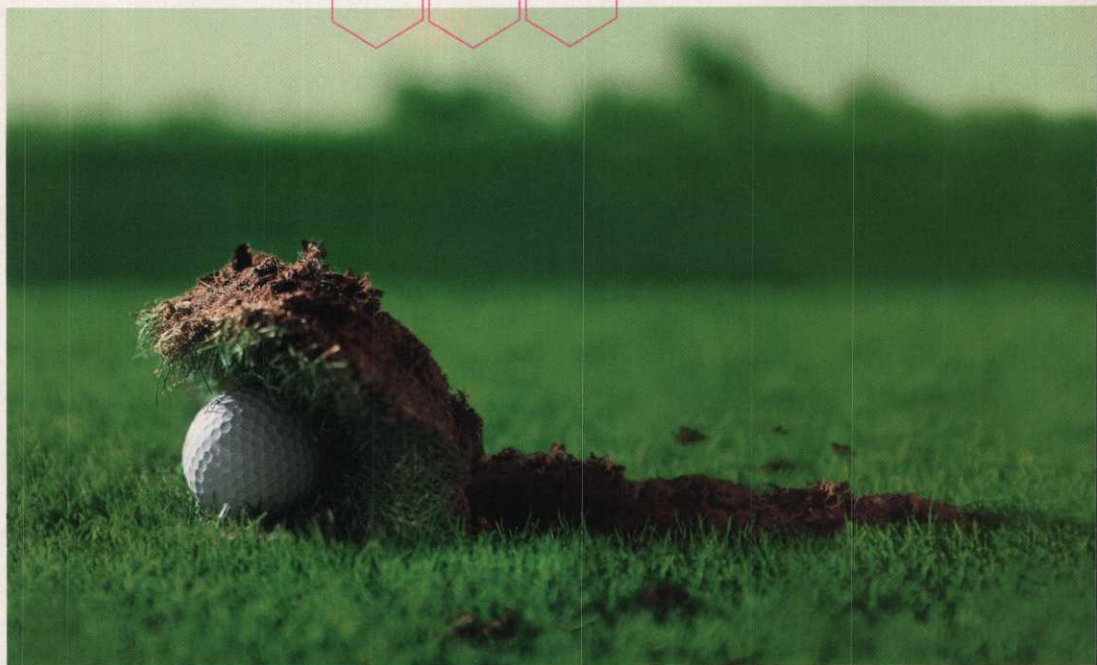
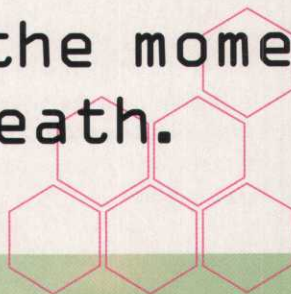



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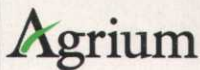


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**QUICK TIP**

Spring is just around the corner, and as you know, the warm weather brings with it the germination of annual weeds, such as annual bluegrass (*Poa annua*), crabgrass, goosegrass and others. But did you know that one of the best herbicides for controlling these weeds is a strong, dense, healthy stand of turf? Many times we forget about the basics, like sunlight, water and sufficient nutrition to promote healthy turf growth. But healthy turf is always the best defense against weed establishment. So be sure to focus on a strong stand of turf. And take a strong stand with Agrium Advanced Technologies. We're here to help you make your job easier.

*Continued from page 60*

most common (and important) antioxidants that make up this defense system are the enzymes superoxide dismutase (SOD), ascorbate peroxidase (APX), and catalase.

This defense system also requires favorable conditions to operate efficiently and can be overwhelmed by stress. Stresses such as drought and heat increase the production of free radicals. And if the plant has low energy reserves, poor access to soil moisture or damaged root systems, then it will often lack the ability to increase production of enough antioxidants (which are nitrogen and carbon-rich proteins) to offset the increase in free radicals. The result is called oxidative stress — a primary factor in summer bentgrass decline.

