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### On the cover:

An “action” shot from the re-surfacing of FedEx Stadium, Washington, DC, completed early last November. Carolina Green Corp., Indian Trail, NC completed the project by installing new, custom-grown sod grown on plastic. Photo courtesy of Carolina Green Corp.

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## From the Sidelines

**Eric Schroder**  
**Editorial Director**  
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### @twits #whocares\*

I am a late adapter to new technology. I didn't buy a cell phone until my wife was well into her first pregnancy. I realized how bad I'd look if there was a problem and I, most likely three-putting a green at the time, was unreachable. And I recall brushing off texting early on: what a waste of time, I thought; why not just make the call? Most recently I have been shaking my head at friends who constantly have their devices in hand, checking an updated score or searching for the nearest men's room.

But just as the cell phone itself quickly became invaluable, of course I now text, especially with my kids. No more waiting for the bus; a quick message from my daughter tells me she is close and I arrive at the bottom of the hill just as the bus pulls up. High school football game a blowout at the start of 4th quarter? Text the teenagers to meet me at the car (they hate that because the game is really a reason to socialize). Not to mention how exchanging texts with the wife can ease the communication process—information only, no emotion!

So far I have survived without a smart phone and data plan; call me the omega man. Working from a home office with limited road time, I can get away with it. Besides, the oldest kid has an iPhone so I can always ask him to find something out if necessary (and yes, he paid half the cost of the phone and shells out monthly for the data plan so thanks for not going there on my parenting).

Enter Twitter. When it was introduced I ignored it as a fad. What important can you say in 140 characters? A lot, allegedly, as now everyone from presidents to rappers compete to see who can attract more followers. I had two questions when a previous boss requested that I sign up for an account so I could tweet on sports turf issues. If you don't have followers, who sees your tweets? And aren't sports turf managers busy folks who shouldn't be bothered with more digital noise deemed important by just me?

But again I've come around albeit late to the game. Here are some tweets you might have seen from me if I'd bothered to post them:

- "Txtng while driving sure is risk—ah, I just rear-ended a guy! #whatadumba\*\*!"
- "Viagra commercials funny. Guy can start a fire with sand and corkscrew but can't . . . #nowonder mydaughterwon'twatchfootball"
- "Cell phone use on planes! Say it ain't so! #ratherbepokedinfacewithsharpstick"
- "2 million pickup trucks sold in US this year mostly to haul groceries. #urnotjohnwayne"
- "Read novel titled 'Schroder' w/ protagonist named Eric Schroder. Character was an idiot"
- "@college basketball coaches. Sit down and let 'em play! #yourfancysuitisempty"
- "Dads talking cooking. 'roasted carrots & beets w/ sheep's milk feta blah blah.' #makesme-wannabarf"

So yeah, I'm tweeting now; please follow me, as well as Green Media editors John Kmitta and Steve Noe, on Twitter's @GreenMediaMags for news of interest to those in the Green Industry.

\*The views expressed in this column are entirely those of the author and have no connection to the STMA, Green Media or the author's spouse. ■

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# President's Message

**Dr. Mike Goatley**

Goatley@vt.edu



## Plan ahead to take advantage of Conference opportunities

**T**he annual conference and exhibition is upon us and I hope many of you can join us in San Antonio very soon. As an attendee, I advise you to come to conference with a plan to get the most out of your experience. Do a little pre-conference homework and make a note of the questions that you absolutely hope to get answered. The presenters, the exhibitors, and your peers are all valuable sources of information. What are your "must see" educational sessions?

Scout the exhibition schedule and locations of specific vendors with products or services that could better you and your facility. Be sure to take advantage of all the fellowship offerings available at our annual meeting, networking sessions, welcome reception, and awards banquet. All of these events provide opportunities to make new friends and professional colleagues for a lifetime. And also be sure to find time somewhere to do a little exploring of San Antonio, one of the prettiest cities in America, full of history and great culture. The 2014 Conference and Exhibition promises to be another home run for our association.

I want every member to know that it has been an honor and a privilege to serve as your President for the past 2 years. This association is poised for continued growth as the need for quality, safe playing surfaces for athletes of all ages rises. Thanks to all of the Board members with whom I have worked since 2008; there is no better volunteer leadership anywhere. My thanks to previous Boards that paved the way for the future by developing outstanding strategic plans and making sound financial planning decisions that have provided this and future Boards the opportunities for new initiatives. I had the opportunity to learn and grow from some outstanding Presidents (all CSFM's) during my tenure on the Board: Mike Andresen, Abby McNeal, Chris Calcaterra, and Troy Smith. Each possessed unique and effective leadership qualities and they continue to lead by their examples today. Our CEO, Kim Heck, is one of the best things to ever happen to STMA. Kim has surrounded herself with a wonderful staff that allows her to efficiently and effectively advise the Board. She provides guidance and recommendations, but always reminds the Board of their responsibilities on behalf of their membership. Finally, you will be glad to know that the best is yet to come for STMA. David Pinsonneault, CSFM, is a natural leader and one of the nicest people I have met in the business; those qualities bode well for STMA for 2014.

Kim and I have been doing a countdown on the "President's Messages" for at least 6 months now. Trying to write something of value that might also hold your attention has been both a challenge AND a joy. Thanks to my wife, Lisa, for her regular editing of my writing efforts and thanks to you for putting up with 2 years of my ramblings! Most of all, thanks for your support, suggestions, and friendship as a whole. All the best to you for 2014. ■

A handwritten signature in black ink that reads "Mike Goatley". The signature is written in a cursive, flowing style.



## Contracting services: how to successfully develop productive partnerships

**I**n recent years, most parks and recreation agencies have had to deal with the economic realities of reduced revenue and higher personnel costs. On the recreation side of the house, program fees and charges can be revised and/or programs can be eliminated/given to other service providers to close budget shortfalls. However on the parks side, which is charged with maintaining the amenities, facilities, and landscape, raising additional revenue can be problematic. As a result, many agencies are either considering or have started to contract for maintenance services.

Contracting for maintenance services, a concept that many times replaces department employees with con-

---

The quality of service provided by a contractor is paramount to any success. The contract needs to clearly state your quality standards so that you get what you want.

tract employees, is usually looked at as being “bad” or something that will not provide the same level of service. However in our new economic reality, contracting may be something that we have no choice other than to accept. If that is the case, there are some lessons learned that can help to make contracting successful.

Contracts that are professional services contracts, where negotiation is possible, are more successful than “low bid” contracts. Experience shows that a low bid contract can end up costing more through change orders and other extra work than a contract that allows for ongoing negotiation. Price is important; however if it is the only criteria you are able to look at, you will probably end up spending more in the long run.

The quality of service provided by a contractor is paramount to any success. The contract needs to clearly state your quality standards so that you get what you want. Do not beat around the bush: if you want your turf to be “weed free”, then write your standards that way. Time is not something we are blessed with these days and spending additional time trying to haggle over agreement on a standard is time you do not have. Standards need to be written in as simply and directly as possible, so that a 12-year old child could say, “Yes it does or does not meet standards.”

### QUALITY OUTCOMES IS THE GOAL

Standards for quality should be written as “outcomes” and not based on a performance that you have to count. You want to let the contractor know what you want: weed free turf. You don’t want to direct the contractor on how to make the turf weed free or you will be treating the contractor more like an employee and you will have to spend time making sure they do what you told them to do.

The relationship between the contractor and the agency needs to be written into the contract as that of a partnership where the contractor and agency have a shared interest in maintaining the landscape. One of the arguments against contracting is the belief that a contractor will not care as much as an agency employee. If the contract is an “us versus them” contract, that will be true. If the contract allows for incentives and collaborations, and extensions or options based on a partnership, the contractor will look at the contract as a longer term investment and will hopefully bring skills other than burying the agency in change orders. The City of Rosville uses both collaborations and extensions as methods of showing their long term commitment to their partners. In return this commitment provides their partner with a level of comfort that enables them to invest in both people and equipment that will make them more

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productive and efficient. This commitment has led to the lowering of contract costs over time for the City of Roseville and has also resulted in a sense of ownership within the employees of their partners due to the numerous years that they have spent maintaining portions of Roseville parks and streetscapes. The City of Brentwood regularly meets with contractors to see if there are improvements that can be made in the contract. The intent is to get a great partnership that will last over time to the benefit of both partners.

Quality assurance is critical to the success of any contract and true partnership. The City of Roseville and the City of Brentwood both use the quality assurance process to assist in building relationships and partnerships between their staff members and the staff members of their private partners. Quality assurance inspections are necessary and can be very time consuming but are critical. If you do not do regular inspections, how do you know if your partner is meeting the standards you require? The quality assurance inspection should be a tool used to ensure that your partner is achieving their contractual obligations but can also be a valuable tool that builds the concept that “we” are maintaining this area for “our” residents and the inspection is just another tool that your partner can use in their scheduling, planning, and prioritizing. To simplify the process and reduce paperwork, inspections can be exception based, meaning that unless indicated otherwise, the site meets standard. This requires that the only information you need to identify relates to what does not meet standard. Additionally, the standards should have only two measurements: meets standard and does not meet standard. Measurements such as “needs to improve” only add additional time and misinterpretation between the contractor and the agency. Remember, friends are friends and business is business. When done properly your quality assurance inspections can meet your contractual compliance needs while enhancing the sense of partnership for both entities.

A comprehensive background check of any prospective contractor is important so that you know what they can do in like environments. Is the company fiscally solid? Do they have references that you can check where they do work similar to what you are asking for? Do they use technology and can



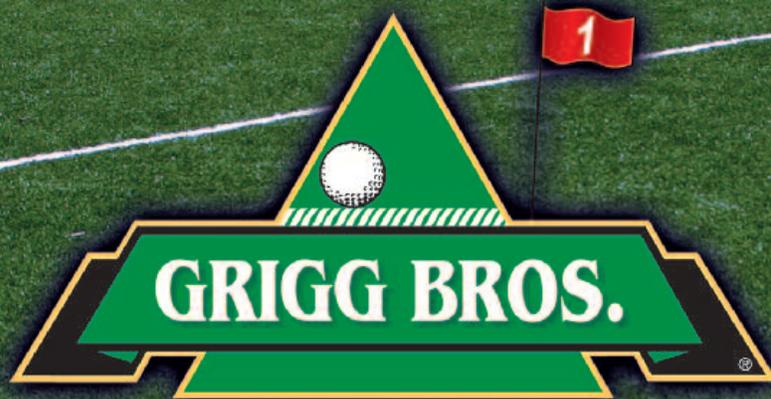
they be flexible when necessary? Are they responsive to requests, especially in emergency situations? What is their quality control plan that will provide you a level of comfort that they are paying attention to the details you need? How do they resolve differences with they disagree on the terms of a contract? How did they do in the interview (yes, a formal interview should be a part of your process and you should request that they bring the staff to the interview that will be overseeing your contract). Having the comfort level that a company understands your expectations and can deliver the maintenance you expect is more than just a price consideration.

### REMEMBER THE TRUE CUSTOMER

Customer service is many times a misunderstood component of maintenance contracts. Though it is important for the contractor and agency to provide excellent customer service to each other throughout the contract, the real customers of both the contractor and the agency are the citizens of the community. Many times we lose track that the citizens who pay the taxes and/or assessments, the very ones who actually use the facilities and landscape areas, are the customer. A contract should in take into consideration the wishes of the community related to standards and expectations as the agency is just the administrator of the contract when the citizens are providing the funding for the maintenance. Having users understand what they should expect from a maintenance standpoint helps the agency keep the contractor on track and builds on the partnership that should be one of the guiding principles of the contract. The quality of a contract is what the citizens and users want and expect. Truth be told, they care very little how you get there.

Finally, a contract needs to have corrective measures to insure that the work is done to the level the agency expects. Once a situation has been identified as not meeting





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standard, how long do you allow the contractor to make repairs? If plant material dies on a contractor's watch, how do you get them to replace/pay for replacement? Do you assess a financial penalty for each out of compliance? What about repeat out of compliances; is there an additional penalty? There is not one way to do this; however you need to address corrective measures up front to make sure that the standards are met as per the contract conditions. The contract needs to be clear and up front on your expectation for corrective measures. You also need to understand that overseeing a contract takes time and is some-

thing that has to be factored into the cost of contracting for maintenance.

