

SPORTS FIELD AND FACILITIES MANAGEMEN

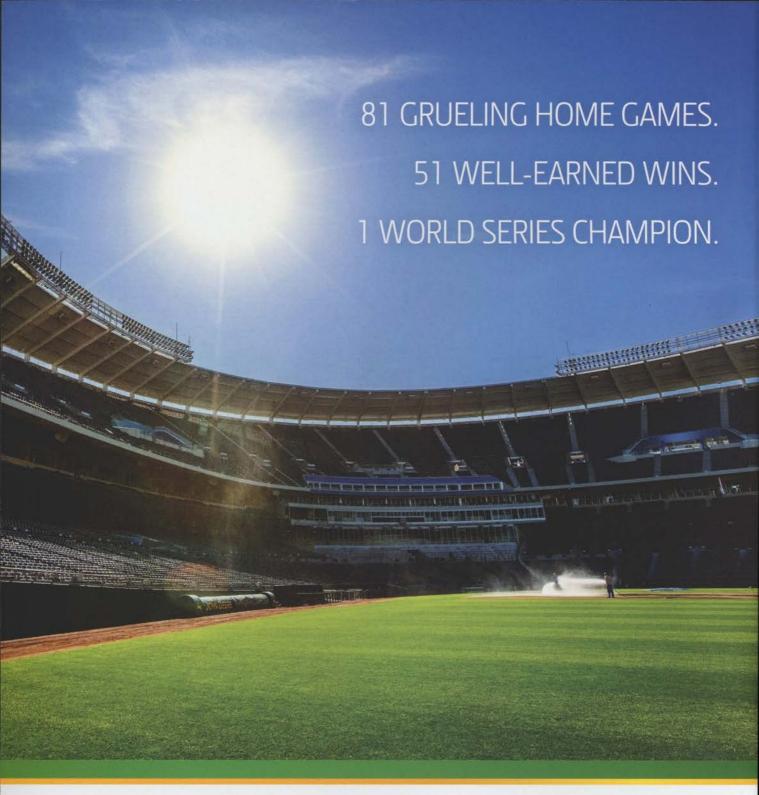
green ...

SportsTurf

FIXING IRRIGATION LEAKS

ALSO INSIDE:

- What triggers need for water?
- Handling renovation in-house
- Synthetic turf maintenance
- Seed: what's in the numbers?



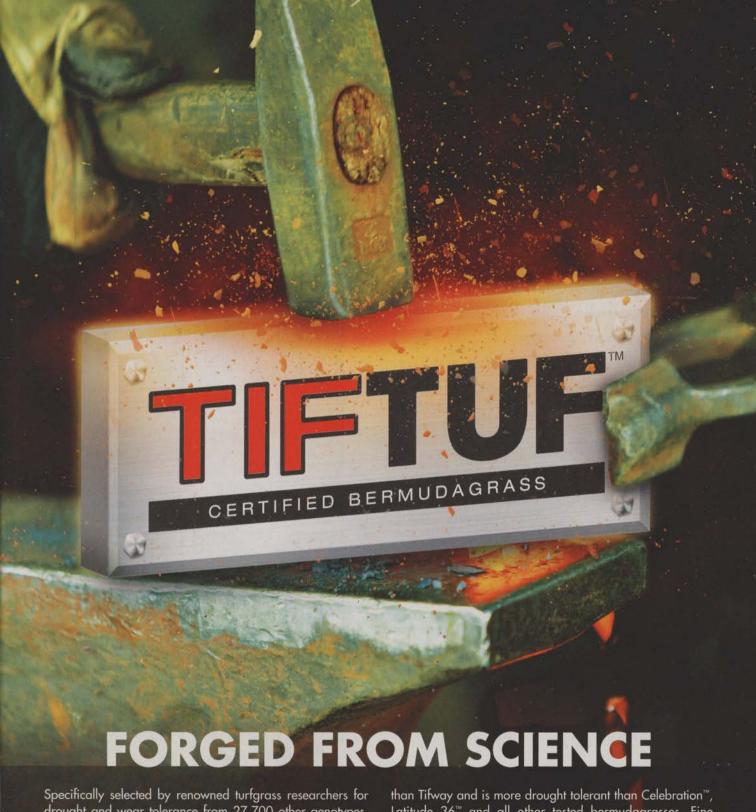
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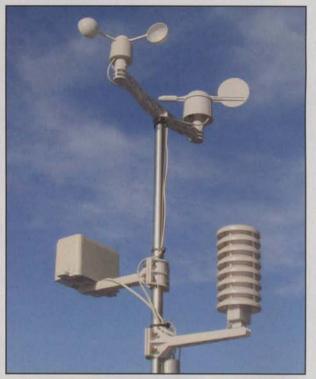
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ON THE COVER:

While our article on fixing irrigation leaks doesn't actually cover something as big as the fix on the cover, a leak is a leak! The one depicted here is from 2015 STMA Field of the Year College Football winner Brandon Hardin, from some work that was done at Mississippi State's Davis Wade Stadium. The STMA Editorial Committee thought this shot was a reminder of the hard work it takes to achieve the "perfect" field.