### Managing rootzone moisture

With soil moisture being a significant factor for both photosynthesis and the operation of turf's natural defense systems, the question was raised regarding the impact that modifying soil moisture might have on these plant functions. Since the occurrence of water repellency and non-uniform rootzone wetting can interfere with consistent moisture availability required for optimal plant functioning, our research hypothesis was that use of surfactants to correct water repellency and provide more consistent availability of moisture would enhance plant performance. A research project was initiated to investigate this hypothesis.

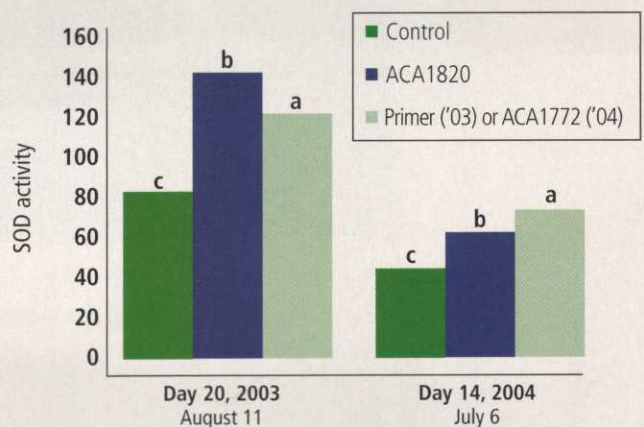
Previous research on a new patent-pending methyl-capped surfactant formulation (ACA1820, commercialized as Revolution) indicated that this particular formulation contributed to turf being able to better withstand stresses and maintain higher quality ratings compared to turf managed with other surfactants already on the market. The manufacturer's hypothesized that because

of its unique structure, this material would not just overcome water repellency, but could improve the rootzone moisture and air environment to a degree that would positively influence the turf's physiological functions. Such a claim had not been made previously on behalf of a soil surfactant, and the company was willing to fund research to investigate its hypothesis.

The test area was a 35-year old sand-modified bentgrass/*Poa* green with a significant organic matter layer (4.4 percent) and water repellency (Table 1, p. 59), which regularly exhibited localized dry spots. There was about 40 percent to 60 percent *Poa* within the bentgrass stand. The area was mowed four times per week at 0.125 inches and received standard fertility and fungicide applications every two weeks. In June through September of 2003 and 2004, ACA1820 was applied monthly at 6 ounces/1,000 square feet, while Primer Select was applied monthly at 4 ounces per 1,000 square feet in 2003 only, and ACA1772 was applied at 8 ounces per 1,000 square feet at trial initiation and then seven days later in 2004 only.

Trials in 2003 focused on collecting biochemical measures of the physiological health of turfgrass leaves and turf-quality ratings

