telling of the legality on turf. Where illegal to use many golf course superintendents have little to fight against the continual attack from disease, insect and weed pests.

In countries where agricultural products are allowed for use on turf and ornamental, what are the issues? Imagine yourself as a superintendent where you can only use agricultural chemical products. First you would need to determine the turf rate compared to the rate used on corn, soybeans or some other row crop on the agricultural label. Often this might consist of visiting the company's United States website to look for the turf label. You would then try to interpret the rate, given formulation differences and whether the rate is higher or lower than that recommended on the agricultural product. And if there is a significant difference, what does that mean?

A Concern for Global Golf

BY KARL DANNEBERGER



WHEN IT COMES TO THE REGISTRATION OF TURF AND ORNAMENTAL PRODUCTS GLOBALLY, THE PROCESS IS OFTEN HAPHAZARD OR NON-EXISTENT.

Now imagine that you are interpreting the company's United States turf and ornamental label with English as your second language. Now combine the potential language barrier with how we express units. Here in the United States we mainly use English units while most of the rest of the world uses metric units.

What about differences in formulation? Although the active ingredient may be the same between an agricultural and turf and ornamental product, the formulation often varies. Formulation differences in part might be due to where the product is used. For example, if you are formulating a product to be used in the middle of a 2,000-acre corn field what you can tolerate regarding plant safety, drift, or efficacy is considerably different than if you are spraying around gardens, ornamentals, on short-cut turf or in the presence of golfers.

I think you can now appreciate why many international golf course superintendents placed in the situation of using an agricultural product get extremely worried should they make the wrong interpretation, assumption or rate conversion.

How countries structure product registration will be one important aspect if golf is to continue to grow internationally in a sustainable manner. The lack of a registration process exposes golf negatively through a lack of product stewardship. Although we do not like government intrusion into our lives, it is the duty of governments to provide legislation that governs the safe use and environmental protection that will help golf's growth internationally be sustainable.

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

PLANT HEALTH: THE ROOT OF THE MATTER

PART ONE OF A THREE-PART SERIES

Golfers understand some of what goes into maintaining and caring for a golf course. But really, what they see is just the tip of the iceberg.

They might see the crew blowing off walkways near the parking lot, or syringing greens on a hot day. But they rarely see the effort that happens in the early morning hours. Or the planning that goes into keeping the turf healthy. They aren't aware of the hours of research that's involved.

They just see the tip of the iceberg.

Likewise, when golfers golf, they're playing on the tip of that iceberg. Below that beautiful fairway, green or tee is a root system working to keep the plant alive. Golfers don't see it, but it's there, and it's just as important as what they're hitting off of.

Golfdom, in partnership with BASF Professional Turf and Ornamentals, is proud to once again bring readers the three-part Plant Health Series. In this series, we're asking superintendents what they're seeing when they look at "the root of the matter." As in, the roots of their turf.

Part one begins this issue, while parts two and three will be coming in our May and June issues.

It might be the tip of the iceberg to golfers, but to superintendents? It's the root of the matter.

PHOTO COURTESY: FAIRVIEW CC

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The Root of Plant Health

Superintendents have the tough job of managing and modifying turfgrass physiology. Golf course turf often exists on the edge of viability because it has less leaf area than unmanaged turf — and faces additional stress from foot traffic, mower blades, heat, drought and humidity. Superintendents typically focus turfgrass management practices on the top half of the turf plant because that's what people see. But focusing on the root system may help improve aboveground performance.

To gain better insight into the role roots play in plant health, I spoke with Dr. Christina Wells, associate professor in the Department of Environmental Horticulture at Clemson University and a plant physiologist.

Root Functions and Size

"Turf roots are a thick, fibrous mass that can be very challenging to work with," said Dr. Wells.

Root system size is influenced by many factors, including the availability of water and nutrients. If water and nutrients are abundant in the soil, then roots won't branch out to find additional resources. There is little point in investing additional biomass and energy to get water and nutrients if they are readily available.