Contracting out maintenance services for many years has been considered something that most agencies try and avoid. In the new normal, where expenses continue to rise faster than revenues, it may be something that you have to consider. If you consider contracting, you can make sure you get what you expect if you spend the time writing the contract and standards using some of the lessons that have been learned to increase your chance of success.

Building partnerships takes time and effort on everyone's part and although the expectation should be written into a contract it is the responsibility of both parties to foster the development of a long term partnership. It is extremely important, especially in the beginning of a new partnership, to take the time to care for it. A partnership is no different than a marriage. Someone is going to leave the cap off of the toothpaste and someone else is going to leave the kitchen light on. The key to a successful partnership is learning to work together as well as appreciate each other's little quirks. Do not be over critical, especially in the beginning! It is important to talk through situations to ensure that people are "seeing" things in the same way and learning

from every experience, good and bad. Through years of trial and error both the City of Roseville and the City of Brentwood have come to anticipate that a true partnership will take 12-18 months to establish. The focus should be on making the initial period a long term relationship or you will forever spin in the trial and error period.

Generally speaking private contractors, and especially those bidding on public projects, have been trained by the public sector to come in low on the base bid and then make their profit on change orders, extra work, and cutting a few corners. This is their culture. The public sector culture is to be on guard for such activity and enter contacts with the intent of "catching" the contractor doing something wrong. Acknowledge that these cultures exist and understand it will take your partner's staff as well as your own staff time to adjust to this new method of thinking. Also, remember that you are the steward of public funds and must ensure that those funds are being used wisely. ■

*Craig Bronzan is the Director of Parks and Recreation for the City of Brentwood, CA; Scott F. Miller, CPRE, is Parks Superintendent, for the City of Roseville, CA.*

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# Managing trees, shrubs and other ornamentals at sports facilities

**O**rnamentals play a significant role in the overall success of a sports facility. To many spectators, the enjoyment of their game attendance is influenced as much or more by the aesthetics and function of the landscape at the facility as it is by the turf or outcome of the contest. This article will provide the sports turf manager with some of the tools and techniques to successfully manage the ornamentals at their facility.

## ORNAMENTAL PLANT MAINTENANCE HIERARCHY

In the overall scheme of maintenance activities at a sports facility, a hierarchy exists. Depending on the size,

intensity of management and range of teams that are routinely using it as well as the number of practice, game and tournament quality fields that are present, varied levels of time are spent on different parts of a given complex for care of the turf. The same is true for trees, shrubs, groundcovers, perennials, annuals and containers. The important consideration is to recognize the hierarchy and devote time accordingly. For example, a high-interest tournament field might have adjacent shade trees, container plantings and shrub/perennial beds to care for routinely basis, while a practice field has little to nothing in the way of ornamentals associated with it. A thoughtful differentiation within the hierarchy is certainly a worthwhile endeavor.

▼ **WELL PLACED** shade trees at a sports facility. All photos by John C. Fech, UNL.



## SIMPLE MAINTENANCE PLAN FOR THE SPORTS FACILITY

Once the hierarchy has been established, a simple maintenance plan is a natural second step. It can be set up field by field or by groups of plant material...either is fine as long as it gets accomplished. Just like a schedule for aeration, overseeding, irrigation, fertilization, mowing, disease/insect monitoring and other important aspects of field maintenance, a plan should be set up for ornamentals. Many sports turf managers have found it useful to establish a calendar format and conduct maintenance duties for both turf and ornamentals accordingly. Each month, a calendar is posted in the maintenance shed with an outline of the jobs and projects in the weeks and months to come. Written with grease pencil and a white board or a simple poster on a wall, these tools provide a helpful reference for all employees at the facility. Pruning shrubs, replacing mulch, planting bulbs, inspecting for disease and insects, removing weeds and monitoring the sprinkler systems are examples of items to be attended to in a simple maintenance plan.

## SOILS AND FERTILITY

All plants in the sports turf landscape are not the same. On average, ornamentals require about a third to a fourth as much water and fertilizer as turf. As such, they should be cared for differently. Rooting depth tends to be



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▲ **Left:** Inspection during site assessment is an important facet of maintenance. **Middle:** Mulch serves various purposes; it can reduce maintenance during mowing and serve to protect tree trunks from damage. **Right:** Providing shade and amenity is important, but ornamentals shouldn't encroach on the playing surface.

different as well. Approximately 85% of the roots of most trees, shrubs and flowers are located in the upper 24 inches of the soil profile. Naturally, the depth and density of the root system varies with the species and age of the ornamental. Newer plantings of woody plants usually produce “spiker” or “sinker” roots to provide initial stability as well as horizontally growing feeder roots, and then transition to a greater percentage of lateral roots as they mature. The locations of the roots in the profile have consequences in terms of the best placement of applied fertilizers and pest control agents as well as potential encroachment of roots into the sports field. When necessary, delivery via surface application or through drip irrigation systems is a good approach.

### GOOD BED DESIGN

The critical factors with good bed design are separation of turf and ornamentals and the creation of a smooth and naturally flowing bed line.

As mentioned above, ornamentals have different needs in terms of water and nutrients. As such, the irrigation zones for ornamentals should be set for shorter runtimes and fewer days of the week. Regardless, the key principle of watering to the depth of the roots and keeping the roots moist but not dry or soggy is important for both turf and ornamentals.

The lines of separation between turfgrass and ornamental plants should be natural and flowing rather than abrupt and geometric. Gentle bed lines are much easier to maintain and more pleasing to the eye than ones that create rectangular or narrow beds. Within the bed, size and function of plant material are important considerations. Trees should be placed such that they provide shade for fans and overall amenity without interfering with sports play. Implementation of gradation and recognition of the mature size of specimens should be considered with the taller plants being placed towards the back of the bed and shorter material in the foreground.

### SITE ASSESSMENT

For established ornamental plantings, a site assessment is a very helpful process. Actually, assessment is composed of two steps: an assessment, the initial documentation of the existing conditions and

status of the plantings; and analysis, a set of value judgments and possible recommendations for the future health and welfare of the plants involved. For example, a tree may appear yellowish and struggling (the assessment), and upon further investigation, it is determined that it has a nutrient deficiency and soil treatment or nutrient injections could provide it with a fighting chance to return to good health (the analysis).

A sample set of questions to use in site assessment/analysis is:

- Tree roots growing into the field?
- Plants too close to the field?
- Trees with defects near the field?
- Trees with nutrient deficiencies or pest infestations?
- Insufficient ornamental plantings?

Where could some easy to care for plantings be placed?

**The positive benefits that proper mulching provides are many, while the negatives are few.**

In some cases, after the questions are asked, assistance from another green industry specialist should be sought. In the case of the safety of a tree near a facility, an ISA (International Society of Arboriculture) certified arborist should be consulted to inspect the tree to determine if defects such as crossing limbs, decay, girdling roots, basal flare injury or co-dominant leaders are present. If so, action must be taken to remove or stabilize the tree in such a manner that it no longer poses a threat to people and property at the sports facility. Seeking the advice of a certified expert will not only increase the overall safety of the area, it will greatly diminish the liability of the property to potential lawsuits.

Perhaps one of the easiest but most advantageous maintenance practices for ornamentals at a sports facility is mulching. The positive benefits that proper mulching provides are many, while the negatives are few. The overall objective is to replicate what Mother Nature provides, namely a naturally occurring layer of twigs, leaves and fallen bark—at the ball park. Using organic mulch made from processed pieces of former woody plants provides weed suppression, cooler soils, moisture retention, nutrient recycling and a clean, neat

# John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

*Can you identify this sports turf problem?*

**Problem:** Brown area extending out from infield

**Turfgrass area:** Softball field

**Location:** Westport, Connecticut

**Grass Variety:** Bentgrass, perennial ryegrass and Kentucky bluegrass

**Answer to John Mascaro's Photo Quiz on Page 33**



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## Facility & Operations

appearance for the plant materials.

On the practical side, another benefit is that well placed mulch creates a barrier between bored or distracted teenage mower operators and the trees and shrubs that are near the sports field.

Otherwise referred to as “mower blight,” damage to the trunk of a young tree greatly decreases the capacity for water and nutrient flow and creates openings in the bark and sapwood that facilitate decay and degradation of the woody tissues inside.

The two-part question always arises: “How deep should the mulch be and exactly where should it be placed? The two-part answer is: Starting 3 inches away from the trunk of woody plants and extending it as far into the sports facility landscape as is feasible is the best placement of mulch. A depth of 2-3 inches is desirable for most ornamental species.

Of course, mulch is not a panacea for all that ails an ornamental planting or a silver bullet for the sports turf manager looking to completely ignore its care. Mulch needs to be replaced over time



▲ **Left:** Gentle, easy to follow bed lines increase the ease of maintenance; a few well placed shrubs would complete the planting and cut down on fans cutting through the bed. **Right:** Mower blight causes disruption in water and nutrient flow.

and is an expense that must be included in the overall budget, but should be considered to be as important as a mower or irrigation system for the field turf.

Without a doubt, ornamental plantings that include groundcovers, perennials, annuals, containers, trees and shrubs can provide attractive surroundings as well as many desirable functional attributes for players, coaches and fans alike. Proper care must be taken to maintain them in a safe and responsible manner for the benefit of all. ■

*John C. Fech is a horticulturist with the University of Nebraska-Lincoln and an ISA Certified Arborist.*

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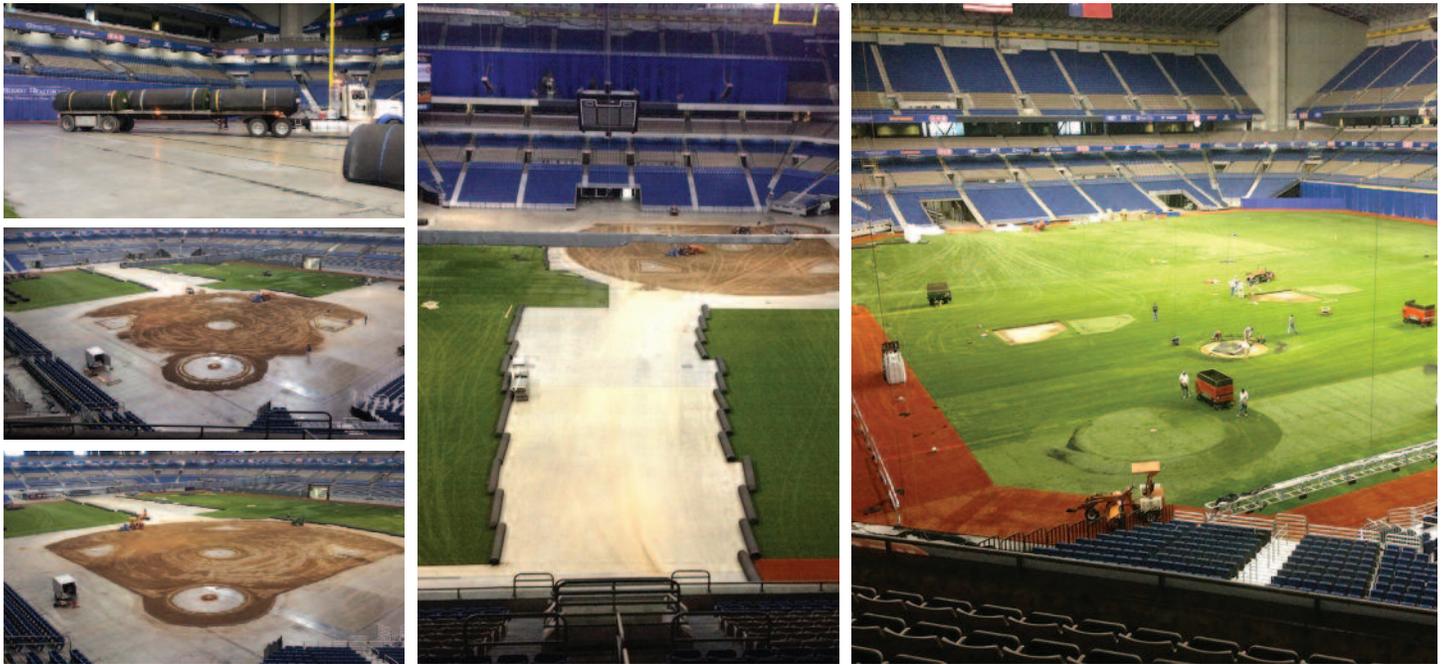
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## Setting up for a “Big League” weekend in the Alamodome

**S**ince its completion in 1993, the Alamodome in San Antonio has hosted many events. From NBA basketball to boxing, Final Fours to football, ice shows to trade shows, monster trucks to bull riding; its versatility has made it an easy choice for events both large and small. So when officials from Ryan-Sanders Baseball, a group founded in part by Hall of Fame pitcher Nolan Ryan, approached the Alamodome about hosting professional baseball, it was an opportunity to do something that never had been done inside the facility.

