

will run from \$30 to \$75, with most distributors giving volume discounts. These are concentrated products that are then further diluted before application. A typical dilution rate is one part colorant to seven parts water, although some manufacturers suggest their products can be diluted one part colorant to 15 parts water. So, carefully read the label to get an idea of how much area one can cover with the product of choice. The cost of colorant needed for per acre of athletic field using the higher recommended application rates would range from \$200 to \$500 an application, depending on colorant brand.

With seed prices currently a bit higher the past few years, using one of these products could save a field manager a bit of money when compared to overseeding. Overseeding also has added maintenance costs. Considering that overseeding will require ground preparation, seeding, watering, fertilizing, mowing, pest control, spring transitioning, etc.; colorants may be a significant labor saving alternative as well.

The painting process can be boiled down to pick/purchase a colorant, add water plus colorant to your sprayer, and begin spraying. Any type of sprayer will work, although a boom-sprayer would be much more efficient to apply. If the color is not even or dark enough, you can make additional passes to accommodate aesthetic needs. There is some clean-up, but no season-long care like with overseeding. Speaking of clean-up, be very careful to not get this product on anything you do not want green. Fences, goal posts, benches, protective padding, etc. will all absorb the colorant and may be permanently stained. Be sure to wear "old clothes and shoes" and I would recommend rubber gloves. Always use good judgment and wear personal protection equipment when using sprayers.

Depending on your field's use, there are a few other potential drawbacks to using a colorant. It does not provide a wearable playing surface like an overseeded grass. Once the dormant tissue is worn away, there is no regeneration until spring. So, the "wear factor" must be considered if you have a bunch of games or other events take place on your field during the winter.

THE RESEARCH

Over the past few years, we have conducted numerous studies at North Carolina State University to evaluate various colorant products. Our first detailed studies were applied to putting greens in fall 2008. Subsequent trials have included evaluations on bermudagrass and zoysiagrass at a great assortment of mowing heights. In total, we have evaluated more than 30 products. These products are from manufacturers/distributors such as BASE, Burnett Athletics, D. Ervasti Sales, Enviroseal, Geoponics, Harrell's, J.C. Whitlam Manufacturing, John Deere Landscapes, Milliken, Missouri Turf Colorant, Pioneer Athletics, Poulenger USA, Precision Laboratories, Solarfast, US Specialty Coatings, and World Class Athletic Surfaces. There has been a rapid increase in new products in the past 5 years in response to the growing interest in using colorants.

In the earlier studies we applied colorant treatments to completely dormant turfgrass in late October to early November using a boom sprayer at rates ranging from 40 to 160 gallons per acre (gpa). Applied to bermudagrass, colorant increased turf color from 38 to 67 percent

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Table 1. Visual colorant quality ratings following the application of turf colorant on bermudagrass in fall 2012.

Colorant Name	Colorant Quality Rating			Initial Color
	Week 1	Week 5	Week 10	
Bermudagrass	3.4	1.0	1.0	Not Categorized
Endurant	7.9	7.0	1.8	Dark Green
Enviroseal Go Green	7.0	7.0	6.8	Yellow Green
Evergreen	8.0	6.8	3.9	Green
Green Dye Turf Colorant	7.0	7.0	7.0	Yellow Green
Green Lawnger	8.8	8.3	7.0	Green
Green Lawnger-Graphics	7.0	6.0	2.4	Blue-Gray Green
Green Lawnger-Lineman	7.8	6.6	4.1	Green
Kameelyan-Bermuda	7.0	7.0	6.1	Green Blue
Kameelyan-Blue	7.0	7.0	7.0	Blue
Lesco Green	8.4	8.0	5.4	Green
Mtp Turfgreen	7.0	4.3	1.3	Blue-Gray Green
Original	7.3	6.9	5.3	Yellow Green
Regreen	7.3	7.0	6.5	Green Blue
Solarogen	7.8	7.4	4.8	Blue-Gray Green
Southwest Green	7.8	7.6	1.8	Black Green
Southwestern	3.0	1.1	1.0	Dark Green
SprayMax	8.1	6.0	3.9	Dark Green
Sugar Hill	8.0	6.0	1.8	Black Green
Super Cover	4.3	1.6	1.0	Blue-Gray Green
Titan Green Turf	7.9	7.0	5.8	Green
Turf Cote	1.8	1.0	1.0	Not Categorized
Ultradwarf Plus	8.0	6.0	1.6	Dark Green
Ultradwarf Super	8.1	7.5	2.8	Dark Green
Wintergreen	7.0	7.0	7.0	Green Blue

