



The plots were rated for both color and surface quality (without regard for color) separately. Stressing the turf for anthracnose trials often results in poor color but not necessarily poor surface quality (without regard to color) if the fungicides applied are effective.

(Trt 1) and the untreated fertilizer control (Trt 14). Nine of the fourteen fungicide treatments had average disease cover ratings of 0.2 percent or less on Sept. 6th. Three more fungicide treatments had average disease cover ratings of 0.5 percent or less on Sept. 6th. Only two fungicide treatments had average disease cover ratings over 1 percent on Sept. 6th: A8574D (Trt 5) with 1.4 percent disease cover, and Pillar G (Trt 15) with 1.6 percent disease cover.

Because of the low fertility level, the color of the plots was generally lower than what one would normally see on a high-end golf course. However, the color was surprisingly good on many

Table 2. Percent Disease Cover

Trt #	Product (s)	Rates	7/12	7/25	8/09	8/23	9/6	Avg.
1	Untreated	na	0	0.8	2.8	6.9	8.0	3.7
2	Briskway alternated w/ Daconil Action	.62/3.5	0	0.0	0.1	0.0	0.1	0.0
3	Briskway alternated w/ Daconil Action	.50/3.5	0	0.1	0.1	0.1	0.1	0.1
4	A8574D	0.22	0	0.1	0.1	0.6	0.5	0.3
5	A8574D	0.42	0	0.0	0.1	1.4	1.4	0.6
6	A18281A	1.0	0	0.0	0.0	0.1	0.3	0.1
7	A19858A	0.6	0	0.0	0.0	0.1	0.1	0.1
8	Briskway + Daconil Action	.62+3.5	0	0.0	0.0	0.0	0.2	0.0
9	Briskway + Daconil Action	.50+3.5	0	0.0	0.0	0.1	0.2	0.1
10	Bayer Rotation 1	See Above	0	0.0	0.0	0.1	0.0	0.0
11	Bayer Rotation 2	See Above	0	0.0	0.0	0.0	0.0	0.0
12	Torque + Spectro alt. with Affirm + Spectro	.60+3.75/.90+3.75	0	0.0	0.0	0.1	0.1	0.0
13	BASF Rotation 1	See Above	0	0.0	0.1	0.1	0.0	0.0
14	Fertilizer Check	.20 lbs. N	0	0.5	2.1	3.1	4.8	2.1
15	BASF - Pillar G (48 oz)	48	0	0.1	0.1	1.4	1.6	0.7
16	BASF - Headway G (64 oz)	64	0	0.2	0.3	0.4	0.4	0.3
		LSD@ .05	ns	0.2	1.0	1.8	1.8	na

Real Science

treatments. Treatments that included pigments (Trts. 10 & 11) scored the highest in the color ratings on average, although the color dropped slightly after a DMI fungicide was

applied. Also, color ratings were negatively impacted by disease. Six fungicide treatments had an average color rating of 6.7 or higher throughout the trial. These included the two

Bayer rotations, Torque mixed with Spectro 90 alternated with Affirm mixed with Spectro 90, Briskway (.62 oz.) alternated with Daconil Action, and the two treatments of Briskway mixed with Daconil Action. The fertilizer check had an average color rating of 6.8.

The color ratings were generally lower than the surface quality ratings because the stresses imposed on the plots had a larger impact on color than surface quality.

The surface quality of most of the plots treated with fungicides was excellent. On Sept. 6th, 10 of the 14 fungicide treatments had a surface quality rating averaging 7.1 or higher. Of those, five had a surface quality rating or 7.8 or higher, which included the two Bayer rotations, Torque mixed with Spectro 90 alternated with Affirm mixed with Spectro 90, Briskway(0.50 oz.) mixed with Daconil Action, and Briskway (0.62 oz.) alternated with Daconil Action. **GCI**

Brian McDonald is a research assistant at Oregon State University.