...decision was made to use **133,000 square feet** of custom turf from AstroTurf.



*“We felt most comfortable with AstroTurf and their staff,” said Gottsch, “and with their being the official turf supplier for MLB we knew we would have their blessing.”*

One of the first questions many wondered was why the Alamodome? “With our two teams in Central and South Texas (Round Rock Express and Corpus Christi Hooks), and the Ryan’s Ranch near San Antonio, they (the Ryan’s) had driven past the Alamodome many times and wondered about the possibility of baseball,” explained JJ Gottsch of Ryan-Sanders Baseball. “It was never the right time or the right opportunity never presented itself before, and then when Nolan became CEO of the Rangers, it became a possibility. The opportunity for the Rangers to extend their brand in San Antonio, and the chance to do something really special and unique, led us to the event.”

Playing a baseball game in a facility not specifically designed for baseball presented many challenges. Essentially everything had to start from scratch, from the playing field, to walls, bullpens and nets, batting cages and screens, none of which were available in the Alamodome. According to Gottsch, “We created a great team with Dome staff, MLB and Ryan-Sanders Baseball to get it done.”

The first hurdle was what to do for the playing field. Early ideas were to go with a grass field. However, when it became apparent that it would be labor intensive with



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no guarantee on how long it would hold up or for how many games, officials looked at other options, including the possibility of purchasing the original turf field from the Sky Dome in Toronto. But in the end the decision was made to use 133,000 square feet of custom turf from AstroTurf.

“We felt most comfortable with AstroTurf and their staff,” said Gottsch, “and with their being the official turf supplier for MLB we knew we would have their blessing.”

The field installed was an AstroTurf GameDay Grass 3D52 Diamond synthetic turf system, a third generation artificial playing surface. Once the turf was selected, a decision needed to be made on whether the turf would be laid on a pad, dirt, or the concrete floor alone, and how the dirt areas would be handled. With the help of Murray Cook, former president of the Sports Turf Managers Association and a MLB consultant, the decision was made to put a 3-4 inch thick dirt sub-base under the infield area and feather it down to the floor in the foul areas and starting beyond the 95-foot arc to the outfield.

Doing a one-of-a-kind install like this would be difficult under normal circumstances, but making this one even more complicated was the Alamodome’s busy schedule. In addition to getting ready for this event, the Dome already had other events on the schedule; two home games for the San Antonio Talons of the Arena Football League, a 2-day running event, and a pay per view Total Nonstop Action wrestling event. Coordination among all the parties was key; if this was going to succeed, we all had to be on the same page.

Kevin Swank with Texas-based AstroBuilders handled the install of the turf. When the turf was delivered, his team began the process of cutting it and piecing it together to conform to the Dome floor and seating configuration.



Once that was done, the turf in the north half of the building was rolled up and moved south and stored so stadium staff could install the arena for the Talons home game. This also required the turf on the south side to be partially rolled up so seating could be moved.

As soon as the AFL game was over, that field was removed and seating moved back, and the installation of the dirt sub base began. Garrett Reddehase, field superintendent for the Round Rock Express, and his staff handled this portion of the project. Once home plate was set, wood frames for home plate, the pitchers mound and each of the three base pits were constructed and placed. Then, approximately 300 cubic yards of dirt was brought in to provide the base that the turf would be laid on. Reddehase and staff then laser graded everything, and once it was completed, the turf was laid back in place and finally preparation of the turf began. Total installation of the turf took 8 days, which is about one-third of the time a standard project takes.

Upon completion of the turf, the crew from Round Rock began finally prep of the base pits, home plate and the pitchers mound. Bullpen mounds were constructed in the tunnels leading from the loading docks to the stadium floor. Crews began hanging wall pads on the seating and temporary fencing was placed in the corners and from behind home plate down the 3rd base line to form one of the dugouts. Once the games were complete, the turf was rolled up and hauled off to a storage facility down the street from the Dome, along with the wall pads, fencing and other items used for the event, to be used for future games.

More than 75,000 people attended the 2-day event that saw the Texas Rangers take on the San Diego Padres. Overall the response to the event was good from the both players and fans. Recently, a 2-year agreement was signed that will bring Big League Weekend back to the Alamodome. In 2014, the Texas Rangers will take on the Houston Astros for two games. As with anything, some changes will be made to enhance the experience for players and fans. The bullpens will be moved out onto the field so fans can see them. Lighting will be added in the corners to help brighten up these areas up (Alamodome lighting is configured for football not baseball). In addition, home plate will be moved a few feet to make the viewing experience better for all fans. Officials for both the Alamodome and Ryan-Sanders Baseball hope that this event will be something that they can grow and continue to do for many years to come. ■

*Thomas McAfee is the Facilities Operations Coordinator, Convention & Sports Facilities Department, for the City of San Antonio.*



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# Maximizing pesticide performance

*Editor's note: The author is the product manager and technical specialist for WinField's Professional Products Group.*

**P**esticides are one tool turfgrass managers use to create quality playing conditions. Using pesticides can increase the financial investment in a field and can raise concerns from stakeholders. Improving pesticide performance can reduce reapplications, thus optimizing financial investments and possibly reducing stakeholder exposure. Pesticide performance is influenced in three areas of the application process: in the spray tank, between the equipment and the target, and on the surface of the target. There are several adjuvant technologies on the market that can be used to improve pesticide performance in each of these areas.

acidifiers, which could take the pH into a bad range for the pesticide being used. Both buffering agents and acidifiers must go in the spray tank before the pesticides to have the desired effect. Additionally, it is best to fill the spray tank almost completely before adding these products to limit pH fluctuations with additions to the tank.

Most everyone has witnessed an ineffective application of glyphosate, which is the active ingredient most effected by positive ions in carrier water. Positively charged ions in carrier water also decrease pesticide performance. Ions, such as calcium, iron, potassium, sodium and magnesium, can attach themselves to active ingredients. This attachment alters the chemistry of the active ingredient, therefore, rendering the individual molecule ineffective. Although positive ions cause problems with only a few pesticides, mainly weak acid herbicides, they can really limit pesticide performance.

Water conditioners can be used to remove free positive ions in the water. In one study at Kansas State University, the addition of the water conditioners, AirTech, Dispatch or Bronc Plus Dry EDT to a mix containing glyphosate and hard water (452 ppm) more than doubled the control of large crabgrass. Just like buffering agents and acidifiers, water conditioners must go in the tank before the active ingredient and it is ideal to have the spray tank mostly filled before using water conditioners.

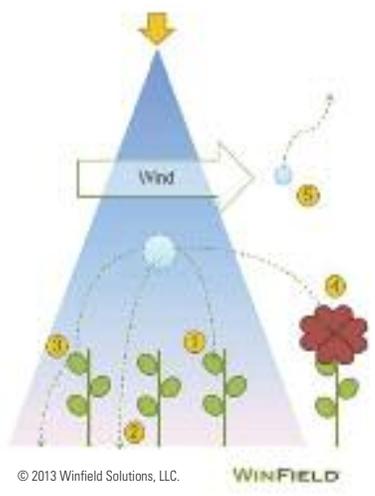
As a spray droplet leaves the nozzle, the droplet can hit the target, miss the target, bounce off the target, drift away from the target, or evaporate. Numerous studies have concluded that pesticide performance is increased when more droplets reach the target. Too big and small droplets need to be minimized in order to get the most droplets on the target. The greatest concern should be over small droplets as they have the potential to drift away from the site and cause off target damage. Equipment modifications and adjuvants are the two main ways to alter droplet size.

Spray pressure, nozzle pattern, nozzle spray angle and nozzle age have the most impact on droplet size. As spray pressure increases, the average size of spray droplets decrease. Flat fan nozzles produce the finest spectrum of droplets, while air induction nozzles produce a coarser droplet spectrum. Wide angle nozzles, such as 110o, produce more small droplets. Brass and stainless steel nozzles wear the fastest and worn nozzles produce more small droplets. Spray pressure should be lowered and new nozzles with an 80o angle that produce a coarser droplet size, but still provide adequate coverage, should be selected to minimize the number of small droplets created.

Polymer and oil based drift adjuvants are two technologies that minimize small droplets. Polymer adjuvants increase surface tension by thickening the spray solution. This significantly increases the size of droplets, which makes them less prone to drift. Polymer products are known to cre-

## In the environment

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4. Drift: off-target deposition - 20-200 µm
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## In the spray tank

Pesticides typically make up a fraction of the material in a spray tank. The quality of the carrier water is often overlooked, but the quality of the carrier water can have a significant impact on pesticide performance. The pH and presence of positively charged ions are the two main concerns with carrier water.

Mixing pesticides with too acidic or basic water can decrease pesticide performance. Under the wrong pH the rate of pesticide breakdown increases, which reduces the activity of the pesticide. With some pesticides, the activity can be reduced by half in a matter of minutes. Most pesticides prefer to be in slightly acidic water.

Buffering agents and acidifiers are two chemistries that can alter carrier water pH, thus limiting pesticide breakdown. Buffering agents lower the pH to around 6 and then maintain the pH in that range as other products are added. Acidifiers can lower the pH below 6. Unlike buffering agents, the addition of more carrier water or pesticides can raise the pH of a solution containing

ate droplets that are too large and mix poorly in spray tanks. Oil-based drift adjuvants increase droplet size, but mix more easily and do not create substantially bigger droplets. This makes them the ideal adjuvant to optimize droplet size. Drift adjuvants should be considered for every spray, even when wind is not present, because the improved spray spectrum leads to significant improvements in pesticide performance.

### On the target

Once a spray droplet reaches the target it must be absorbed to have the desired effect. Increasing droplet spread increases the contact area, thus increasing the potential for absorption. The longer a droplet remains in the liquid state the better chance there is of absorption. Droplet spread and droplet longevity can be improved with two different classes of adjuvants.

Droplet spread can be increased with the addition of non-ionic or organosilicone surfactants. Both of these technologies increase droplet spread by reducing surface tension. Organosilicones increase the droplet spread substantially, up to four times as much as a water droplet. The increased spread of organosilicones leads to faster drying time, which can limit overall uptake. Organosilicone surfactants are best used with contact insecticides and fungicides. Non-ionic surfactants are best used with systemic pesticides and herbicides.

Droplet longevity can be increased with the addition of crop oil concentrate and methylated seed oil adjuvants. Crop oil concentrate adjuvants do not increase the size of the droplet, while methylated seed oil adjuvants increase the size of the droplet. The difference in droplet size tends to lead to greater pesticide uptake with methylated seed oils. When using crop oil concentrates and methylated seed oils increased absorption occurs in both the target and the desirable species in the area. Thus, these oil adjuvants can lead to damage in non-target organisms. Both of these technologies are best used with herbicides.