"Turfgrass roots are very efficient at finding water and nutrients," said Dr. Wells. "Think



BY KATHIE KALMOWITZ, PH.D.

of roots like a factory. If you can get the job done with two or three machines, why would you invest in more? Roots are the same way. The plant invests in the amount of root mass its needs and no more."

Another factor affecting root system size is the removal of material from the top. Mowing turfgrass takes away above-ground biomass, and the plant responds by replacing lost shoot biomass rather than into growing more roots. Above-ground environmental stresses such as high temperature also impact root size: repairing stress-related damage uses carbon that might otherwise be used to help grow the root system.

Disease Control and Plant Health with Intrinsic Brand Fungicides

Research from BASF Professional Turf & Ornamentals shows that Intrinsic brand fungicides (active ingredient: pyraclostrobin) control a broad spectrum of diseases, as well as providing plant health benefits. Intrinsic brand fungicides control fungal diseases by affecting the ability of the fungi to grow and colonize turfgrass.

In addition, they allow the plant to use photosynthetically fixed carbon more efficiently, reducing respiration and increasing growth, particularly under stress. Laboratory and field research from BASF has demonstrated pyraclostrobin-based fungicides improve plant nitrogen usage and improve photosynthetic efficiency.

"Last year at Clemson, we did a greenhouse trial where we applied Intrinsic brand fungicides to turf that was well-watered and turf that was drought stressed," said Dr. Wells. "When we applied these products on the stressed turf, we saw greater root growth and greener tops compared to untreated turf. With sufficient water, treated and untreated turf were similar."

Read part 2 of "The Root of Plant Health" in the next issue of *Golfdom* and learn more about Intrinsic brand fungicides at www.IntrinsicPlantHealth.com and other BASF Professional Turf & Ornamentals innovations at www.betterturf.basf.us. ■

Kathie Kalmowitz, Ph.D., is Technical Specialist, BASF Professional Turf & Ornamentals.

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Intrinsic brand fungicides don’t just fight disease; they give turf the resilience to endure stress. Find out more at IntrinsicPlantHealth.com.



HEALTHY PLANTS, HEALTHY MINDS

When plants get stressed, healthier roots help keep superintendents at ease.

BY STEVEN TINGLE

The city of Sugar Land, Texas lies 20 miles southwest of Houston in a part of the gulf coastal plain defined as humid subtropical. At the mercy of the prevailing winds from the south and the warm waters of the gulf, this particular part of Texas experiences weather so unpredictable 15 inches of rain in one month is just as normal as six months with none at all. For a weatherman this may be frustrating but for those managing golf courses in the area it's an exercise in adaptation.

Chris Lineberger, the golf course superintendent at Sugar Creek Country Club in Sugar Land, knows better than to try to predict the weather. "You never know what exactly you're going to get from year to year," he says. Sugar Land saw 18 inches of rain total in

2011, but that's no indication of a trend. "January and February this year we've had 19 inches so far," he says. "It is a unique growing environment to say the least."

It is in this unique environment that BASF asked Lineberger to experiment with Honor Intrinsic brand fungicide, one of just a handful of turf fungicide products adorned with the recent EPA approved "plant health" labeling.

"We are always open to any kind of experiment around here," Lineberger says. The experiment consisted of treating the back nine greens with Honor Intrinsic fungicide and the front nine greens with a similar product but lacking the "plant health" benefits. "The purpose of the study was to go through and determine whether or not the recovery was going to

be quicker with the Honor Intrinsic versus the other product and also what the difference was in the root mass post aerification," Lineberger says.

The results were not immediately noticeable, at least not above ground. "Visually it was hard to really see much difference between the two, but after the aerification healed up and we pulled samples, especially in the side by side, the root mass difference between the two was significantly different and that was pretty eye-opening."