Table 3. Color 1 – 9; 9 = dark green

Trt #	Product (s)	Rates	7/12	7/25	8/09	8/23	9/6	Avg.
1	Untreated	na	6.4	5.4	5.0	5.1	4.5	5.3
2	Briskway alternated w/ Daconil Action	.62/3.5	7.1	6.9	6.1	6.9	6.8	6.8
3	Briskway alternated w/ Daconil Action	.50/3.5	6.5	6.3	5.8	6.8	6.5	6.4
4	A8574D	0.22	6.3	5.8	5.0	6.0	5.5	5.7
5	A8574D	0.42	6.4	5.6	5.0	6.5	6.1	5.9
6	A18281A	1.0	5.9	5.6	4.6	6.3	6.3	5.7
7	A19858A	0.6	6.4	6.0	4.6	6.8	7.0	6.2
8	Briskway + Daconil Action	.62+3.5	6.9	6.6	6.0	6.8	7.0	6.7
9	Briskway + Daconil Action	.50+3.5	6.9	6.9	6.0	7.3	6.9	6.8
10	Bayer Rotation 1	See Above	7.3	6.4	6.1	7.4	7.6	7.0
11	Bayer Rotation 2	See Above	7.5	7.0	7.3	7.6	7.4	7.4
12	Torque + Spectro alt. with Affirm + Spectro	.60+3.75/.90+3.75	7.0	6.8	6.6	7.4	7.1	7.0
13	BASF Rotation 1	See Above	6.0	6.6	5.8	6.6	7.4	6.5
14	Fertilizer Check	.20 lbs. N	7.4	7.0	7.0	6.8	5.8	6.8
15	BASF - Pillar G (48 oz)	48	6.5	5.9	5.0	6.3	6.1	6.0
16	BASF - Headway G (64 oz)	64	6.3	5.5	5.6	7.0	6.6	6.2
		LSD@ .05	0.6	0.7	0.8	0.9	1.1	na

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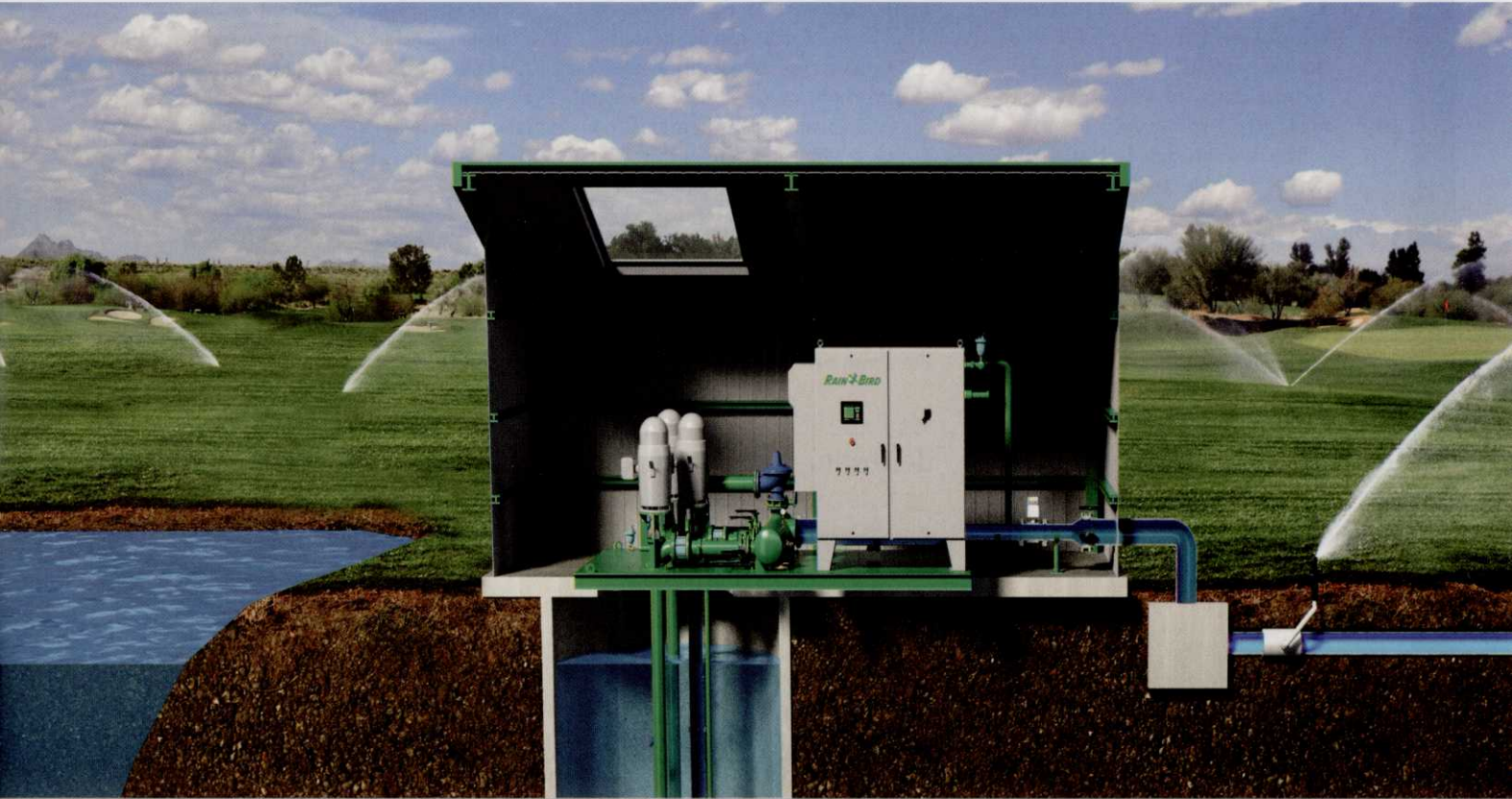
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John E. Kaminski, Ph.D. is an associate professor, Turfgrass Science, and director of the Golf Course Turfgrass Management Program at Penn State University. You can reach him at kaminski@psu.edu.