Improving pesticide performance begins with recognizing the factors that limit pesticide performance. Pesticide performance can be increased by making sure the pesticide remains active in the spray tank, the spray droplets reach the intended target and the pesticide is absorbed by the target. Buffers, acidifiers, water conditioners, anti-drift, non-ionic surfactants, organosilicone surfactants, crop oil concentrates, and methylated seed oil adjuvants are useful products to manage factors impacting pesticide performance. The pesticide applicator is responsible for analyzing spray conditions and making the appropriate decisions that maximize pesticide performance. When pesticide performance is high, fewer reapplications are needed. ■

*Aaron Johnsen is the product manager and technical specialist for WinField's Professional Products Group.*

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# Fungicides: *what they do (and don't)*

**Y**our turf has a disease! What do you do? Reach for a fungicide? What kind? And what's the best way to use it? What exactly do fungicides do? How can I maximize my chance of getting a good result from a fungicide? There are several ways in which fungicides are classified: By when they are used, by how they move (or don't move) inside a plant, by their chemical structure, and by their mode of action (how they kill a fungus, or prevent it from growing).

## TIME OF USE

Fungicides can be used both preventively, before any disease symptoms are present, and curatively, after disease occurs. This distinction is important because some fungicides are much better suited for one of these uses than others. For example, fungicides that work by activating a plant's natural defense responses to infection must be used preventively. By the time a disease is ravaging a plant, its defenses are already being overcome.

Although a fungicide application made after disease symptoms appear is called curative, it's important to remember that fungicides don't actually bring dead plants back to life. If a lawn or field is suffering from a disease, a curative fungicide application can stop the dead patches from getting bigger. But for the turf to recover takes either good growing conditions for the grass to fill back in if it can spread vegetatively, or to re-establish via new seed if it can't spread vegetatively. This is why turf managers should be much more aggressive about treating (and preventing!) diseases at the end of the growing season: it is much harder to repair damage than during good growing weather.

Some fungicides are able to be absorbed into plant tissue and moved in a plant's vascular system, while others are not. In general, fungicides that do not move inside a plant are called contact fungicides. These fungicides work by coating the leaf with a protective fungicide barrier that will prevent any spore or piece of fungal mycelium that lands on a leaf from growing and being able to infect the plant. Since contact fungicides can only protect plant parts that the spray lands on, they are useless for treating root diseases like spring dead spot, summer patch, *Pythium* root rot or anything else that infects below ground.

Because the contact fungicides work outside the plant, they must coat the entire leaf on both sides. Getting even spray coverage can be tricky in turfgrass, which has many small leaves that overlap each other. This is why fungicide labels specify using large volumes of water, often as much as 5 gallons per 1000 square feet (more than 217 gallons per acre)! This is much more water than is used for spraying herbicides, but it is needed to ensure there is enough fungicide solution to cover every leaf thoroughly. One problem that turf managers often have is that they have only one sprayer and setting it up for both herbicide and fungicide applications can be time consuming. The time it takes to refill a sprayer tank also has to be taken into consideration when deciding on spray volumes for fungicide applications over large areas, like multiple field sports complexes, but the large volumes are on the label for a reason.

Nozzle design also can have a large impact on the effectiveness of fungicide applications. In general, nozzles that produce many smaller droplets or droplets that are designed to shatter into many tiny droplets on impact (flat fan or air induction type nozzles) give better results than raindrop type nozzles designed to produce fewer, large droplets. However, smaller droplets also drift much more easily. Air induction nozzles may offer the best combination of reduced drift and good coverage.

Some fungicides can be absorbed into a leaf and diffuse around different parts of a single leaf, but they do not enter a plant's vascular system and so cannot be transported from leaf to leaf. These are called local penetrant fungicides. Local penetrants, by entering a leaf and diffusing through it, reduce the need for absolutely perfect spray coverage although they are not able to move down from a plant's leaves to the roots and so are, like the true contact fungicides, not effective against root diseases.

With both true contacts and local penetrants, the recommended re-application intervals are relatively short, on the order of 5 days to 2 weeks depending on the individual product and disease pressure. New grass leaves that formed since the last application are not protected, and the fungicide coating can be susceptible to being washed off the leaves or degraded by sunlight. The tradeoff for a relatively short window of protection is that contact fungicides usually are the cheapest.

A fungicide that is able to move throughout an entire plant is called systemic. Systemic fungicides are generally very useful in preventive applications, because they are able to be absorbed by and remain present in a plant for several weeks. Re-application



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intervals for these types of fungicides are generally in the two to four week range. However, most systemic fungicides can only move upwards in a plant. If they are absorbed by the roots they will be moved to leaves, and they will move from lower leaves to newer leaves, but they will not move from leaves down to roots. The only exceptions to this rule are the phosphite fungicides.

Because these fungicides are actively taken up by plants, they can be effective against root diseases—provided that there are actually roots there to absorb the fungicide! The problem with root diseases is that above-ground symptoms often don't appear until the root system is almost totally destroyed. In some cases, such as spring dead spot, symptoms don't appear until months after the initial infection. It is much, much better to use a preventive application than a curative application to fight root diseases in almost every case.

It is very difficult to predict where a root disease will occur without complete and accurate records. With most root diseases, the fungus stays in the soil year after year and disease occurs in the same areas over and over again when the weather is favorable for the fungus. So keeping good records of a disease occurrence will allow the proper preventive applications to be made before the next outbreak. When making fungicide applications to prevent a root disease, remember that the fungicide has to move down through the canopy, through the thatch and into the soil before a root can absorb it. Many times a preventive

fungicide application will fail because it wasn't sprayed in enough water to wash it thorough the canopy (or it wasn't irrigated in after application), or because the fungicide became bound to organic matter in an excessively thick thatch layer. Again, following label directions for spray volume and irrigation and managing the thatch layer are critical factors in using fungicides successfully against root diseases.

Mode of action refers to the specific biochemical processes in a fungus that a fungicide interferes with in order to kill it, or at least stop it from growing. There are many different modes of action available in the fungicides labeled for use on turfgrass. Some fungicides interrupt a fungus' cell division, some interfere with cell wall or cell membrane synthesis, some disrupt a fungus' ability to make DNA, RNA, or proteins, some stop energy production, and some have more than one mode of action.

One mode of action relatively new to the turfgrass market is the activation of plant defense responses. Chemicals that do this are not toxic to fungi, but they "fool" plants into activating their array of physical and biochemical responses to infection before they are exposed to a fungus. This in turn boosts the plant's ability to resist infection and reduces disease incidence and severity. As noted above, however, this only works if the defense response activator is applied before any infection takes place. This type of fungicide does not work as a curative application.




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While there are many different modes of action available, many of the most popular fungicide products for turf contain ingredients with the same mode of action. This brings up the potential problem of fungicide resistance. Fungi are highly diverse and repeatedly spraying the same mode of action selects for any resistant individuals that happen to be present in a given population. If they are, then they multiply while susceptible ones are killed and soon the majority of the fungal population is resistant and the fungicide stops working to prevent disease.

Modern fungicides tend to have very specific sites of action in fungi. For example, many target just one enzyme in a fungus, binding to it and making it no longer able to function. This is good, since it means that the fungicides are very specific and less likely to cause harm to non-target organisms. But it is also bad from a resistance standpoint because it means that all that has to happen for a fungus to become resistant is a small change in that one enzyme such that the fungicide can no longer inactivate it. This happens in nature and often just one or two mutations are enough to make a fungus resistant.

Because of the potential for many turfgrass diseases to become resistant to fungicides, managers have been advised for years to rotate modes of action or to tank mix more than one mode of action at a time in a given application. The international Fungicide Resistance Action Committee (FRAC, [www.frac.info](http://www.frac.info)) maintains a listing of currently registered fungicide active ingredients and their modes of action. They are sorted into groups of individual ingredients sharing the same mode of action and each group is assigned a unique code.

Recently, manufacturers have begun placing the FRAC mode of action group codes on their product labels. This is a tremendous help to the turf manager trying to manage resistance as now it is immediately obvious which products contain ingredients that have the same mode of action. Now it is possible to tell at a glance whether rotating to a given product will actually mean switching modes of action.

It is important to remember, though, that even though resistance has been documented in many turfgrass diseases, not every failed fungicide application is due to resistance. It is still more common to see fungicides fail due to improper calibration, reading labels incorrectly, not using enough spray volume and/or the wrong nozzles, and plain old misdiagnosis of the disease. Nevertheless, if you suspect resistance, it is a good idea to contact your local Extension agent or plant pathology lab. They will be able to assist you in identifying possible problems with your fungicide application and, if needed, can collect samples and screen them for resistance. ■

*Dr. Dave Han is an associate professor of Crop, Soil and Environmental Sciences at Auburn University and an Extension Specialist at the Alabama Cooperative Extension System.*

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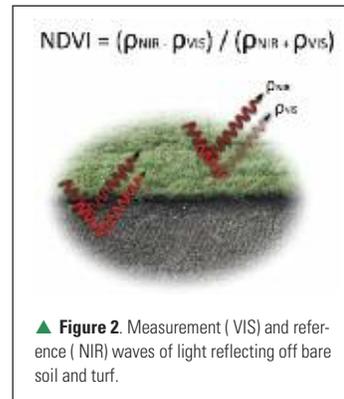
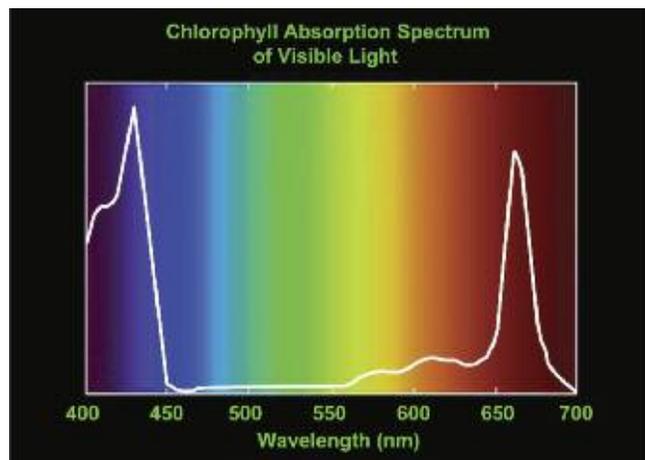
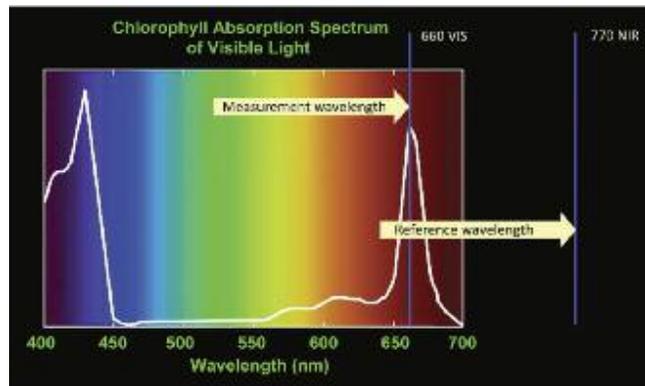
# Using canopy reflectance tools in turfgrass management

Turfgrass managers can tell a lot about turf just by looking at it—and the more experienced they are, the better their judgment. Nutrient status, pest damage, abiotic stresses (drought, traffic, etc.) are all visible to the trained eye. Sometimes, however, it's good to have some tools to help; the highly trained manager may not be available to see everything, or the problem may produce very subtle effects. This article discusses some recent innovations in assessing turfgrass, developed and widely used in turf research, which might be useful to the turfgrass manager.

What we see when we look at a turfgrass sward could be termed “canopy reflectance”; it's just the ambient sunlight reflected off the leaves in the full visible light spectrum. A trained

▼ **Figure 1. Top:** The peaks show the wavelengths of visible light that are absorbed by chlorophyll (Photosynthetically active radiation).

▼ **Figure 3. Bottom:** Measurement (660 nm) and reference (770 nm) wavelengths used by the Greenseeker to calculate NDVI.