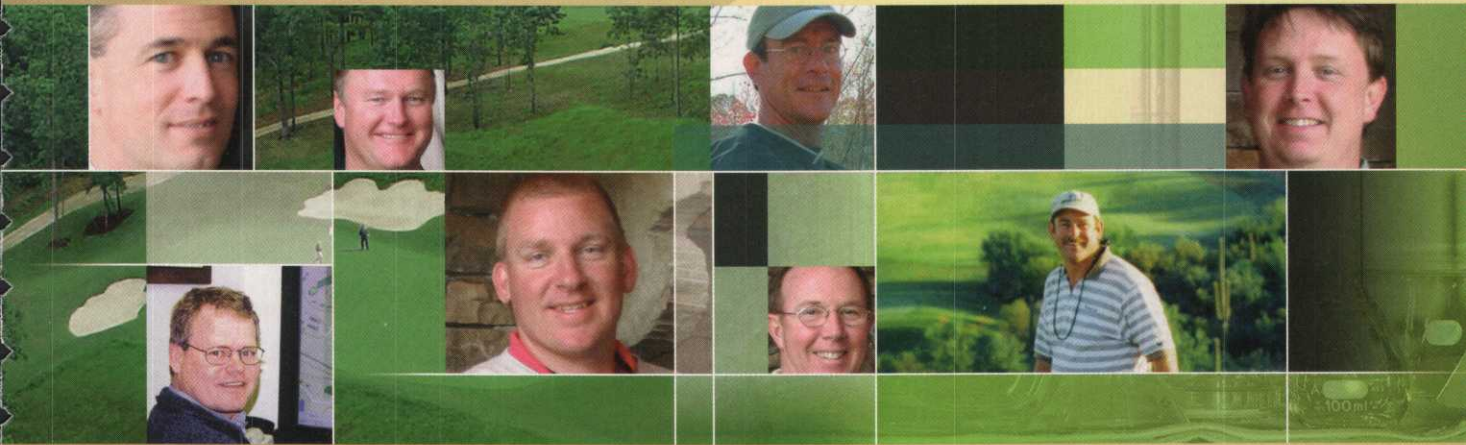
*Continued on page 64*

**TABLE 4**


Superoxide dismutase (SOD) antioxidant enzyme activity of leaf tissue as affected by surfactant treatment as irrigation was withheld during summers of 2003 and 2004. Days 20 or 14 refer to the number of days into a drought cycle where no significant rainfall has occurred, with the corresponding sample date included below. Bars labeled with different a, b or c letters are significantly different at a 95% probability level.

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*Continued from page 62*

through a stress period. In particular, activity levels of key antioxidants, levels of the amino acid and osmoregulant-proline, chlorophyll levels and photochemical efficiency were monitored. July and August of 2003 provided heat and drought conditions that imposed stress resulting in wilt and turf decline.

Trials in 2004 included a three-week dry-down period between June 21 and July 13. Additional data collected included visual wilt ratings, clipping weight, soil moisture levels and water droplet penetration time.

Relative to the untreated control, we measured greater retention of available soil water (0-2 inch depth) during non-irrigated dry-down cycles (Table 2, p. 60) and significantly less leaf wilting (Table 3, p. 60) due to both surfactant treatments. Less wilting was accompanied by higher antioxidant levels (Table 4, p. 62) resulting in the maintenance of higher chlorophyll levels and canopy photochemical efficiency.

We also measured increased leaf tissue levels of proline, in ACA1820 and Primer Select plots in 2003 and only due to ACA1820 in 2004. A natural mechanism of most plants experiencing declining soil moisture availability is to alter energy use dynamics in favor of proline accumulation. Proline increases of one to tenfold have been commonly measured in response to moderate drought stress. Increased proline serves to concentrate the cell solution, protect protein function, and delay cell dehydration. The effect is longer maintenance of leaf turgor (and photosynthesis) under mild to medium drought stress.

Ultimately, turf quality is the measure of success for turf management programs and cultural practices. In both 2003 and 2004, turf quality in the treated plots was significantly higher and showed less susceptibility to stress conditions (See additional figures and charts at [turfgrasstrends.com](http://turfgrasstrends.com)).

## Summary

As noted at the start, healthy turf begins with efficient photosynthesis. The availability of a good balance of moisture and oxygen in the rootzone are key factors in how efficient photosynthesis can be. Our research indicates that surfactant formulations have a positive impact on these rootzone conditions and a correspondingly positive impact on photochemical efficiency, level of antioxidant production and other drought stress-related plant functions.

Turf areas treated with such surfactants showed an enhanced ability to avoid drought stress resulting in more efficient photosynthesis and greater up-regulation of defenses for tolerating stress. Research is ongoing to investigate and better understand differences in the effects and consistency measured with different surfactant formulations.

The final implication for the superintendent from bol-

stering turf's ability to use natural defenses against stress is the possibility of healthier greens that stay healthier, because they can sustain photosynthetic integrity longer during drought events, experience less oxidative stress and recover/respond faster at each irrigation event.