WHY PUSH WHAT YOU CAN'T DEFINE?

Remember when we used to talk about “IPM” programs? Integrated Pest Management was the standard phrase for all of the care and attention towards the environment when it came to managing golf courses.

The new buzzword? Sustainability. The word gets dropped by many superintendents and companies trying to market their products for use in our industry. While I’m a huge fan of the idea of sustainability, I am often confused by exactly what is meant by the term.

I have asked many people to define sustainability, only to receive various definitions... in addition to a few blank stares. Andrea Li, assistant golf superintendent at Connaught Golf Club in Canada, said sustainability is designed “to preserve the longevity of the golf course environment for our future generations of golfers.”

Via Twitter, @Aquatrols relayed the International Golf Federation’s definition of sustainability as “Optimizing the playing quality of the golf course in harmony with the conservation of its natural environment under economically sound and socially responsible management.”

In my opinion, sustainability is no different than IPM. In integrated pest management we utilize all resources available to us to provide a product. We take into account the economy as well as the environment. Isn’t this similar to maintaining a course in a sustainable way?

As I see it, the problem doesn’t lie in the definition of the word, but rather the varying opinions of what it means to the individual. I’m guessing if you ask a superintendent and an anti-golf environmentalist what it means, you’ll get two very different answers. In other words, there are varying degrees to which people will

consider themselves to be managing turfgrass in a sustainable manner. Due to these differences, the debate over what is sustainable can get heated.

The idea of sustainability is one that many people are passionate about and for that reason “push” their ideas on others. It’s like an argument about religion or politics. The problem is there is no right answer. Different people are going to have varying ideas and beliefs on whether they are sustainable in their management practices.

Let me use the vegetarian example. For about two years in college I de-

U.S. superintendents. Yes, they may use fewer pesticides (due primarily to weather-related circumstances) than a mid-Atlantic superintendent, but many of them still use pesticides to some degree. So do uncontrollable climatic differences make one turfgrass manager more sustainable than another?

If we accept that varying climatic conditions define sustainability, then we should probably shut down every desert course. Surely, the use of irrigation for the game of golf can’t be considered sustainable can it?

As I see it, the problem doesn’t really lie in the definition of [sustainability], but rather the **varying opinions** of what it means to the individual.

ecided to become a vegetarian. During this period I gave up all meat except for fish. People were always curious about my decision and it invoked a lot of discussion. My meat-eating friends would make fun of my food choices, while others would say I wasn’t “really a vegetarian” because I ate fish. The best discussion involved a vegan who told me and a “true vegetarian” that neither of us were doing it right. I didn’t know there was a wrong way.