Quality ratings are based on the color of the colorant on a scale of 1-9 with 1=straw brown to 9=dark green. Products categorized as Blue and Yellow Green had a maximum rating of 7.

relative to the control at the time of painting. Of course there was some variation in how the color was judged over time. But remember the saying, “beauty is in the eye of the beholder.” Most of these products will have a date in which they will need to be re-applied to get season-long green color. Over the 6 years we have tested these products, some years the color lasted the full winter and some years it did not. On average the best products will have good color for about 75 days.

GOOD RESULTS ON SEMI-DORMANT GRASS

In another study when the products were applied to semi-dormant turfgrass, the products performed much better due to the greater background color at the time of application. This is a very important point. Subsequent tests have proven that some background color goes a long way. Applied to semi-dormant turfgrass, the color will look better and may last longer. For optimum



▲ Colorants applied to Tifway bermudagrass (left) maintained beside next to tall fescue area (right).

results, do not wait until the turfgrass is straw brown.

Some of the colorant-treated turf took a bluish tint over time (some quicker than others). While this may sound like a negative attribute, in one survey many people did not mind the bluish color. Why blue? Well, often green is produced by mixing blue and yellow pigments. The yellow pigments are generally not as stable as the blue pigments so as the products age, the blue tends to be the more dominant color. We also found that most of the darker, more bluish products held their color longer than the products that started out a more natural green color. The more natural green products tend to fade to a grayish color as they age.

Applying the colorants at 160 gpa provided turf color increases up to 44 percent greater than the 80 gpa treatments. Applying colorants at rates above 80 gpa also resulted in increased color longevity over the winter season. We did not expect to see such a significant rate response in longevity of the products.

More research is needed in this area to fully understand how to best use this information.

I often get asked, “What is the best colorant?” In fairness, no one turf colorant was clearly superior on both grasses in terms of natural green color at the time of application and at the end of the winter season. Results from our earlier studies generally indicated that the colorants with the best natural green color did not generally last as long as some of the others. This suggests that to have a natural green color for the duration of the study, reapplication will be necessary. A longer-lasting color, although it may have a blue-ish hue, can be achieved with minimum to no reapplication. ■

Grady Miller, PhD, is professor of crop science at North Carolina State University. Drew Pinnix, MS, is a graduate research assistant in the Crop Science Department at NC State.

John Mascaro's Photo Quiz

Answers from page 15

John Mascaro is President of Turf-Tec International

As most of you know, Canadian geese can cause significant damage to turf-grass and other surfaces due to their foraging and also their droppings cause additional problems on impervious surfaces. In addition, geese in large numbers or even small flocks that frequently visit the same area can overgraze and leave dead spots. As with many others who have struggled for goose control, this school has tried many different things, including fake coyotes, radio controlled cars (fun but frustrating), repellent sprays, lasers (these are no longer used due to FAA restrictions), chasing with utility vehicles and golf carts, dogs, as well as a

lifelike fox decoy. If you look closely at the photo, you will notice the fox decoy at the center of this flock. Apparently, the geese are showing no respect to the decoy. In fact, the Sports Turf Manager reported that as he moved the decoy around to different areas, the geese would actually go to the same area like he was protecting them!

Photo submitted by Peter Thibeault, CSFM, Sports Turf Manager at Noble and Greenough School, Dedham, MA.