*Acknowledgements: Primary funding for this research was provided by Aquatrols Corporation of America. Technical help in conducting this research was provided by Virginia Tech Turfgrass Research colleagues Xunzhong Zhang, Charlie McCoy, Frederick Shepherd, and Adrienne LaBranche.*

*Author Erik H. Ervin, Ph.D., is an associate professor of turfgrass physiology in the Department of Crop and Soil Environmental Sciences at Virginia Polytechnic Institute and State University.*

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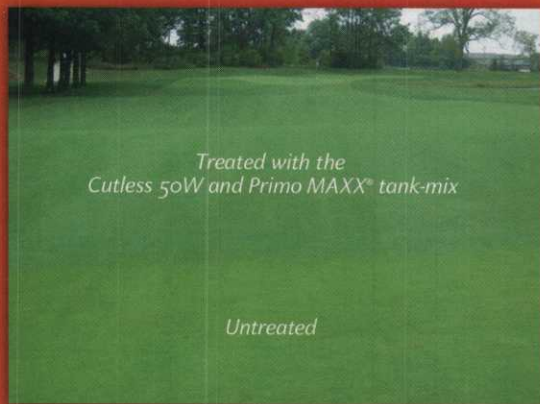
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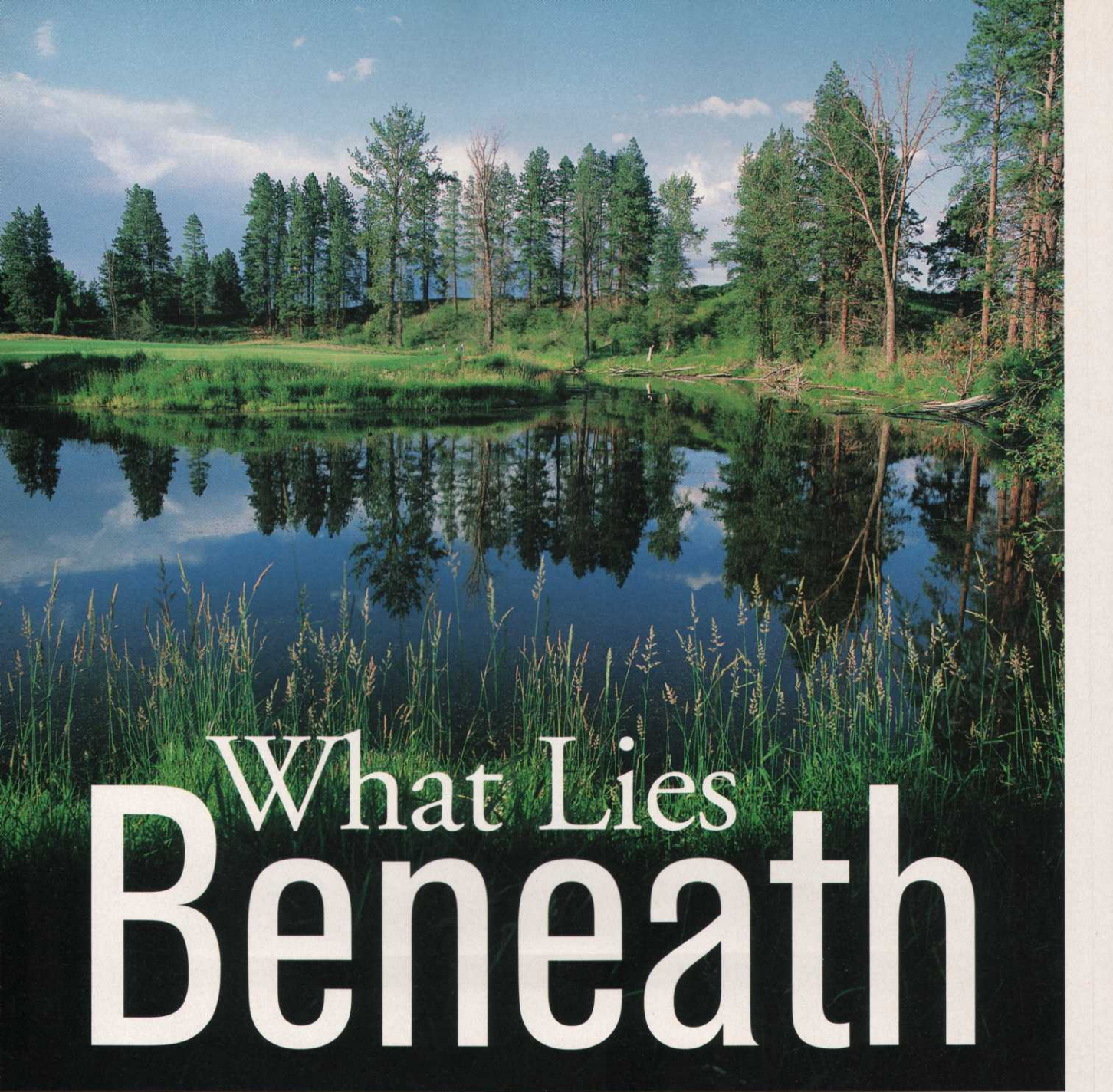