Below the surface

Lineberger and his staff noticed the roots of the nine greens

treated with Honor Intrinsic were healthier than the greens treated with the fungicide lacking the plant health bonus. In fact a few of the nine greens treated with the non plant health fungicide were splotchy and exhibited signs of stress. "It was nothing significant," Lineberger says, "we had a root pathogen working on a couple of those greens and we didn't have anything on the back nine."

Were the plant health promises of the Honor Intrinsic fungicide the key? "Maybe it's just us managing everything much better. It's hard to pinpoint exactly what's creating the success we've been able to have," Lineberger says. "Visually I can't see a big difference, but below the surface we've definitely been able to see it."

"We've got believers popping up all over the country," says Tom Hill, communications manager, specialty



Chris Lineberger,
superintendent,
Sugar Creek CC

The Lure of Turf

As many superintendents know, sometimes the golf business chooses you.

Chris Lineberger is sometimes surprised to find himself on a golf cart, or sprayer, or in front of a camera as a chemical company films a testimonial (to see Lineberger's YouTube video interview visit www.youtube.com/watch?v=-epotgnetFw or www.golfdom.blogspot.com).

Golf course management was certainly not Lineberger's original career path. "Does anybody actually decide the golf business is for them?" he asks.

A native of Memphis, Lineberger dreamed of a career in law. But in his freshman year as a pre-law/criminal justice major at Mississippi State University, he accepted a summer job on a golf course maintenance crew, which ultimately led to a change in plans.

"I ended up enjoying working on a golf course and I was already attending Mississippi State, which at that time had one of the best turf programs in the country. I met with a couple of advisors and they said take a couple of classes and see what you think. So I did and I actually enjoyed going to class. It just kind of all came around."

Now in his fourth year at Sugar Creek CC, Lineberger realizes the golf business requires the same quick thinking as the court room.

"Obviously as superintendents we adapt to anything that's thrown at us. We're pretty good about that," he says. "We can take the hand we're dealt and run with it." — S.T.

products for BASF, who first witnessed the plant health advantages of a BASF fungicide in the agricultural industry. "The benefits on the crop side are very evident — people have set records by timing the spray of these fungicides the right way. They've got larger fruit coming, greater yield on almost every tree, nut and vine crop it's applied to. Of course that means dollars to a farmer," says Hill.

But what does that mean to the superintendent whose success is not measured in bushel baskets? "That was

what was stumping us," says Hill, "because no one was going to say, 'This will give you more grass to cut.'"

The measured benefits came not in terms of more turf but in healthier, more robust root systems that endured stress more effectively than standard fungicide treated turf. "If the stress wasn't there the turf would look good," says Hill, "but we realized the difference was when the stress was there the turf looked better longer, it weathered the stress or recovered faster, even from things like mechanical stress, we saw holes closing up