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. 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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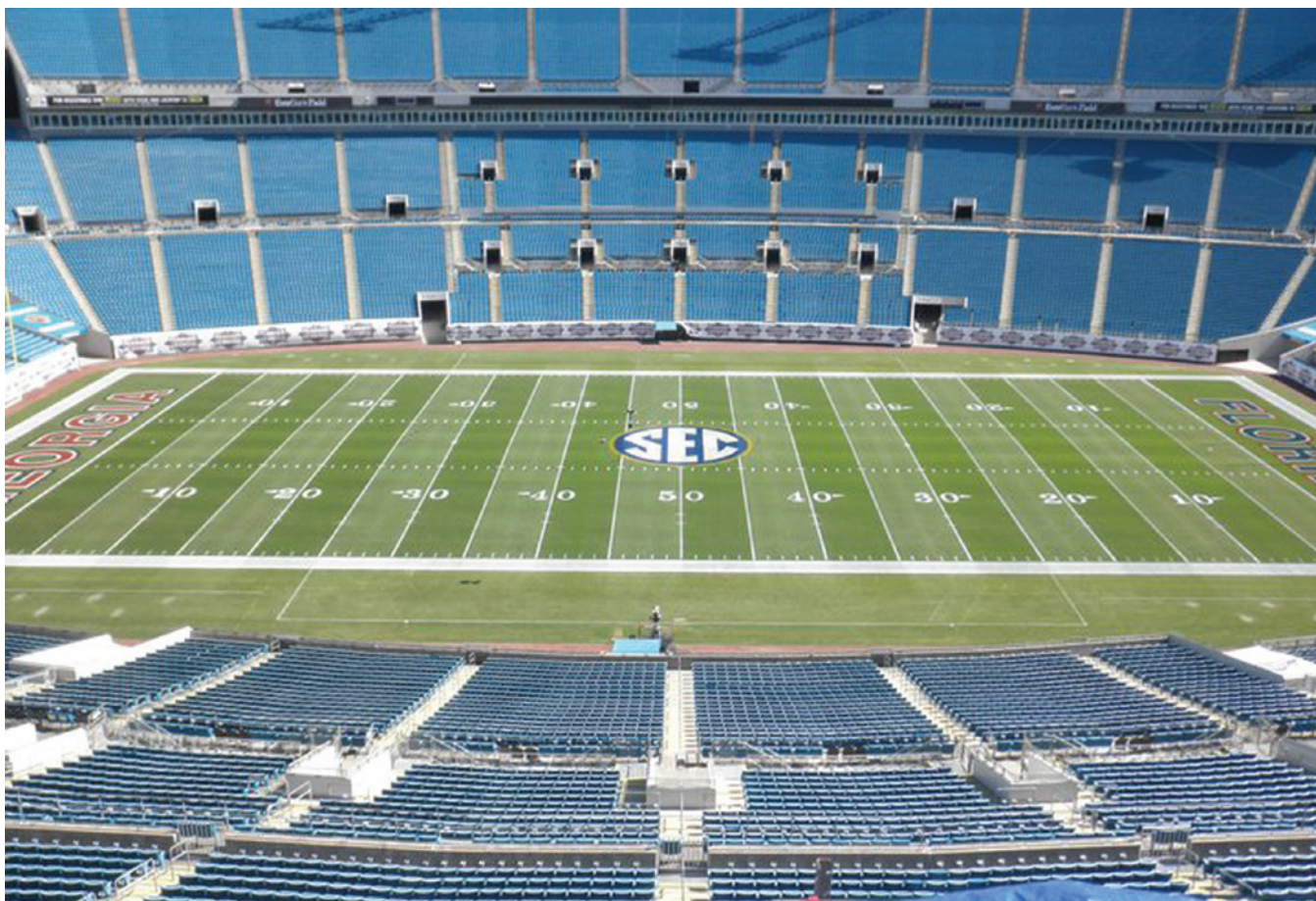
Maintenance of NATIVE SOIL compared to SAND-BASED FIELDS

While most turf managers would prefer having a sand-based field, a University of Missouri survey found around 80% of sports fields are native soil based compared to 20% being sand-based. Sand-based fields can have many benefits but unfortunately the cost of installation can be prohibitive. Regardless of the soil type, it is important to know what you are working with and how it will affect the way the field is managed.

First, let's look at what native soil and sand-based

systems are and what makes them different. A native system is an unaltered soil that was at the site before the field was built. It is usually a mixture of silt, clay, and sand. A sand-based system is typically 80-100% pure sand. The difference in soil particle sizes can cause native systems to be more prone to compaction, while sand-based systems have better resistance to compaction. Due to having higher nutrient and water holding capacity, native systems might have inadequate drainage while sand-based systems, with their higher infiltration rates, provide adequate drainage.

▼ **Florida/Georgia**
football game on sand-based system at Everbank Field. Image courtesy of Natasha Restuccia.





◀ Left: **Bermudagrass** growing on native soil. Image courtesy of Natasha Restuccia. Right: **Bermudagrass** growing on sand-based soil. Image courtesy of Natasha Restuccia.