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# What Lies Beneath

Historic trends should direct proactive pond maintenance programs

**BY DAVID FRABOTTA**  
SENIOR EDITOR

It's not too early to think about pond maintenance. In fact, managing algae on a curative basis isn't as effective as programs that try to stave off algae bloom infestations while it's still cool.

"We recommend that you start in the spring using low rates of materials every two weeks, so it's preventive instead of curative," says Andy Moore, director of marketing and business development for Aquatrols Corp. of America. "Instead of fighting a fire, you're

keeping it from sparking in the first place."

Although pond maintenance likely isn't a large part of superintendents' budgets, it can be done on the cheap if it's managed proactively.

"It only takes a few dollars an acre to stay ahead of it," says Greg Roman, account manager of the Southeast region for Novozymes Biologicals. "Once you have the algae, it not only becomes a nuisance and an eyesore, but it's a lot harder to get under control and more expensive to treat, so early spring is really a good time to be thinking about it."

Fortunately, superintendents probably know which ponds turn to pea soup in the

PHOTOS BY MIKE KLEMM

heat of summer, which allows facility managers to focus on the most unsightly water areas based on what they looked like last year.

If you had a historical problem in a water area, then there's a good chance you'll be battling similar issues this year, sources say. And superintendents might not have the luxury of visual symptoms of a pond's health, either. Different algae can form below the surface.

"Filamentous algae will form at the bottom of the pond before floating to the top, but if you have a proactive management program, you can treat the algae with a chelated copper algacide before it creates aesthetic problems," says Tyler J. Koschnick, Ph.D., aquatics research manager for SePRO Corp. "If the pond had submersed weed problems last year, consider doing some early season applications of some herbicide before the pond becomes filled with weeds again. If your weeds reach the surface in June, that means they were likely actively growing at least a month prior and at a level to be controlled."

While the general cause of algae blooms is nutrient runoff, especially phosphorous, water circulation and depth play important roles, as well as vegetation growth and aquatic wildlife.

"If you have some areas that are shallow and silting in, then that makes it very hard to manage," Moore says. "Getting them dredged out and the shore lines cleaned up so they are not too gradual so the water gets down to that 3- to 4-foot level pretty quickly can help from a construction and design standpoint to keep algae from popping up."

Cleaning up the shoreline, knowing the pH levels and hardness of the water can help, too. Unfortunately, altering wetlands and some water bodies requires regulatory approval, so the process might not be entirely cut and dry. Weeding out the shoreline by hand might be the only option in regions or states with rigid regulations. Florida, for example, is very regimented because of its shallow water table.

"Partners include the local DNR (Department of Natural Resources) for environmental-quality resources; they are the first people to go to for compliance as well as licensing," says Joe Lara product manager for the horticulture specialties for Becker Underwood.