The bottom line is everyone has different degrees to which they consider themselves sustainable, but most if not all of us practice some level of sustainability in our management practices. So why do people push their practices on others when most can’t even agree on a definition?

In some cases it’s a superintendent’s philosophy and passion. I see this often with greenkeepers in the UK. They are passionate about their sustainable management practices, but in many cases I can’t really see what they’re doing differently from

The answer is there are costs and benefits for everything. If we were truly sustainable we would all walk to work, grow our own food, and consume only what was necessary. We surely wouldn’t drive our gas-guzzling trucks, eat store-bought food, or indulge in anything considered unnecessary to sustain our lives.

Although it may seem like I’m anti-sustainability, the exact opposite is true. I feel we all can improve our management practices through proper IPM strategies. However, we should stop worrying about why others don’t do it like us and focus on what we as individuals can do in our specific cases. What is considered sustainable at a Minnesota muni course is not going to be the same at a West Chester, N.Y. private club.

Superintendents should work together to share programs and discuss what really works. If so, then the industry will continue to improve. We must stop placing one definition on sustainable turfgrass management. **GCI**

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Travels With Terry

Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He shares helpful ideas relating to maintenance equipment from the golf course superintendents he visits — as well as a few ideas of his own — with timely photos and captions that explore the changing world of golf course management.



Terry Buchen, CGCS, MG, is president of Golf Agronomy International. He's a 41-year, life member of the GCSAA. He can be reached at 757-561-7777 or terrybuchen@earthlink.net.

VERSATILE FORMER GOLF CART

The 27-hole Grandee Nasu Shirakawa Golf Club in Fukushima Prefecture, Japan, is the only golf course in Japan designed by Robert Trent Jones, Sr., who was assisted by Roger Rulewich, in 1995. Shigeto Hayashi is the golf course superintendent. This Yamaha Turf Mate was formerly used by women caddies to transport four golf bags around golf courses in Japan, where this type of vehicle was ultimately replaced by traditional four-wheel golf carts. Hayashi purchased it used about 10 years ago, along with four spare wheels and tires, for approximately 10,000 Japanese Yen (\$100 U.S.). It was then modified by removing the upper golf bag holder frame and installing the round plastic case and supports and the hooks for the topdressing drag mat to be attached to, which cost about 2,000 JY (\$20 U.S.). The greenskeeper operates this vehicle standing up and it is used for course setup, dragging in topdressing, dragging the dew off of the fairways, etc. It took about four hours to modify it.



CAPILLARY CONCRETE TEST BUNKER

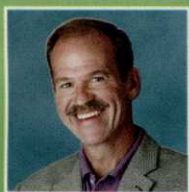
Capillary Concrete (CC), the unique pervious concrete-based bunker liner that is designed and manufactured in Sweden by Martin Sternberg, CGCS, is now being tested by Stephen Ehrbar, CGCS, director of golf course maintenance, and Nick Sabatino, assistant director of golf course maintenance, at the Jupiter Hills Club in Jupiter, Fla. The chipping green was initially built with a native sugar sand base, which is quite soft, and it needed to be stabilized. Ehrbar and Sabatino decided to test CC on the bunker slopes only so that golfers could walk up and down the slopes, with a new stabilized subsurface base, to play a shot. An 8-cubic-foot concrete mixer was used to blend the equivalent of one cubic yard of light weight porous aggregate (expanded shale or expanded slate, which are manufactured in seven different facilities in the U.S.), six bags of CC and 18-20 gallons of water. The mixture was then spread at a 2-inch consistent depth with a shovel and bunker rake and then it was smoothed-out with a long-handled paint roller. The mixture was allowed to dry for four hours after it was covered with a tarp to keep the sun off of it so it would set-up better. The mixture was tapered into the sub grade at the bottom of the slopes and then bunker sand (that settled to a 2-inch depth) was placed over it. Irrigation and rain water are



draining through the slopes flawlessly and the bunker slopes are now stabilized. CC costs about \$1.10/\$1.15 per square foot, the light-weight aggregate costs about 40 cents per square foot and the installation production was about 130 square foot per labor hour. The mixture was installed in late March and it is performing quite well.

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(MORAGHAN continued from page 30)

One product he likes is sand, and he has increased top-dressing programs for tees, fairways, and putting greens. A lot of sand has been used to get the course dry and firm. Matt thinks this also has allowed him to cut back the use of pre-emergent herbicides, as there's been less weed germination.