COMPACTION

In native systems, the soil particle size is not uniform which can lead to increased compaction. The coarser textured sand-based system is more uniform and has less risk of compaction. For multi-use fields there will be some level of compaction regardless of your soil. Less than 200 hours play per year is recommended to maintain good field conditions; however with multi-use facilities, this is not always realistic. If space allows, rotating or moving fields can help reduce localized compaction.

With native systems having a higher water holding capacity it is important to postpone play when fields are saturated. The increase in soil moisture not only increases compaction but it also increases the depth of the compaction, which is more difficult to remedy.

One way to manage compaction is with soil cultivation, specifically aerification. In native systems, aerifying with hollow tine cores that are 5/8 to 1 inch in diameter and 3 to 4 inches deep is most effective. For fields with lower use, aerifying twice per year (spring and fall) is enough. Fields that are heavily used can be aerified 6 to 8 times per growing season. In either situation it is important that the turf is actively growing when you aerify to insure optimum recovery. In sand-based systems, hollow tine coring twice per year is usually sufficient. Higher traffic areas like goal mouths and between hash marks might require additional aerifying. Consider your options when

aerifying, because repeated core aerification to the same depth can result in a compacted layer at that depth. Rotating soil cultivation methods such as deep tine aerifying, solid tine aerifying, or deep drill and fill can alleviate the problem.

TOPDRESSING

In either situation it is important to topdress after aerifying. Light, frequent applications (about 1/8 to 1/4 inch depth) are preferred over less frequent, heavy applications. After topdressing, drag the material into the canopy. Topdressing material helps with thatch control as well as leveling out low spots. In native systems topdressing can be used to modify the rootzone. Topdressing with a medium coarse sand after core aerifying can help promote drainage and reduce the risk of compaction. In sand-based systems it is important to topdress using a material that is similar to the rootzone mixture already in place. Using materials with different particle sizes can lead to layering, which can have a negative effect on drainage over time.

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▲ **Layering in a sand-based system** caused by a buildup of organic matter. Image courtesy of Nick Fedewa.

IRRIGATION

The water holding capacity of native systems vs. sand-based systems will affect the way that field is irrigated. Native systems have a higher water holding capacity, allowing for less frequent watering. Native systems can be watered 1 to 1 1/2 inches every 7 to 10 days. Less frequent and deeper watering helps to encourage deeper

sand-based systems, irrigation can run before an event without the increased risk for compaction. Regardless of the rootzone system of your field, it is important to watch for signs of wilt, and water when necessary. Irrigation scheduling can be done using evapotranspiration (ET) data, soil moisture sensors, or visual evaluation and experience.

▼ **Standing water** on a poor draining native soil system. Image courtesy of Natasha Restuccia.



root growth. In native systems, not watering right before an event allows the field to dry some before an event, which can reduce the risk of compaction. However, it is important to water right after the event to keep the turf from becoming stressed.

Sand-based systems have a poor water holding capacity and will require 1 to 1 1/2 inches of water every 3 to 5 days. Even in these situations, irrigation should be as deep and infrequent as possible to encourage deep root growth. Because of the increased infiltration rate of

DRAINAGE

Native soil systems typically have lower infiltration rates due to the higher water holding capacity, smaller pore spaces caused by compaction, and lack of drainage system. These fields will mainly depend on surface drainage from crowns and slopes. When native systems become saturated and are unable to properly drain, it is important to postpone play. Under these conditions, native systems can have reduced traction and stability, resulting in poor playability of the field and an increase in injuries to players. Aerifying native systems can open pore spaces to allow for more water flow. If the drainage becomes an unmanageable issue, installing subsurface drainage is an option; however, it can be expensive.

In sand-based systems, drainage is not typically a problem. The uniform and coarse particle size allows for larger pore spaces and increases water infiltration. If the drainage of your sand-based field seems to be getting worse, take a look at the soil at a depth of 12 to 24 inches. Older sand-based systems can start to have layering due to resodding, organic matter buildup, or topdressing with the wrong materials. These layers will slow water infiltration and may need to be remedied through deep tine aerifying or renovation.

FERTILITY

For native systems, a soil test will tell you what your rootzone is lacking. This is a good place to start in determining a fertilizer regime. Native systems are higher in clay and organic matter, both of which increase the nutrient hold capacity of the soil. This higher nutrient holding capacity means that native systems can be fertilized less often with higher rates. During the season, fertilizer is needed to increase growth rates to help fields recover from increased traffic and wear. During other parts of the year when the turf is still growing, fertilizer should be used as needed to maintain growth.