▲ **Figure 2.** Measurement (VIS) and reference (NIR) waves of light reflecting off bare soil and turf.

researcher or turfgrass manager learns to record and interpret the details of what they see, whether it's the off color of nutrient deficiency or spray damage, or the darkening of drought stress. However, both in research and in practical management situations, we work with less well-trained helpers, and

will benefit from techniques that remove the subjectivity and observer bias, and reduce the need for training.

One very familiar tool is a camera, and with improved digital cameras this is a very useful adjunct to assessing problems. However, even though they can form an important permanent record, the digital photos still need to be interpreted. Researchers are working on improving software to analyze digital images to document and quantify turf characteristics (weed and disease infestation, drought and nutrient stress), but these full spectrum techniques are still relatively early in development for widespread turf use.

A more mature, and somewhat simpler, technology for assessing turf involves restricting the wavelengths observed to ones that we have learned through experience are indicative of turfgrass problems. Photosynthesis in plants involves chlorophyll absorbing light to power the plant, and the wavelengths that chlorophyll absorbs are a subset of the sunlight hitting the plant (Fig. 1). Light that chlorophyll absorbs is not reflected, and the light hitting the plant looks different from that reflected. Of the visible wavelengths, chlorophyll absorbs red light, generally, so the light reflected is white minus red = green. The wavelengths that chlorophyll absorbs are often termed photosynthetically active radiation or PAR.

Various sensors have been developed which all function in a similar fashion, comparing the reflectance off a surface (e.g. turf) of a wavelength that chlorophyll absorbs (measurement wavelength), with one that chlorophyll does not absorb (reference wavelength). Fig. 2 shows light reflecting from turf and bare soil. The longer (reference) wavelength is not absorbed by chlorophyll and is reflected equally from both surfaces; the shorter (measurement) wavelength is partly absorbed by the plant, and the reflected amount is reduced. Usually the meas-

# John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

## Answers from page 17

The brown area extending out from this softball infield was caused by a large homecoming bonfire. A plastic tarp was first placed in the center of this softball infield skin area and then about 2 tons of sand was applied to the top of the tarp to a depth of about 2 inches. Next hundreds of wooden pallets were stacked in the center of the skin area to a height of about 12 feet. The fire got over 1800 degrees Fahrenheit this year and high winds that night caused the flames to blow toward the left field turf and scorched the leaf tips well into the outfield grass. The fire department was on site the whole time and even monitored the fire temperature with an infrared camera but was not able to prevent damage to the turf. They put about 500 gallons of water on the fire after the event was over and then raked it and watered it again. It is about a 45 minute process putting out the fire. The tarp was pretty well scorched after this event and luckily the grass grew out after the fire burn. Interestingly enough, the clover in the outfield was totally killed by the heat and some small goosegrass plants that were in the clay area never stood a chance!

*Photo submitted by Tom Barry, Grounds Manager and Field Specialist at Greens Farms Academy in Westport, CT. ■*



If you would like to submit a photograph for John Mascaro's Photo Quiz please send it to John Mascaro, 1471 Capital Circle NW, Ste # 13, Tallahassee, FL 32303 call (850) 580-4026 or email to [john@turf-tec.com](mailto:john@turf-tec.com). If your photograph is selected, you will receive full credit. All photos submitted will become property of SportsTurf magazine and the Sports Turf Managers Association.

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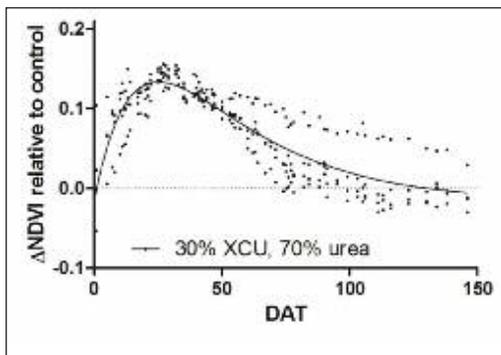
◀ **Figure 4. Left:** Greenseeker canopy reflectance sensor system.  
 ▶ **Figure 5. Right:** Spectrum FieldScout chlorophyll meter.

urement wavelength used is in the red (visible) part of the spectrum and the reference in the near-infrared (Fig. 3). Canopy reflectance sensors like this will report/record an index which is usually of the form  $(\rho_{\text{NIR}} - \rho_{\text{VIS}}) / (\rho_{\text{NIR}} + \rho_{\text{VIS}})$ . Rho ( $\rho$ ) is the reflectance, and you can see from the formula that when there is no absorbance by chlorophyll ( $\rho_{\text{NIR}} = \rho_{\text{VIS}}$ ) the top of the ratio is zero, and the index is zero. When all of the measurement wavelength is absorbed ( $\rho_{\text{VIS}} = 0$ ), the ratio becomes  $\rho_{\text{NIR}} / \rho_{\text{NIR}}$  or 1. Some sensor systems, like the Greenseeker (Fig. 4), will report an index between 0 and 1 (sometimes called the normalized-difference vegetation index, or NDVI), others like the Spectrum FieldScout (Fig. 5) multiply the index and report a value between 0 and 1000 (chlorophyll index).

**CANOPY REFLECTANCE IN TURF MANAGEMENT**

The key feature of canopy reflectance indices like NDVI and the chlorophyll index is that the values observed in turfgrass are very sensitive to a multitude of things of interest to a turf manager. Changes in nutrient status, moisture status, traffic, insects, disease, rootzone problems, and other biotic and abiotic stresses can all produce subtle shifts in canopy reflectance, some of which are even undetectable by a trained human eye.

Canopy reflectance, especially as it is affected by nutrient status, has become an important tool in precision agriculture, where maximizing yields and optimizing fertilizer inputs is tied to systems that measure reflectance. The uses in turfgrass management will likely be more complex as they develop, since yield and nutrient stress are



▲ **Figure 6.** Change in canopy reflectance following a single application of slow-release nitrogen fertilizer (points represent data from four replicate plots; the line is the best fit release curve; DAT = days after treatment).

only a small part of the stresses that turf experiences. For example, research is currently being done to examine the potential in water management, but most of the current use is in turf research.

A few examples of the power and sensitivity of

the system will, we hope, convince you that it is a technique to watch. The more the system is used in research, the faster the applications to the real world will be developed.

**FERTILIZER PERFORMANCE AND RELEASE CHARACTERISTICS**

Fig. 6 shows a sample of data collected from recent fertilizer performance trials at the Guelph Turfgrass Institute (GTI). The points show the change in NVI as a fertilizer application at day 0 gradually releases and increases the absorption of PAR to the maximum at ~25 days after treatment, then gradually declines as the fertilizer runs out at ~100 days. Using these techniques we can help fine tune release characteristics of fertilizers, but the same data could help a turf manager track nutrient status.

**GERMINATION, ESTABLISHMENT AND COVER DEVELOPMENT IN TURF**

Canopy reflectance can be used to track the establishment of newly seeded turf. In research trials, we can use this to assess different cultivars, blends and mixtures, or different management techniques in establishment. Fig. 7 shows cover development in a recent trial at the GTI, and Fig. 8 shows the change in canopy reflectance in one of the entries over the first 26 days after seeding. Fig. 9 shows data from an earlier trial, in this case using the chlorophyll index rather than NDVI. Sixteen Kentucky bluegrass cultivars show clear differences in speed of establishment as measured by canopy reflectance.



▲ **Figure 7.** Cover development in turf trial.

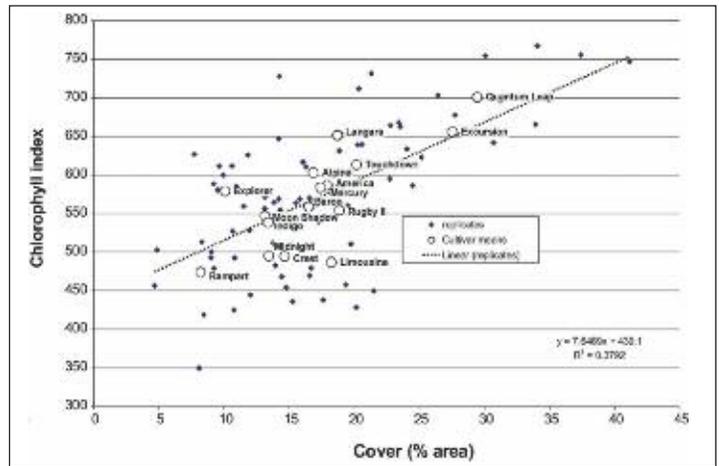
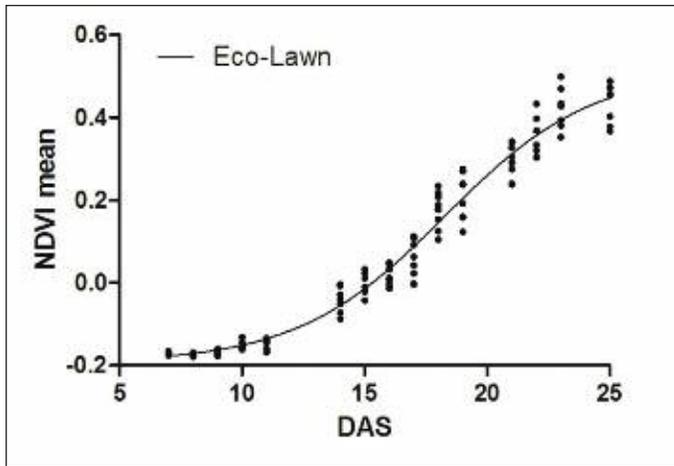
**DROUGHT STRESS, WATER USE AND LOCALIZED DRY SPOT**

Fig. 10 shows localized dry spot and treatment effects of wetting agents in a recent trial. If we look at the canopy reflectance and independent assessments of soil moisture (Fig. 11) and localized dry spot (Fig. 12), the potential of canopy reflectance to detect and help manage water problems is clear. We have also used the technique in assessing the effectiveness of different irrigation regimes in establishing turf from dry seeding, hydroseeding, and sod.

**OTHER BIOTIC AND ABIOTIC STRESSES**

As mentioned above, many stresses that affect turfgrass will be detectable in changes in canopy reflectance. We routinely use the

▼ **Figure 8. Left:** Increase in canopy reflectance with germination and cover development in seeded turf. ▼ **Figure 9. Right:** Association between grass cover and canopy reflectance (chlorophyll index) in Kentucky bluegrass cultivars.



technique in assessing trials involving dollar spot disease, for example. Fig. 13 shows symptoms of dollar spot as they develop in a recent trial, and Fig. 14 shows how the disease pressure shows up in the canopy reflectance data.

**WHAT'S NEEDED BEFORE THE TOOLS ARE WIDELY USED BY TURF MANAGERS?**

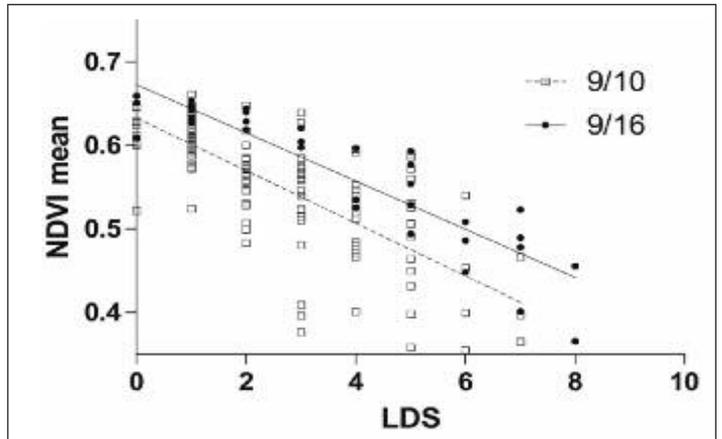
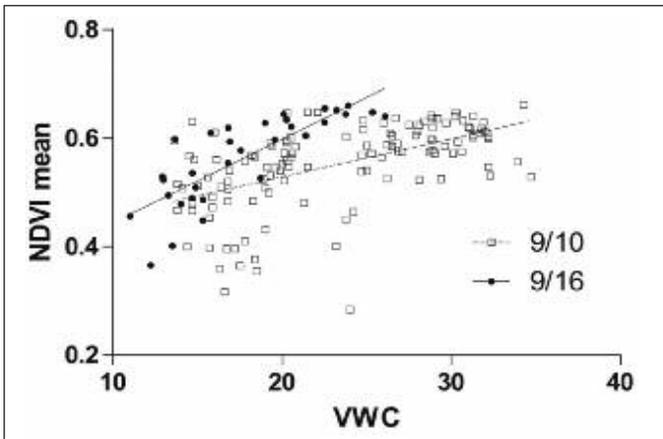
Experience. We need to have a better grasp of how the numbers change across species, management conditions, etc. It is a very

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▼ **Figure 11. Left:** Association between soil moisture (volumetric water content – VWC) and canopy reflectance in wetting agent trial. ▼ **Figure 12. Right:** Association between localized dry spot (rated visually) and canopy reflectance in wetting agent trial.