Local universities can identify the aquatic wildlife and determine what works best for the ecology of the system, Lara adds, and private applicators can be good resources either as consultants or independent contractors.

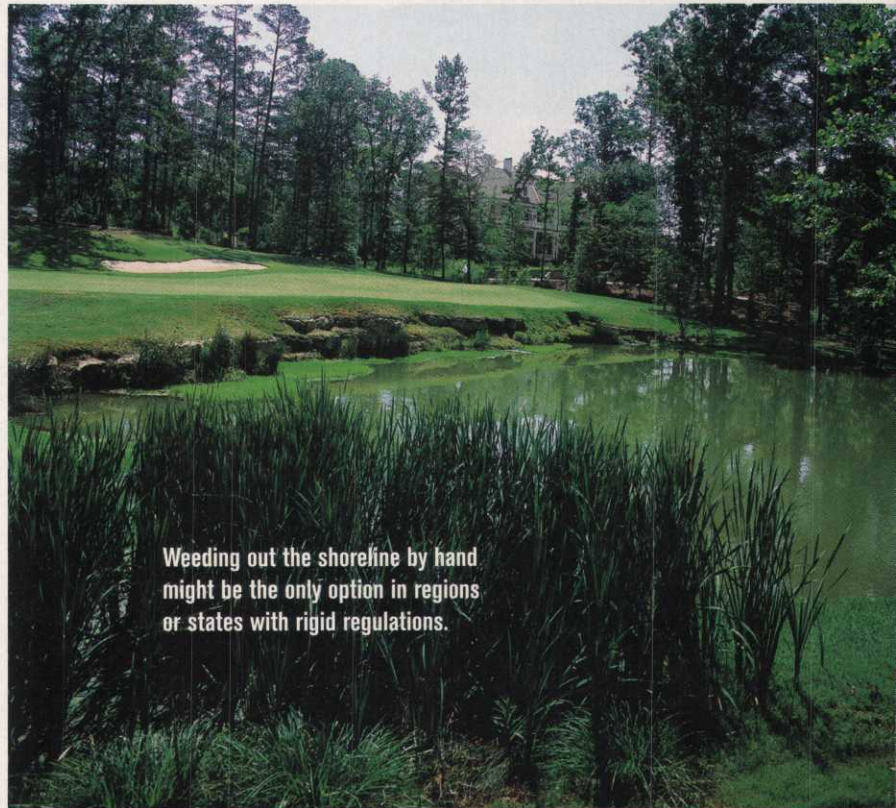
The regional differences make it important to consult professionals to determine a strategy for vegetation, fish, wildlife and appropriate algae levels.

"I like to get the biologists involved because there are certain things you are never going to get a handle on," says Gary Custis, research and development manager for PBI/Gordon.

The important takeaway is maintenance of water bodies requires a strategic plan instead of a knee-jerk treatment reaction.

"Think of your pond as a lawn," Koschnick says. "You don't mow the grass once a year and expect a nice healthy lawn. You fertilize, mow repeatedly, and do weed control throughout the year. Try going a couple of years with no weed control or only spraying one time late in the season. A pond needs similar attention as a lawn. Scouting for weed and algae problems and addressing them immediately are critical steps to successful maintenance." ■

Often, regional differences require professionals to determine the correct balance of fish, vegetation and algae levels.



Weeding out the shoreline by hand might be the only option in regions or states with rigid regulations.

# Leaders

## PEOPLE ON THE MOVE

**Walt Gooder**, superintendent at Country Hills Golf Club in Calgary, is the winner of the Alberta Golf Superintendents Association 2006 Distinguished Service Award for excellence in his profession. The master superintendent is a founding member of the Alberta Golf Superintendents Association, a founding member of the Alberta Turfgrass Research Foundation, a past president of the Canadian Golf Superintendents Association, and a past winner of CGSA's superintendent of the year. Country Hills is certified in the Audubon Cooperative Sanctuary Program.