While it is best to use a slow release fertilizer for its longevity, native systems can benefit from water soluble fertilizer for recovery in worn areas of turf. In that case, lower rates should be used. The budget is always a factor in fertilizer scheduling, so

» While it is best to use a slow release fertilizer for its longevity, **native systems can benefit from water soluble fertilizer for recovery in worn areas of turf.** In that case, lower rates should be used.

treat areas of extreme wear (like goal mouths and between the hash marks) separately.

Sand-based systems have much less organic matter and nutrient holding capability. In these systems, applying too much fertilizer at one time can lead to leaching. Leaching is not only an environmental issue, but can equal money lost. Try splitting fertilizer applications in half and apply in 14 day intervals for sand-based systems. In these systems applying less fertilizer more frequently helps to keep nitrogen available to the plant when it needs it. For sand-based systems applying potassium at a 1:1 rate with nitrogen can help with stress tolerance,

but should be done so to reduce losses as potassium can be readily leached.

The basics of turf management are the same for any situation; however, knowing what your rootzone consists of can give you a better idea of how your field will respond to those management strategies. By taking the soil in to account, both native and sand-based systems can be managed to obtain excellent playing surfaces. ■

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USING BODY LANGUAGE TO ASSIST YOUR WORK

Wouldn't it be great if you could read your co-workers intentions? Wouldn't it be neat to know in advance if the next person approaching you is hostile? How would you like to know if people are interested in what you have to say? Wouldn't you like to know the next time someone may be deceiving you?

Reading body language is a skill. Like any other skill in life to get good at, it requires practice. With practice you too can get good at reading body language, which can offer a multitude of advantages at work, at home, and elsewhere.

It has been well established by researchers that those who can effectively read and interpret nonverbal communication, and manage how others perceive it, will enjoy greater success in life than individuals who lack this skill.

HOW IS READING BODY LANGUAGE DEFINED?

It is a means of transmitting information, just like the spoken word except that it is achieved through facial expressions, gestures, touch, physical movements, posture, embellishments (clothes, hairstyles, tattoos, etc.), and even the tone and volume of one's voice. It does require that one be observant to detect "tells" (clues that our bodies give off). Consequently, it is inadequate to simply see the tell, but one must also understand what the tell means for any advantage in using the tell. Consider this: the human body is capable of giving off thousands of tells. Which ones are most important and how do we decode them?

The best place to start is to get baseline information about the person. Base lining in this context is defined as "observing a person's behavior when he or she is under normal, non-threatening circumstances." In other words, how does this person look, act and

sound under normal conditions. This is valuable information because when people go off their baseline, there are usually reasons for this and we can usually figure out those reasons. To accomplish base lining simply observe and make mental note of what you observe. This may happen at social functions, meeting in stores, or at the workplace. Take note how they normally stand or sit, facial expressions, hand gestures, where their eyes look when asked a question, where their eyes look when answering a question, eye blink rate, how they sound when speaking, speaking tone, words per minute, speaking cadence, etc. Any and all information you can establish as baseline for that person.

WHERE TO LOOK FOR TRUTH IN BODY LANGUAGE?

All parts of the body give off information. Consequently, all parts of the body should be examined for tells and what they mean. As a beginning point, most body language experts would start with what's called the limbic system. The limbic system is something we all have in our brains, and it consists of numerous parts. What is significant is not where the limbic system is located or the parts names, but rather what the limbic system does. In the non-verbal world, the limbic system is

Body Area	Tells	What It Means	How It Can Help You
Upper Torso	Leaning away	Disagreement	If you're in a meeting and introduce a new concept, and people lean back – you now know what they think of your new idea.
Hands	Wringing hands (like washing your hands without water)	Nervousness, anxious, stressed	When a co-work or client hand wrings, it would be time to back off and allow the stress to dissipate.
Face	Tight lips	Hesitancy and secrecy	Tight lips suggest these people have more information to share, but are simply unwilling to share.
Feet	Direction of feet	Intentions	Where the feet point show the true intentions of the person, i.e., towards a door (wants to leave), towards a person (wants to connect with that person), etc.
Legs/Feet	Bouncing feet	Happy, confident	With a person in a sitting position and their leg crossed and the foot bouncing up and down indicates that person is feeling good about what they are hearing and seeing.