**Figure 10.** Localized dry spot in bentgrass turf; some plots are treated with wetting agents.

young technique outside of research applications.

**Calibration.** The sensitivity of the tool to so many factors means that in order to isolate effects of interest, we need to learn to calibrate to remove extraneous noise (we use untreated control plots in research, and similar techniques can be used in management).

**History.** The more the tools are used on a particular turf area, the better the information. The advantage of these tools is that they automatically record and time-stamp the information, and if so-

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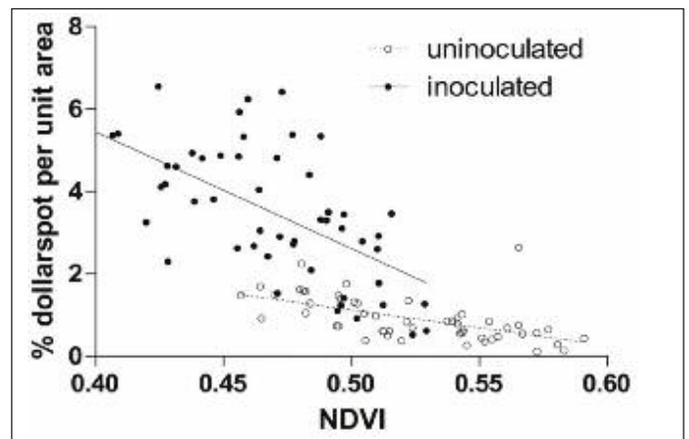
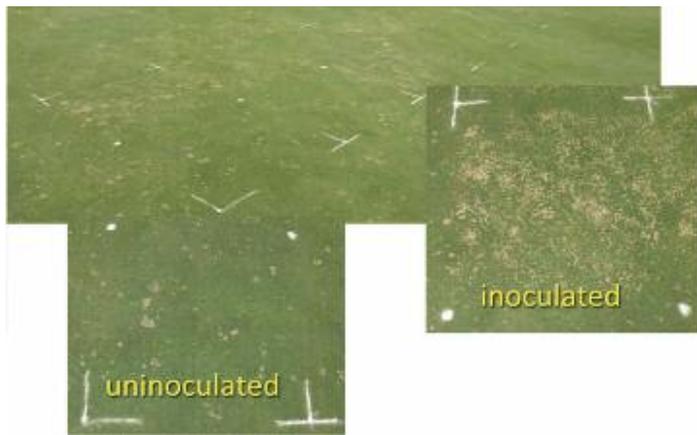


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▼ **Figure 13. Left:** Dollar spot disease on inoculated and uninoculated plots. ▼ **Figure 14. Right:** Association between canopy reflectance and dollar spot disease levels in trial plots.



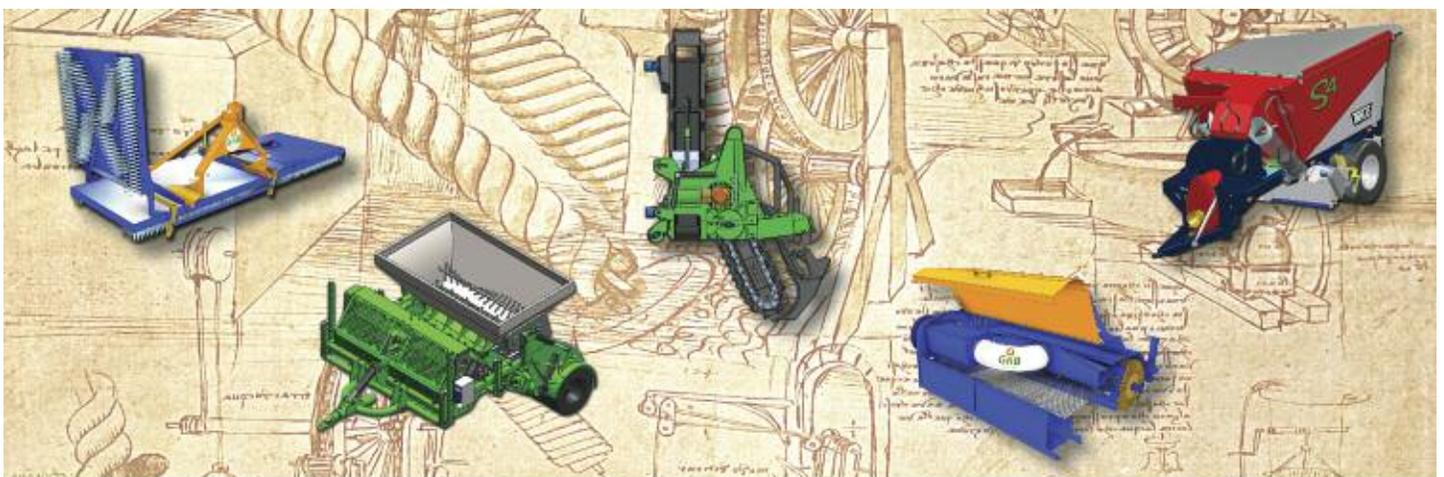
equipped will even record GPS information.

More computer tools. Recording, analyzing, and interpreting canopy reflectance data is dependent on computer software and training. At the moment the tools are research tools; widespread use of the techniques in industry will require computer tools that assist in the analysis and interpretation.

The tools and techniques are powerful, the equipment is easy to use and becoming more and more affordable all the time (currently

low four figures for the equipment we use in research), and worth keeping an eye on if you're a turfgrass manager. Someday in the not too distant future you may be sending your crew out to take routine canopy reflectance readings of your turf, and using the data to make your job easier. ■

*Dr. Ken Carey is a technician with the Department of Plant Agriculture, University of Guelph, Ontario, Canada.*



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# 50 Years: Willie Leak maintains TifGrand bermudagrass at RFK Stadium

**T**he iconic Robert F. Kennedy Stadium, affectionately known as RFK, was built in 1961, and was then called District of Columbia Stadium. In 1969, a year after the assassination of Senator Kennedy, the stadium was re-named in his honor. By that time, Willie Leak, head groundskeeper at the stadium, had already been working at the Washington, D.C., facility for 4 years. This year, Leak celebrates half a century of service

Leak began his career at RFK as a part-time member of the grounds crew. **In 1969**, he was hired to the full-time crew. **In 1997**, he was promoted to head groundskeeper.

*"Something here just draws me," Leak says, "and makes me come here everyday."*



◀ **WILLIE LEAK**, head groundskeeper, RFK Stadium. Photo credit Nick Woodall, Mike B Photography.



▲ **IN 1994**, RFK hosted the FIFA World Cup; this game featured the USA v. Germany. Kea Taylor, Imagine Photography.

at RFK. "Something here just draws me," Leak says, "and makes me come here everyday."

Leak began his career at RFK as a part-time member of the grounds crew. In 1969, he was hired to the full-time crew. In 1997, he was promoted to head groundskeeper. He's held the position ever since. "I haven't missed any games. I've been here for quite a few things," Leak says.

Those few things include 35 years as the home of the Washington Redskins NFL football team and nine years as the home of the Washington Senators Major League Baseball team. Since 2011, RFK has been the venue for the NCAA AT&T Nation's Football Classic, featuring teams from the traditionally black universities Howard University and Morehouse College.

The 45,423-seat stadium was the site of concerts by the Beatles in 1966; Bruce Springsteen and the E Street Band in 1985; the Jackson Five in 1974 and 1984; and U2 in 1987, 1992 and 1997. RFK has hosted many religious, memorial and charitable functions. Of note are the 2009 National Day of Service for Our Military when more than 12,000 volunteers joined First Lady Michelle Obama to create 85,000 care packages for troops serving overseas; and United We Stand, a 2001 benefit concert spearheaded by Michael Jackson to benefit victims of the September 11th attacks.

In recent years, RFK has been a Mecca for soccer-related events. In 1994, RFK hosted the FIFA World Cup. In 1996, the stadium hosted nine soccer games over six

days during the Summer Olympic Games. And since 1996, RFK has been the home field of the DC United MLS soccer team.

Field prep these days focuses on soccer for DC United, a 40-game soccer festival for AESA-ONE (the All Ethiopian Sports Association), and football for the Howard vs. Morehouse game. The main difference in maintenance between the two sports the field must service, Leak says, is the height of cut. For soccer, the turf is mowed at 3/4-inch. For football, it's mowed at 1.5-inches.

Two years ago, Leak says the decision was made to regrass the existing Tifway 419 bermudagrass field with a new shade-tolerant turf variety called TifGrand bermudagrass.

"One of the main reasons why we switched over was the shade tolerance that this particular grass provided," says Mike Mohamed, RFK building manager. "We have an overhang that goes around the entire stadium and it creates quite a bit of shade, even in the summer months on the field. The nearside of the field and the corner will be in shade almost year round. We had a lot of issues trying to bring that turf back after play and getting it to recover because it didn't get enough sunlight. So we wanted to use this turf just to test it out to see how the recovery would be since it is a shade tolerant grass. So far, the nearside near the tunnel where we've had a lot of shade issues in the past, it's been a lot better this year. It gets a lot of traffic there. The teams warm up there so it gets a lot of wear. The field as a whole has been able to recover very well. TifGrand has been markedly better than the turf we used before."

Dr. Wayne Hanna, who developed TifGrand bermudagrass at the University of Georgia, attributes the shade tolerance and fast recovery of the grass to its thick, vigorous rhizome structure.

"TifGrand has a good rhizome system right below the surface so even if the tops get damaged, or if it doesn't get a lot of sun, it has a lot of reserve energy right below the ground to keep the grass moving," Hanna says.

Leak says he has noticed an increase in wear tolerance with the TifGrand over the old 419 field. "The divots in the grass grow back really fast," Leak says.

Even though TifGrand is quite durable, every grass has its limits. Each July since

2011, RFK has hosted the AESA-ONE soccer festival. The event consists of 40 semi-pro soccer matches played in just one week's time. Three weeks later, DC United is scheduled to play a league game in the stadium.

"With the amount of games we played, basically from the goal mouth to the goal mouth, if you'd take the 18-yard box and just

extend it all the way down, in between those areas got so torn up that there really wasn't any grass left in those spots because of the amount of games that were played. You've got to remember, it's a semi pro league, so the wear and tear, the sliding that they put on the field is a bit more than the professionals do. There's just nothing to bring back. To have

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## Field Science

DC United come back and play a league game on the field would be a disservice. So, we decided to resod the field,” Mohamed says.

Leak adds, “In order for the whole thing to look the same, we just decided to resod the whole field. We figured that would be the best way to go. We only have X-amount of time to recover and we didn’t think we had enough time to make it come back in time for soccer.”

After the tournament, the field is stripped of sod, laser graded and resodded, “everything as if we were installing a new field,” Leak says.

Charles Harris is the president of Buy Sod, Inc., the licensed sod producer that grew and installed the original TifGrand field at RFK. Buy Sod is licensed to produce TifGrand through The Turfgrass Group. Buy Sod has come back each July after the weeklong tournament and replaced the grass, providing the stadium with a brand new playing surface every year. Because he knows the replacement sod will be needed each summer, Harris and his team plan ahead.