Of course, too much sand can lead to leaf surface abrasion and disease, which would require spraying. So Matt doesn't top-dress any playing feature when it's hot because when the turf isn't growing it's more susceptible to injury and sand is abrasive.

Here are a few other sustainable practices in use at Merion:

Cultivation. Solid tine aeration is preferred over hollow core cultivations.

Fertilizer. Once again, less is more, since a fat, happy plant invites disease. Matt monitors growth habits, clipping rates, temperature, soil moisture content, and humidity before deciding to fertilize, apply pesticide, and irrigate.

Tees. Increased top-dressing makes tees firm, which means fewer divots and less over-seeding. Tees are mown with a solid front roller on the mower, not grooved rollers that can waste seed from divot mix by throwing it back into the mower bucket. This practice also preserves seed already on the tee.

Approaches. The greatest increase in top-dressing has been in approaches. Firming up the turf in front of greens enhances Merion's signature bump-and-run shots, but just as important, the golf course is drier and healthier, and the use of chemicals reduced. Using Tri-plex riding mowers reduces labor and the heavier equipment helps keep the approaches firm.

Bunkers. Merion's bunkers are all hand-raked. The crew does very little edging and does not mow bunker edges. They simply trim the seed heads.

Fairways. Starting this past winter, members were asked to hit off little green artificial mats, similar to those used on the Old Course at St. Andrews. Using mats, which attach to members' bags, reduced the number of fairway divots at a time of year when nothing was growing. The mats also helped preserve the turf within specified Open landing zones, which were roped off. The mats were a big success and will likely become club policy for winter play going forward.

Greens. Roll more, mow less. And to promote smoothness and better grooming, the club uses imported (and expensive) yak-hair brooms.

Matt Shaffer is doing some fascinating things at Merion, and I agree with him that most of his practices – except perhaps for the yaks – can succeed at courses throughout the U.S.

Superintendents should tell their green committees and other members to watch this year's U.S. Open very carefully. Besides the stellar play we've all come to expect at our national championship, they will see a great old course in prime condition thanks to a sincere and all-in commitment to sustainability. **GCI**

(IRRIGATION continued from page 46)

- Doing long range and capital planning for replacing irrigation components and doing preventive maintenance to keep pace with technology enhancements that better utilize limited resources.

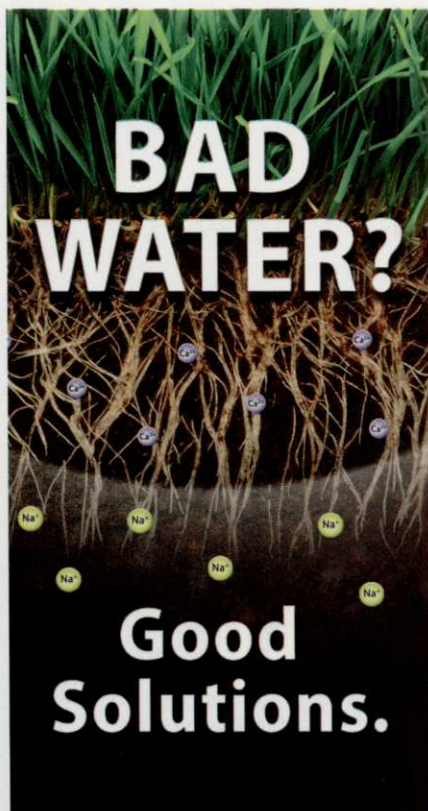
- Investing in more sprinklers to provide more control. More control gives you the opportunity to use less water and provide better conditions with fewer inputs.

- Installing a green roof on your pump house or other out buildings.

- Scheduling your pump station on a daily basis just like you schedule your irrigation system by selecting what pumps can come on, how much energy can be used and what the discharge pressure should be at each hour of the day.

- The list could go on and on, but the general gist is to maintain your irrigation and pump systems while maximizing their abilities and efficiencies.