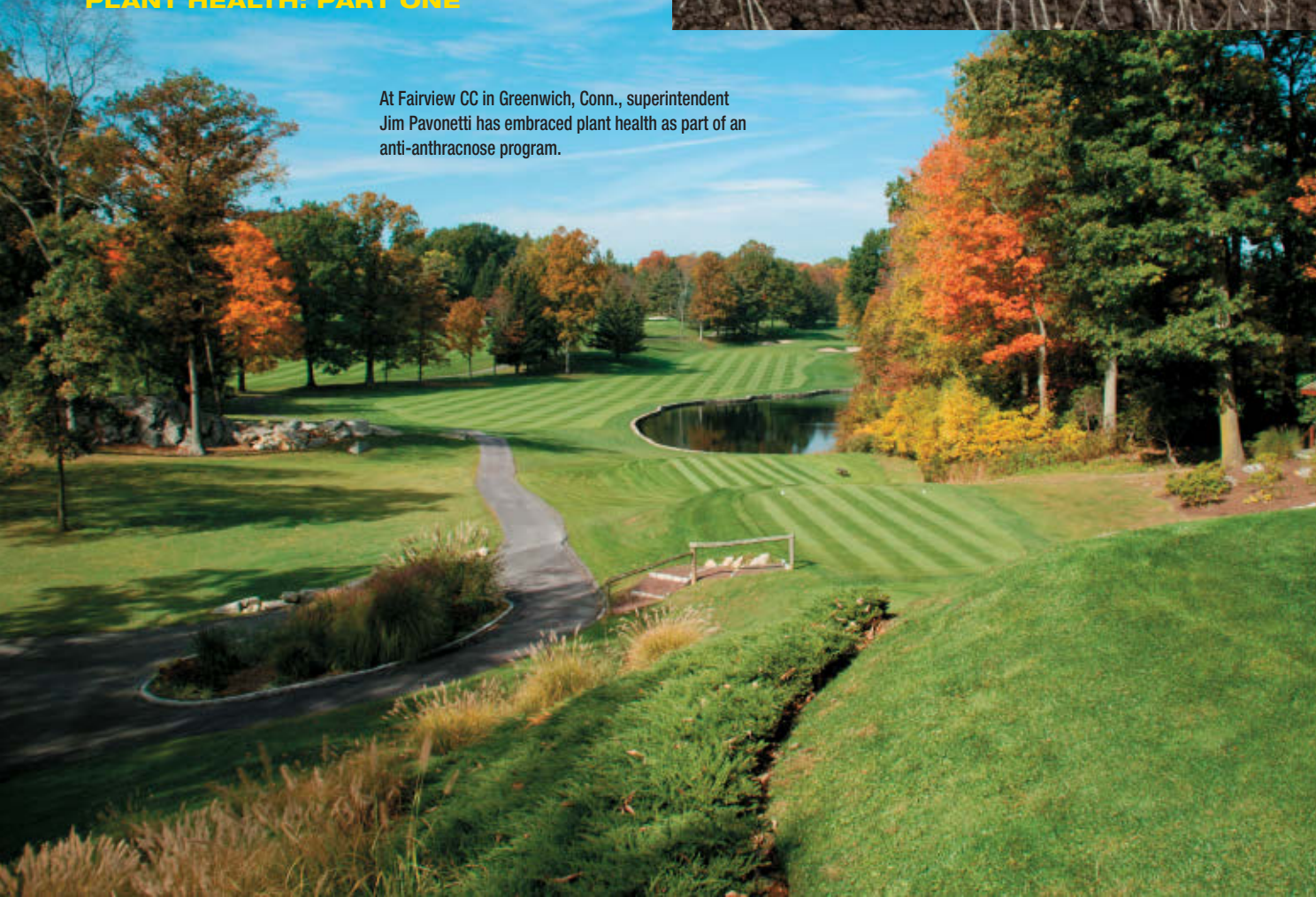
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The back nine greens were treated with Honor Intrinsic brand fungicides while the front was not. "The root mass difference between the two was significantly different," Lineberger says.



At Fairview CC in Greenwich, Conn., superintendent Jim Pavonetti has embraced plant health as part of an anti-anthracnose program.



Continued from page 17
from aerification faster.”

These claims of healthier root systems and enhanced tolerance to stress fall under the “plant health” wording, which was first approved by the EPA in 2009. The EPA requires a whole lot more than a “please” to agree to changes in label wording.

“Whenever you bring a product to registration for the EPA you’ve got to have replicated data,” says Hill. “No matter what it is, if you’re saying you’re curing a disease or preventing a disease or eradicating a weed you’ve got to have data that says you’ve done it in replicated trials over a number of years.”

BASF used its years of data from the agricultural industry to supplement its data for turf. “We were fortunate in that the same active that we have in the turf and ornamental side is an active that’s used in the agricultural crop side,” says Hill.

Plants are plants are plants

Even though Intrinsic brand fungicides are not labeled for use for plant health benefits in the absence of disease, some agricultural and turf professionals are concerned about their potential misuse.

In early 2009 a letter signed by 46 university plant pathologists, agronomists and IPM managers was sent to the

EPA requesting the agency rethink its approval of the “plant health” supplemental labeling for Headline fungicide, which is used in the agricultural industry. They were concerned this type of labeling language could start an avalanche of similar labels and a confusion of what a product is treating and why it should be applied. It’s a concern some superintendents feel might be overblown.