“We select the sod field the grass will come from the year before and hold out the grass to be sure it’s at least two growing seasons old so the sod is very mature and will hold together very well. We grow the turf in sand and the rhizomes on the back of the pad are very uniform,” Harris says. “I think that’s the critical component, the quality



**JFK FIELD CREW (L-R):** Pablo Blanco, Michael Mohamed, Willie Leak, Jeff Hunter, Anthony Jones. Photo credit Nick Woodall, Mike B Photography.

of the sod and the way you’re maintaining it so it’s ready for play when you put it down ... The TifGrand is extremely dense. There are just more plants per square foot and the density makes it really wear tolerant. We take the mowing height down to 3/4-inch

in the farm field. It gets dense and tight and uniform so it plays very well and holds up to traffic.”

The TifGrand sod is grown on sandy soil in North Carolina and some 95,000 square feet of sod is shipped as 42-inch big rolls to the stadium site.

“Now it’s almost routine,” Mohamed says. “Once we have the event in July, we know we’re tearing up the field. It only takes about a week to get the old field up and the new field down.”

Resodding an entire field every year is an expensive proposition but Mohamed says, “fortunately the event in July helps take care of some of those costs.”

Erik Moses is senior vice president of sports & entertainment for Events DC, the entity that operates the stadium for the city. Moses explains his position as the “person responsible for attracting events to our campus.” He says that his clients, including college coaches and event promoters, continuously offer enthusiastic compliments regarding the condition of the field. “We get those kinds of accolades because

of the hard work that Willie and all of the other guys do to preserve and maintain that surface. They make my job easier for me. I would be remiss if I didn’t explain how maintaining the field and the playing conditions in a particular way really impacts our business, the bottom line and how we service our customers. These guys really play a big role in that.”

The stadium “does function as a living monument to Robert Kennedy,” Moses says. “It means so much to the city. That is why we try so hard to maintain it. Fifty-two years and counting.”

Mohamed says he, like Leak and so many others, has a love for the stadium.

“I’ve been coming here since I was 7-years-old. I was a big Redskins fan. It has a lot of history to it. So much has happened here. The Rolling Stones, Michael Jackson, The Grateful Dead. So many people have been in and out of this building,” Mohamed says. “We have a saying around here that RFK’s got you. You’ll be here forever. You just don’t know how long forever is going to be.” ■

*Stacie Zinn Roberts is an award-winning writer and president of What’s Your Avocado?, a writing and marketing firm based in Mount Vernon, WA*

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# Introducing baseball around the world one village at a time

**Children are playing baseball at the** base of a volcano in the heart of the jungle. In the village of Bongo, in Chiriqui, Panama, boys and girls ages 6 to 12 are swinging for the fences, rounding the bases and falling in love with America's pastime, thanks in large part to a relatively new outfit called More Than a Game.

"The hunger to play baseball is there, but there is nowhere to play in locations like Bongo," says Tim Fanning. "It's not an uncommon situation. The children want to play and learn the game, but they have no field, no equipment and no idea how to play."

Fanning is the head baseball coach at Glenwood High School in Phenix City, AL. He is

also the co-founder of More Than a Game. Established in 2010, Fanning and co-founder Marshall Murray formed the organization to serve communities using the vehicle they knew best: baseball. The 501(c)(3) nonprofit organization seeks to teach baseball to the next generation.

Not long after its formation, More Than a Game divided its efforts into two fronts. Murray's focus is local, planning youth baseball clinics and other community projects. Fanning's focus is global, aiming to bring baseball to those who haven't had the opportunity to play.

*Continued on page 49*



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# Committee service is calling you!

**“Committees are the workhorses of STMA,** says CEO Kim Heck. “They make our job at headquarters so enjoyable and so much more effective.”

STMA is considered a small-staff association in the world of associations, but it has something that many of the large associations do not: a strong culture of Committee Volunteerism.

Committees have helped advance the work of STMA by providing insight and resources for current programs and ideas for future services. The nearly 200 volunteers who participate annually are provided various tasks short and longer-term—to help STMA achieve its strategic plan.

The President of STMA annually appoints each committee chair, and all of STMA’s membership is invited to volunteer. Consider yourself invited!

To help streamline the process of volunteering, STMA has moved it online, at [www.STMA.org](http://www.STMA.org), where members are asked to select one committee on which they are interested in volunteering. Our incoming President Pinsonneault asks for some flexibility and consideration from the membership to place volunteers where there is a need, if a particular committee is full. It is his intention to place all volunteers on a committee for the 2014 committee year, which begins March 1.

Available Committees, their purposes and the estimated time volunteers will spend is noted below. All committees meet primarily via conference call, as necessary.

- **Awards:** To judge the association’s awards program applicants selecting the Field of the Year winners and the Minor League Baseball Sports Turf Manager of the Year; to develop strategies to enhance the programs (approx. 12 hours mid-Oct. to mid-Nov.).

- **Bylaws:** To develop association bylaws, which are fair and enforceable, and clearly define the expectations for membership, governance processes and board of directors’ service (approx. 3 hours per year).

- **Certification:** To develop strategies to grow the number of certified members; to consistently monitor the program and recommend enhancements to ensure that the program is the top achievement for sports

turf managers (approx. 12 hours per year; also asked to volunteer to grade Student Challenge exams during the conference).

- **Chapter Relations:** To create a chapter structure that is beneficial locally and nationally; to financially assist chapters with their administrative, operations and educational efforts; to facilitate the sharing of best practices (approx. 6 hours a year).

- **Conference:** (Conference Education, Exhibition, and Tours subcommittees) To develop all content, sessions, workshops and off-site venues, and select speakers and moderators for the next year’s conference that will make it a “must attend” event for members and nonmembers; to recommend strategies that will drive attendance to the exhibition and will add value to exhibitors. (Education, approx. 12 hours over 2 months; Exhibition, approx. 4 hours per year; Tours, approx. 6 hours per year.)

- **Commercial Membership:** To recommend specific strategies to grow commercial membership and to develop benefits and value for our commercial members (approx. 4 hours per year).

- **Editorial:** To insure that the STMA magazine contains information relevant to the sports turf manager; to provide ideas and contacts for articles for publication (approx. 4 hours per year).

- **Environmental:** To develop environmental strategies that position STMA and its members as leaders in environmental stewardship and the related health and safety issues that impact fans and players (approx. 15 hours per year).

- **Ethics:** To provide a fair and unbiased council to investigate claims of ethics violations, determine if the claim has merit, and shepherd the appeals process. This Committee is called into operation only if there is an ethics violation claim (approx. 15 hours, if engaged).

- **Finance & Audit:** To provide oversight of the STMA’s financial resources by reporting information to the Board of Directors (approx. 6 hours per year).

- **Historical:** To preserve the history of the association and the profession (approx. 24 hours per year).

- **Information Outreach:** To develop educational and informational opportunities for members to enhance their personal and professional development (approx. 12 hours per year).

- **International:** To position STMA as a global leader in sports facility management and make STMA the “go-to” resource for those who work internationally in the industry (approx. 8 hours per year).

- **Membership:** To develop initiatives to drive membership growth and retention; to recommend programs that add value for each member (approx. 8 hours per year).

- **Nominating:** The Immediate Past President chairs this committee and selects its members. It must have representation from each category of membership (not available for general committee sign-up).

- **Past President’s Advisory Council:** Purpose: To advise the STMA Board on issues pertaining to the past, present and future of STMA (limited to STMA Past Presidents)

- **Scholarship:** To judge the recipients of the SAFE Scholarships, the Terry Mellor Educational Grant and the Gary Vandenburg Internship Grant; to develop strategies to enhance these programs (approx. 12 hours over 1 month, mid-Oct. to mid-Nov.).

- **Student Challenge:** To develop the annual student challenge exam questions, answer key, and protocols; assist in proctoring the exam as needed (approx. 8 hours per year and volunteering at the conference).

- **Student Membership:** To recommend specific strategies to grow student membership; to provide students with appropriate resources and services as they move to their first job post-college (approx. 6 hours per year).

Technical Standards: To help determine standards and best management practices needed in the profession and to guide the work of the ASTM on developing sports field and facility standards (approx. 4 hours per year).

- **Turfgrass Curriculum Task Group:** To develop and implement strategies to best utilize the STMA turfgrass curriculum (approx. 12 hours per year).

- **Website:** To insure that the STMA website contains information relevant to mem-

bers, prospects and the green industry in an easily accessible and consumable format (approx. 4 hours per year).

STMA would like to thank its 2013 Committee Volunteers. They are:

#### Awards Committee

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**Members:** Matt Anderson, CSFM, Michael Buras, CSFM, Patrick Coakley, CSFM, Grant Davisson, Alan Dungey, Joey Fitzgerald, Keith Gorczyca, Sarah Martin, CSFM, William McBride, Sr., Ben Polimer, Chris Ralston, Dean Rush, CSFM, Lance Tibbetts, CSFM, George Trivett, CSFM, Charlie Vestal

#### Bylaws Committee

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## **Student Challenge Subcommittee**

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Facility name:

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\*Not been an STMA national member since 2000. New student and affiliate memberships do not qualify for the free conference registration. However, all members are eligible to receive the \$100 voucher for referring a new qualifying member.

### Membership Category:

- Sports Turf Manager \$110  
 Sports Turf Manager Associate\* (Additional member(s) from the same facility) \$75

Please select the primary facility type where you are employed:

- Professional Sports  Higher Education  Schools K-12  Parks and Recreation

- Academic \$95  
 Student (verification of enrollment) \$25  
 Commercial \$295  
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 Affiliate (Person who is indirectly or on a part-time basis, involved in the maintenance/management of sports fields) \$50  
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Chapter name) \_\_\_\_\_ \$ \_\_\_\_\_  
 Contribution To SAFE Foundation (research, education and scholarship): \$ \_\_\_\_\_

**Total Amount Enclosed:** \$ \_\_\_\_\_

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\*There must already be a national sports turf member from your facility or commercial member from your company before you may sign up in the Associate category.

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Finn, Kevin Mathias, Ph.D., Brian McDougal, Joel Rieker, Brian Scott, Tom Serensits, John Sorochan, Ph.D., Tim VanLoo, CSFM, Lynda Wightman

### Technical Standards Committee

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### Website Committee

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## STMA & SAFE Report Audit Findings

**STMA** and its charitable arm, The SAFE Foundation, undergo an annual audit, which is conducted by an independent auditing firm. In 2013, STMA changed auditors after 5 years with the same firm, a practice recommended in the corporate world. STMA adopted that practice to insure the highest level of transparency and confidence in its results for its membership.

Pickett, Chaney & McMullen, LLP, (PCM) completed its work in June and reported the results to the STMA and SAFE Boards in July. The opinion of PCM confirms that STMA uses accepted accounting practices, has a solid financial basis, and has no evidence of fraud. "In our opinion, the combined financial statements present fairly, in all material respects, the financial position of Sports Turf Managers Association and Affiliate as of Dec. 31, 2012, and the changes in its net assets and its cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America," stated Chris Chaney.

<b>STMA</b>	<b>2012</b>
Revenues, Gains and Other Support:	\$ 1,154,399
Expenses	\$ 1,134,509
	\$ 19,890
<b>SAFE</b>	
Revenues, Gains and Other Support:	\$37,279
Expenses	\$42,627
	\$(5,348)

For more detailed information, contact STMA headquarters, 800-323-3875.

## STMA announces Minor League Sports Turf Manager of the Year winners

**STMA** and Minor League Baseball (MiLB) are pleased to report the winners of the annual MiLB Sports Turf Manager of the Year awards. Each league in MiLB conducts a survey to select their league's sports turf manager winner. These surveys include input from nearly 30 different stakeholders rating these STMA members on 11 different criteria. These winners subsequently submit an application to the STMA, and a panel of independent judges rates them on a variety of criteria including staff, budget, events, cultural practices, game day routine, plus field safety and other factors.