**Jeff Perry** was named general manager of The Crossings at Carlsbad (Calif.) The Southern California facility will open this summer.

The Butterfield Trail Golf Club (El Paso, Texas) promoted superintendent **Marty Wells** to general manager of the upscale, Tom Fazio-designed desert layout. Wells has been involved with Butterfield Trail since September 2005 and will continue with grow-in supervision. Most recently, he served as general manager at the 27-hole Black Mountain Golf & Country Club near Las Vegas. Prior to that, Wells managed turf operations at Tucson Country Club in Arizona as well as The Dominion Country Club in San Antonio, Texas, which hosted several Senior PGA Tour events.

Horseshoe Bay Resort made **Brian Henderson** its director of golf. Henderson most recently was director of golf at the Ritz Carlton Members Club in Sarasota, Fla.

Former golf course superintendent **Chris Radcliff** is the new golf sales manager in agronomics for Horizon, a full-service supplier of land-

scape and irrigation supplies. He most recently was employed by BWI Companies in Texas. The company also named **Neb Keeton** as its sales manager for turf sales in Southern California and Las Vegas.

**Ryan Roche** is the new director of golf at Marriott's Griffin Gate Resort in Lexington, Ky. Roche comes to Griffin Gate from Rancho Las Palmas Resort & Country Club, a 27-hole Marriott facility in Rancho Mirage, Calif.

**Steve Argo** was named general manager of Harding Park Golf Course in San Francisco and its sister property Fleming Course.

**Paul Roche** is the new national specification manager for the Golf Division at Rain Bird. He is responsible for the development and management of key relationships with architects, irrigation designers and contractors serving the golf market.

Dow AgroSciences named **Brett Garrard** as the new sales representative for the turf and ornamental market in New Jersey and eastern Pennsylvania. He will serve distributors and customers in the lawn care, golf and nursery industries.

**Lee Stone** has accepted the position of senior product and division manager for golf and turf equipment for The Broyhill Co. of Dakota City, Neb.

FarmLinks LLC recently announced the addition of **Jon Maddern** as the new experience manager at FarmLinks, a research and demonstration golf course in Sylacauga, Ala. Maddern earned a Certificate in Turfgrass Management from Michigan State University and has served as past president and board member of GCSAA. Maddern is also a



Gooder



Henderson



Garrard



Stone



Maddern



Schroeder



Kalasz



Bially

member of The Northern Michigan Turf Managers Association and the Greater Detroit Golf Course Superintendents Association.

**Gary Piotrowski** is the new general manager of Desert Willow Golf Resort in Palm Desert, Calif. He will oversee daily operations of the nationally acclaimed 36-hole resort, located in Southern California's Coachella Valley.

**Stephen W. Schroeder** accepted the position of general manager at Pasadera Country Club in Monterey, Calif. Most recently, he served as general manager of Harding Park Golf Course in San Francisco.

In an executive shuffle at Kemper Sports, **Steven K. Skinner** was named president and chief operating officer of its division of third-party management operations. **Joshua W. Lesnik** is the new president of KemperSports Properties, which oversees Bandon Dunes Golf Resort and other owned properties and directs branding initiatives. Executive Vice President **James R. Seeley**, who has operational responsibility for Bandon Dunes Golf Resort, assumed supervision of KemperSports' owned Illinois properties. He is also the company's senior agronomy and merchandising

officer. **James R. Stegall** was named executive vice president and will oversee most of the company's third-party managed and leased properties. And **Gary S. Binder** and **John C. Clark** joined the company as senior vice presidents.

As part of its succession plan, Dennis P. Walters named **Jeffrey C. Smith** and **A. Lucy Mitchell** senior vice presidents and partners of Walters Golf Management.

**Andy Mitchell** was named Director of Golf at Grande Pines Golf Club in Orlando. Mitchell comes to Grande Pines from The Frog Golf Club in Villa Rica, Ga., where he most recently served as head golf professional.