referred to as the honest brain. Consequently, it gives off a true response to information in the immediate environment. It reacts instantaneously, in real time, and without thought. Thus, it is the “honest” part of the brain. The rest of the brain is the non-honest parts of the brain. Those parts deceive and deceive often. An example of the limbic system would be if you are scared of snakes or spiders and you discover one 2 feet from you. The moment you see the snake or spider you will react (jump, scream, run, yell, etc.). This would be a limbic reaction (instantaneous, in real time, and without thought). These reactions are valuable as they are authentic. That is, they are an honest reveal of that person in that situation. There would be no deception involved as they don’t have time to think about their reaction. It is only when we have time to think about our responses that we many times couch our response to “fit” the person/situation.

In my body language training, I examine multiple tells and their meaning in the western culture. The following table will give you a good starting point:

DETECTING LYING & DECEPTION

This may sound strange coming from a body language expert, but determining if a person is lying or being deceptive through body language is inadequate. Don’t get me wrong; we can get some wonderful tips and clues through body language but to detect lying and deception a couple other features are required. In my training on detecting lying and deception, I refer to the features as a three-pronged approach. One is body language, another is the science of lying, and lastly is what I call content and structure. When all three parts are working in concert, you now have the best chance of detecting lying and deception.

Body language we have already touched on. The science of lying is a body of knowledge that researchers have captured and documented on; why people lie, the types of lies they tell, the frequency of lying, the type of damage done by lying, and the mental gymnastics that liars go through, etc.

The content and structure part relies on a person responding to questions you have asked. What comes out of their mouths is content and the way they structure the con-

tent is very important. Example: when I was a high school principal in Wisconsin a rock was thrown through a window. Two teens were sent to me, each one accusing the other of being the rock thrower. After a couple minutes of asking certain questions, watching their reactions, and listening to their content and structure, I knew who the rock thrower was.

A more high profile example of this would be Susan Smith, the South Carolina woman who in 1994 drove her car into a lake and killed her children. She had told the police her vehicle was abducted by a single African American man at a stop light. When she addressed the media she would plead, “Oh I need my babies back!” But never once was there a tear. As she spoke she said, “I just can’t stress it enough that we just got to get them back home. Where . . . that’s just where they belong, with their mamma and daddy.” Notice in her content and structure, she never referred to her children in the present tense. She referred to her children as “them.” Her estranged husband on

the other hand got up to the microphone and referred to the children in the present tense and called them by name.

There is a strong human emotion that takes over when you lose a family member. It’s called hope. You never give up hope until you know different. Susan knew different and it played out with her content and structure.

Research indicates that up to 93% of all face-to-face communication is non-verbal, yet very few are trained to observe “tells” and know what they mean when they spot them. As a professional that interfaces with humans, it would behoove you to address this much needed skill for the highest level success in the workplace. ■

Jerry Balistreri, B.S., M.S., M.Ed., ASTD Certified Trainer is a retired CTE educator and administrator. Jerry offers training on how to read body language and can be contacted at balis@acsalaska.net.





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▲ **Doing the math** at an irrigation audit workshop at the STMA Regional meeting in Cincinnati in 2012.

“AUDIT” IS NOT A WORD THAT BRINGS ABOUT POSITIVE FEELINGS of personal harmony or financial well-being. A mere mention of the word can evoke a physiological response: sweating palms; involuntary twitches; a creamy gray pallor.

An irrigation audit, however, is like any other internal examination. It reveals performance strengths, structural weaknesses and procedural opportunities. Moreover, an irrigation audit can provide field managers and grounds superintendents statistical data for building a blueprint to improved turf conditions, reduced expenses, and the turf industry Holy Grail—water conservation.

There's no better evidence for budget requests to upgrade a facility than a cost-benefit report to your board, council, commission or CEO. An effective

irrigation audit delivers sound projections for annual savings in water, power, personnel, maintenance, turf and equipment replacement, and more. Connect that with a dollar amount, and you're in business.

Irrigation audits generate concrete information for the boardroom, but as importantly, for your frontline maintenance crews. They're the day-to-day managers with eyes on the ground. Your technicians are key to handling acute problems, like lateral breaks, broken heads or plugged nozzles, while alerting you to more chronic conditions that begin to