The MiLB and STMA are pleased to announce the following winners:  
 AAA—Chris Ball, Gwinnett Braves, International League  
 AA—Brock Phipps, Springfield Cardinals, Texas League  
 A—Keith Winter, Ft. Wayne TinCaps, Midwest League  
 Short Season or Rookie—Bryan Barkley, Connecticut Tigers, New York-Penn League

STMA CEO Kim Heck presented these winners with their awards during the Baseball Winter Meetings, MiLB Annual Awards Luncheon, December 9, 2013 in Orlando.

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## STMA Affiliated Chapters Contact Information

**Sports Turf Managers Association of Arizona:** [www.azstma.org](http://www.azstma.org)

**Colorado Sports Turf Managers Association:** [www.cstma.org](http://www.cstma.org)

**Florida #1 Chapter (South):**  
 305-235-5101 (Bruce Bates) or Tom Curran  
 CTomSell@aol.com

**Florida #2 Chapter (North):** 850-580-4026,  
 John Mascaro, [john@turf-tec.com](mailto:john@turf-tec.com)

**Florida #3 Chapter (Central):** 407-518-2347,  
 Scott Grace, [scott@sundome.org](mailto:scott@sundome.org)

**Gateway Chapter Sports Turf Managers Association:** [www.gatewaystma.org](http://www.gatewaystma.org).

**Georgia Sports Turf Managers Association:** [www.gstma.org](http://www.gstma.org).

**Greater L.A. Basin Chapter of the Sports Turf Managers Association:** [www.stmalabasin.com](http://www.stmalabasin.com).

**Illinois Chapter STMA:** [www.ILSTMA.org](http://www.ILSTMA.org).

**Intermountain Chapter of the Sports Turf Managers Association:**  
<http://imstma.blogspot.com/>

**Indiana - FORMING** - Contact Clayton Dame, [Claytondame@hotmail.com](mailto:Claytondame@hotmail.com) or Brian Bornino, [bornino@purdue.edu](mailto:bornino@purdue.edu) or Contact Joey Stevenson, [jstevenson@indyindians.com](mailto:jstevenson@indyindians.com)

**Iowa Sports Turf Managers Association:** [www.iowaturfgrass.org](http://www.iowaturfgrass.org).

**Kentucky Sports Turf Managers Association:** [www.kystma.org](http://www.kystma.org).

**Keystone Athletic Field Managers Org. (KAFMO/STMA):** [www.kafmo.org](http://www.kafmo.org).

**Michigan Sports Turf Managers Association (MiSTMA):** [www.mistma.org](http://www.mistma.org).

**Minnesota Park and Sports Turf Managers Association:** [www.mpstma.org](http://www.mpstma.org)

**MO-KAN Sports Turf Managers Association:** [www.mokanstma.com](http://www.mokanstma.com).

**Nebraska Sports Turf Managers Association:** [sphillips4@unlnotes.unl.edu](mailto:sphillips4@unlnotes.unl.edu)

**New England STMA (NESTMA):** [www.nestma.org](http://www.nestma.org).

**Sports Field Managers Association of New Jersey:** [www.sfmanj.org](http://www.sfmanj.org).

**Sports Turf Managers of New York:** [www.stmony.org](http://www.stmony.org).

**North Carolina Chapter of STMA:** [www.ncsportsturf.org](http://www.ncsportsturf.org).

**Northern California STMA:** [www.norcalstma.org](http://www.norcalstma.org).

**Ohio Sports Turf Managers Association (OSTMA):** [www.ostma.org](http://www.ostma.org).

**Oklahoma Chapter STMA:** 405-744-5729;  
 Contact: Dr. Justin Moss [okstma@gmail.com](mailto:okstma@gmail.com)

**Oregon STMA Chapter:**  
[www.oregonsportsturfmanagers.org](http://www.oregonsportsturfmanagers.org)  
[oregonstma@gmail.com](mailto:oregonstma@gmail.com)

**Ozarks STMA:** [www.ozarksstma.org](http://www.ozarksstma.org).

**Pacific Northwest Sports Turf Managers Association:** [www.pnwstma.org](http://www.pnwstma.org).

**Southern California Chapter:** [www.socalstma.com](http://www.socalstma.com).

**South Carolina Chapter of STMA:** [www.sc-stma.org](http://www.sc-stma.org).

**Tennessee Valley Sports Turf Managers Association (TVSTMA):** [www.tvstma.com](http://www.tvstma.com).

**Texas Sports Turf Managers Association:** [www.txstma.org](http://www.txstma.org)

**Virginia Sports Turf Managers Association:** [www.vstma.org](http://www.vstma.org).

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F  COACH      E  Other (please specify) \_\_\_\_\_

**3 Do you have the authority to buy, specify or recommend products and/or services for your business or organization?**

Y  Yes      N  No

**4 Yearly operating expenditures** (excluding salaries)

- F  Over \$1 million      C  \$50,001 - \$100,000  
E  \$500,001 - \$1 million      B  \$25,001 - \$50,000  
D  \$100,001 - \$500,000      A  \$25,000 and under

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“We’re not going anywhere on the planet where there is something, some diamond, already established,” Fanning says. “More Than a Game is about spreading the game of baseball to new places and people so we can give them the gift of baseball, which we hold so dear.”

Bringing baseball to Bongo wasn’t easy. It took two trips, the first of which came in the fall of 2012. A handful of More Than a Game volunteers traveled to Bongo and spent a week teaching children of two schools in the village how to play the game. In addition to educating them about the game, volunteers also outfitted the children with uniforms and equipment.

The children had now learned the game and looked the part, but still there was no baseball diamond—only jungle.

In a return trip to Bongo in July 2013, Fanning’s team of volunteers, along with a group of local villagers, carved out a baseball diamond.

“We built the diamond in 10 days,” Fanning said. “It wasn’t easy, I can tell you that, but when we finished you could tell it was a source of pride for the entire community. That’s what we’re all about.”

Corporate sponsorships from Turface Athletics, Warner’s Athletic

Construction and Memphis Nets helped secure the materials needed to make the field construction a reality, Fanning says. A \$1,000 grant from Turface helped get equipment onsite to help construct the diamond and ensure it could be maintained in the future. Eight pallets of Turface MVP, two pallets of Turface Professional Mound Clay Red and two pallets of Red MoundMaster Blocks were used to create a sustainable, playable field. In some instances local materials were used in the construction, including fashioning foul poles and a backstop out of bamboo.

“More Than a Game is doing an incredible job spreading the game we love to new parts of the world,” said Jeff Langner, brand manager for Turface Athletics. “To be able to say we’re a small part of that effort is so rewarding for everyone in the Turface Athletics family.”

Fanning says plans are already in the works to build a second diamond nearby and establish a league in the near future for the remote area of Panama.

“This is just the beginning for More Than a Game,” Fanning says. “If we can build a diamond in a jungle, we can build a diamond just about anywhere.” ■

*Jeff Salem is a public relations associate at Swanson Russell, Lincoln, NE.*

## Preventing cold temperature damage

*It seems we dropped down into the 20s at night earlier this year than normal. It got me thinking about winterkill. I have not had any true winterkill since the 80s, but was wondering if there is anything I should be doing to minimize the potential to have winterkill if this is the year?*

—Myrtle Beach, South Carolina

Damage to bermudagrass in the Carolinas from low temperatures is certainly a possibility any year. Like most of the other damages from “natural causes,” it is very difficult to predict when it may happen. Also, cold temperature injury is just as likely to happen in the early spring, just after greenup, as it is to happen in during the winter dormancy period.

Generally, low temperature injury is caused by crown hydration, direct low temperature exposure, desiccation, or some combination of these three. Additional stresses such as traffic or pests may increase low-temperature injury.

There are some cultural practices that you control that can influence your turf’s susceptibility to low-temperature stress. These include things such as shade, drainage, fertility, irrigation, mowing, pest control, and thatch level. Of course turfgrass cultivar has a significant influence, but that is not easy to influence in the short-term. So a turf manager can certainly manipulate their management practices to minimize or reduce the low temperature damage.

Shade should be eliminated. While most fields are out in the open, I still see fields each year that have nearby trees that cause some level of shade. When evaluating shade, some managers like to look at their conditions on December 21 (the winter solstice) which is the shortest day of the year (in terms of daylight) and just as important, the sun is lowest on the horizon. As a

general rule-of-thumb, if bermudagrass turf is shaded on this date by 9 am or before 3 pm, expect some problems. The greatest shade problems usually occur in the southeastern, southern, or southwestern directions due the sun’s angle. There are also phone applications (e.g. Sun Seeker) that can help you evaluate shade.

Get a handle on your soil water status since too much or too little soil moisture during low temperatures can be lethal, especially for insufficient soil moisture. It is better to have a bit too much soil moisture than too little. Damage from excessive soil moisture is typically confined to low lying, poorly drained areas[—normally on side lines of fields. However, insufficient soil moisture typically causes extensive turf damage. This is especially true during windy, low humidity days when the sun is brightly shining.

Relieve soil compaction since insufficient soil oxygen and buildup of carbon dioxide combine with shade and traffic stress to cause damage especially along the highest wear areas (e.g. between hash marks on football, goal mouths on soccer, etc.). Develop and stick to an aggressive aeration program in the summer. Use smaller diameter solid tines during the less active growth periods for additional oxygenation around the roots.

Prevent or reduce thatch accumulation since excessive thatch accumulation can cause plant crowns to be elevated in the thatch layer which reduces their protection from low temperatures. Thatch also dries easily, contributing to desiccation. Topdressing, vertical mowing, and aerifying are mechanical means to moderate thatch accumulation.

If reasonable, raise the mowing height. Usually about September the days become shorter and extensive cloud cover occurs resulting in a growth habit change. The turf

plants respond to reduced daylight /daylength by stretching or elongating in an attempt to gather more light energy. Allowing the plant to go into winter with a little greater leaf length can increase its carbohydrate production. Some managers counteract the stretching by applying a plant growth regulator.

Provide adequate soil potassium since it has been shown to help with moderating weather extremes. Apply sufficient potassium so levels are in the adequate or sufficient soil report range prior to winter. Levels higher than these have not been shown to be sustainably beneficial. Most research has suggested that applying more potassium than nitrogen (over the years’ time) is not beneficial. But since potassium does not encourage growth and is readily soluble in the soil, applying more potassium than nitrogen before winter may be beneficial.

Cover your field. I know that covers are expensive and may be perceived as a luxury by some. But covers can be great “insurance” against winterkill. Covers help retain heat in the soil and more importantly, help prevent soil desiccation. Numerous theories exist on when covers should be used. A common one is to use them if temperatures are projected at night to be below 23 degrees, especially if the next day’s temperatures are forecasted to stay below 40 degrees and/or if excessive windy conditions are expected.

So, how many of these can you do? Each one can help and alone may be enough to prevent cold temperature damage. But there are still no guarantees against damage even if you could do them all. At some point the turfgrass may just be susceptible or the temperatures too low. So, try to do as many as you can, but do not ever get too confident that you outsmarted Mother Nature. She may prove otherwise. ■



**BY DR. GRADY MILLER**  
Professor, North Carolina State University

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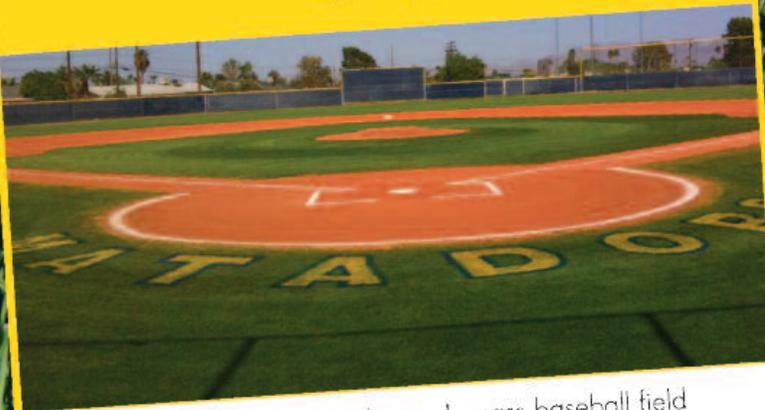
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