**Eric Kalasz** is the new southern regional manager for the golf sales group of Bayer Environmental Science. He will manage the golf sales activities in eight Southern states, from Florida north to Virginia and west through Mississippi and Tennessee.

**Paul Bially** was hired as associate district manager and field application specialist for the turf and horticulture market for Precision Laboratories.



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Standard Golf also offers a new bag stand, which is made of powder-coated steel for extended life, according to the company. It holds full bags or individual clubs and can be stacked easily on top of one another to conserve space.

For more information, contact [www.standardgolf.com](http://www.standardgolf.com).

### Pond Colorant

**Becker Underwood** introduces Black Onyx WSP Lake and Pond Colorant, a high-concentrate colorant in a water-soluble packet that is easily applied to contained bodies of water. Black Onyx WSP will transform pale, off-colored water to a decorative, mirror-like black color, the company says. It is environmentally safe and won't harm or stain fish or other animals. There are no restrictions to fishing, swimming or recreational use during or following the application of Black Onyx WSP. Treated water can be used immediately for irrigation and will not harm grasses or plant life.

For more information, contact [www.beckerunderwood.com](http://www.beckerunderwood.com).

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## Editorial Index

Company	Page No.	Horseshoe Bay Resort	68
ASGCA	18	Hunter Industries	39
Alberta Golf Superintendents Association	68	Hurdzan/Fry Golf Course Design	18
Aquatrols Corp.	66	Irrigation Association	14
Bayer Environmental Science	68	Jacobsen	18
Barona Creek Golf Club	43	Jay Peak Resort Golf Course	10
Becker Underwood	67	John Deere	39
Benchmark Golf	46	KemperSports	68
Broken Sound Golf Course	20	LESCO	12
Butterfield Trail Golf Club	68	Long Prairie Country Club	6
Byrd Polar Research Center	8	Muncie Elks Country Club	6
California GCSA	34	NGCOA	18
Canadian Golf Superintendents Association	68	New England Golf Course Owners Association	34
Cardinal Club	50	North Oaks Golf Course	12
Club Car	50	Novozymes Biologicals	66
Country Hills Golf Club	68	Ohio Turfgrass Conference	8
Crystal Springs Golf Course	49	Old South Country Club	12
Deere & Co.	12	Pasadera Country Club	68
Desert Highlands Golf Club	18	PBI/Gordon	67
Desert Mountain Resort	39	Precision Laboratories	68
Desert Willow Golf Resort	68	Pulte Homes	18
Dow AgroSciences	68	Rain Bird	39, 68
Environmental Protection Agency	14	SePRO Corp.	6, 67
Ewing Irrigation	39	Stowe Country Club	10
FarmLinks LLC	68	Stowe Mountain Club	10
French Lick Resort Casino	47	The Broyhill Co.	68
GCSAA	32	The Crossings at Carlsbad	68
Golf Datatech	10	The Jupiter Island Club	6
Grande Pines Golf Club	68	The Toro Co.	39
Griffin Gate Resort	68	Walters Golf Management	68
Harding Park Golf Course	68	WCI Communities	6
Horizon	68	Woodbridge Golf & Country Club	34

## Ad Index

Advertiser	Page No.	Target	(regional) 48A
Andersons	cv4	TiffEagle	(reg) 35A
Arysta	3	TiffSport	(reg) 45A
Audubon	(reg) 48B	Toro	40-41
BASF Corp	7, 24-25, 54, 69	Turf Merchants	(reg) 35B, 35A
Champion Turf Farms	9	Turfco	34
Cleary Chemical Corp.	36-37		
Club Car	30-31, 33		
FMC	11		
FarmSaver	5		
Gro Power	2		
John Deere and Co.	16-17		
Milliken	cv3		
Oregon Fine Fescue	21		
PBI/Gordon	29		
SePRO	65		
Standard Golf	14, 15		
Syngenta	19, 22-23, 27, 53		

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