The term "sustainability" is being way over used in today's society, but it is not going away. You need to understand what it involves in terms of your overall golf course operations and not just the irrigation system. You also need to be able to tout your sustainable initiatives and to recognize where you are not being sustainable. Good luck! **GCI**



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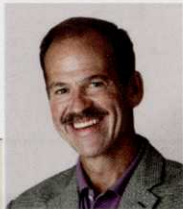
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Pat Jones is editorial director and publisher of Golf Course Industry. He can be reached at pjones@gje.net or 216-236-5854.

DOING THE RIGHT THING

Over the past 30 years, I've had a front-row seat for the environmental sea-change that's taken place in the golf business. It's been a long, strange trip to say the least.

It all started because we were being attacked for polluting our own courses. Golf course superintendents were shocked to find themselves using poisons that "experts" claimed harmed wildlife and water and even people. Concerns came to a head in the late '80s when a suit was filed against a chemical manufacturer by the widow of a Navy officer who died after allegedly exposing himself to a tainted fungicide product thanks to his curious habit of putting his golf ball in his mouth between holes.

Much of the criticism was unfounded crap, but some of the old-school pesticides we used in the '70s and '80s did have ugly side effects. Chlordane stayed in soils forever. Mercury and cadmium products were equally persistent, mobile and dangerous to handle. Diazinon worked great and didn't hurt people, but EPA decided to single it out to prove it could ban a product purely because of its impact on birds and wildlife.

And pesticides weren't the only source of concern. During the various golf booms in the second half of the 20th century, developers filled a lot of wetlands and disrupted a lot of habitat to build housing with golf courses as their anchors. I'll bet that half the courses in the Southeast that were built in the '50s through the mid-'80s could never be built today because they were sited smack in the middle of sensitive, now-protected areas. At the time, we just thought they were swamps filled with critters and varmints. Turns out they were pristine

wetlands and habitats filled with valuable animal and plant species. Who knew?

When aging Yankees started moving to the Sun Belt, we built a ton of golf courses in the desert. We irrigated them by drilling wells into aquifers conveniently located under the sun-scorched sands. Even though it was quite literally a drop in a bucket, the perception that golf courses were siphoning millions of gallons of water a day out of underground reservoirs created another flashpoint, particularly when periodic drought restrictions hit homeowners and other businesses. The courses we built were just too damned thirsty.

Recently, golf and lawn care have come under fire again for possible contributions to the dead zones that threaten the Great Lakes. And, as recently as last month, a sweeping new ban of neonicotinoid pesticides – staple tools for many turf managers – was enacted in Europe in a likely overreaction to concerns about honey bee populations.

In short, there have been and always will be "environmental issues" for golf to deal with. As long as we continue to require water and plant protection to effectively present a good playing surface for the game, we will be scrutinized.

But, thanks to decades of efforts by Audubon International, the USGA, the GCSAA and dozens of leading chapters around the nation, that scrutiny is nothing compared to what it could have been.

The Cooperative Sanctuary Program for Golf created a groundswell of interest in doing the right thing. What other industries might have tried to solve with lobbying, regulatory dogfights and legal battles, we addressed with

education, better products, improved practices and – most importantly – a commitment to ensuring that golf could be sustainable.

Now, as the sanctuary program commences on a new quarter century, the landscape is very different. Economic sustainability is now as important as environmental sustainability.

Happily, these two concepts go hand-in-hand. Examples include reduced water, more efficient plant protection, back-to-basics agronomy and design/landscaping practices that eliminate labor and, often, create a more interesting playing field. Oh, and along the way we've found a way to save and protect a few of those critters and varmints, too.

It's far too soon to declare victory in golf's quest to be viewed as a "green" sport. As turf managers we're still too resource intensive and our use of water will always be in question. But, it's not too soon to say that we have evolved and changed to become far better stewards and far better businesspeople in response to some of the crises we faced 20 or 30 years ago.

Many organizations deserve a large share of the credit for this pretty amazing accomplishment. But the real kudos go to you.

Golf course superintendents were justifiably pissed off to be accused of being indiscriminate polluters and lackeys for rich folks who wanted perfection at any cost. That anger translated into action and real change. It was as if the profession collectively rose up and loudly stated, "Not me! I'm not going to screw up this beautiful place they pay me to manage. I'm not going to leave a black mark on the game. I'm going to do the right thing."

And you did. And that's why golf will abide. **GCI**