Brandon Reese, superintendent at the AT&T Oaks course at the TPC San Antonio has not used any of the fungicides labeled for “plant health” but believes the concerns of misuse might be exaggerated. “I can maybe see that a little bit,” says

Reese, “but I think we have a lot of really responsible professionals in our industry.”

Hill is confident in superintendents’ ability to determine the appropriate use of fungicides at their facilities and whether or not the added plant health benefits are worthwhile. “We stress that it’s a fungicide first and discourage people from using it for the plant health benefits only,” says Hill. “At the end of the day plants are plants are plants and superintendents are trained agronomists and can draw their own conclusions.”

Many superintendents have already drawn those conclusions, and they are generally positive. Chuck Connolly,

Do Supers Appreciate Plant Health?

“Definitely.”

“Whether it’s preventative or curative, with the financial strains that are put on golf courses now, if you can put something out there preventively that’s going to also help your turf during the stressful times **you’re definitely helping yourself.**”

CHUCK CONNOLLY,
superintendent,
Greenville (S.C.)
Country Club



“It’s definitely worth the option. I see the value in it. **You can definitely see a difference in the health of the plant.**”

JIM PAVONETTI, superintendent,
Fairview Country Club,
Greenwich, Conn.



“**There is definitely value there,** and the research to back it up. It’s certainly going to help efficiency.”

ADAM BAGWELL, CGCS,
Cane Creek County Club,
Boise, Idaho



superintendent at Greenville (S.C.) Country Club, says he is always searching for better and more economical ways to care for his turf.

“When you’re spraying a fungicide you’re chasing after diseases or keeping diseases at bay the best you can,” Connolly says. “Whether it’s preventative or curative, with the financial strains that are put on golf courses now, if you can put something out there preventively that’s going to also help your turf during the stressful times, you’re definitely helping yourself.”

Clay Dubose, CGCS, superintendent and general manager of the Tradition Golf Club in Pawley’s Island, S.C., agrees. “I just feel like it is an added bonus to a product that you would already be applying,” says Dubose. “It’s pretty much like the concept of killing two birds with one stone.”

Adam Bagwell, CGCS, superintendent at Cane Creek County Club in Boise, Idaho echoes that sentiment. “There is definitely value there, and the research to back it up. It’s certainly going to help efficiency.”

“It’s definitely worth the option,” says Jim Pavonetti, superintendent at Fairview Country Club in Greenwich, Conn., who embraces plant health as part of an anti-anthraxnose program. “I see the value in it, you can definitely see a difference in the health of the plant.”

Andy O’Haver, assistant superintendent at Meadowbrook Country Club in Northville, Mich., feels these new plant health products will eventually become commonplace.

“I think these products are a glimpse of the future,” says O’Haver. “A future where pesticides are the last ditch effort and overall plant health is the norm.”

Future of plant health

The future of the “plant health” label seems secure as manufacturers continue to research, test and develop new products. Bayer now offers two fungicides, Interface and Reserve, with EPA-approved “plant health” claims and BASF plans to expand its Intrinsic line of products, which currently consists of Honor and Insignia SC fungicides, to include formulation enhancers and formulation technology. For the ornamentals market, BASF will soon launch Pageant Intrinsic brand fungicide with the same label language for disease control and plant health.

As more research and data becomes available, an increasing number of turf professionals are adding these “plant health” labeled fungicides to their arsenal.

“It’s not something I would rely solely upon, but it’s another tool that we can use to help us combat some of these issues we face on a daily basis,” Lineberger says.

Others are noticing the stress relief and health benefits apply to more than just their turf. Dubose sums it up best: “If the greens are healthier and happier, then so am I!” ■

Steven Tingle is a writer, speaker and consultant based in Asheville, N.C. Contact him at tingle@steventingle.com.



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