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FOLLETT READY TO GROW GRASS Eric Schroder Editorial Director Eschroder@epgmediallc.com 763-383-4458

he Baltimore Ravens have switched from artificial turf to natural grass at M&T Bank Stadium for the 2016 season.

When team president Dick Cass announced the move he said, "The players really wanted to play on grass and that was a key consideration. The coaches wanted to play on grass," according to an article by Ryan Mink on BaltimoreRavens.com.

Cass also said the Ravens are not anticipating eliminating any events they host at the stadium. While there will be concern about the field being torn up, measures will be taken to prevent damage and the Ravens aren't willing to sacrifice those events.

"We'll still have concerts, we'll still have international soccer, we'll have Army-Navy football next year, and we'll try to attract other major college football games," Cass said.

Baltimore had natural grass in the stadium when M&T Bank Stadium opened in 1998, but it didn't work out well. Mink's article said, "The field got chewed up during the season and they had trouble keeping it in good condition late in the season due to sunlight restrictions. Starting in early November, sunlight does not reach the Ravens sideline from about the numbers into the bench. However, the Ravens did more research over the offseason on whether they could maintain a high quality grass field."

The man responsible for maintaining that quality is 63-year-old head groundskeeper Don Follett, who has been growing grass for 45 years and calls himself "old school."

"I kept reading how some of the newer varieties like NorthBridge or Patriot [bermudagrass] performed as well as Tifway 419 so I decided to go with that tried and true variety," Follett told me. "Chad Price (Carolina Green Corp.) has a pure stand of 419 in North Carolina that has been genetically tested and matches what I wanted."

Carolina Green's GameOnGrass sod is grown on plastic, is 2 inches thick, weighs 15 pounds per square foot and has a free-draining, sand-based rootzone. It is certified 419 overseeded with perennial rye.

"The players were pushing for real grass so the Ravens' front office told me to get it done. They left it up to me to figure out what grass to use and to keep it growing," he said.

"I knew grow lighting would be a necessary component with the big roll sod, along with our hydroponic heating system (steam/hot water convertors in a multizone, pumped distribution system)."

When we spoke, Follett was 22 days away from a Beyoncé concert on his new turf. His plan is to grow back the grass after the process that was expected to take at least 8 days for set-up, the concert, and teardown. "I'm going to wait and see if we'll need to replace the sod but my plan is to grow it back, though we do have contingency plans in place.

"We also will wait and see if we will need to re-sod during the NFL season. I was hired to be a groundskeeper, not just a grass manager, so the plan is to keep what we have growing. I budgeted for replacement sod but hope we don't need it."

Gun Schuster

SportsTurf

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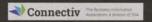
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IT'S JULY AND FOOTBALL TIME.. ALREADY?

Jeff Salmond, CSFM isalmond@ou.edu

uly marks the middle of baseball season, and football is right around the corner. It takes much time and effort to get our football and soccer fields ready for the brutal late summer/fall season. For many of us, it's both sports at the same time. Football training camps in the NFL, college, high school and youth leagues will start back up real soon. The gridiron grind is back for another season.

Sports turf managers across the country have been working on their fields in the spring and summer, beefing them up and getting them ready for the season, perhaps along with multiple non-football events. Putting the fields through the hot, dog days of summer, throughout the milder fall, and testing them again for the cold winter, which is just 5 short months away. Tough and pristine, our members make them look like they haven't even been played on.

It is no different at the University of Oklahoma on Owen Field at Gaylord Family Oklahoma Memorial Stadium. For us on the field management crew, it is the "Two Sacred Acres at the Palace on the Prairie." The field is on display for all to see, and we make it look game-ready, even in the summer. We go through our summer maintenance practices of core aerification, verticutting, pesticide applications, fertilizing and topdressing, as well as cleaning our synthetic surfaces. We will check nutrient levels, moisture levels and surface hardness. We are 3 months removed from spring football and less than 2 months removed from commencement ceremonies, but only 1 month from

continuing football activity.

OU Athletics is also in the middle of a huge construction project, "bowling in" the south end of the stadium, which is on track to be ready for the first home game September 10. Repairs will have to be made where the stadium construction encroached onto the field. We will also go through some setbacks of field management along the way, such as hydraulic leaks, equipment breakdowns, non-rotating irrigation or blown-out irrigation heads and leaks, localized dry spot, and all of the other little things that bug us. But our target date is August 1 when we open for training camp.

In addition to getting our fields football-ready, we help the football equipment managers move football sleds and set up field equipment. We help the sports medicine staff with coordination of their needs such as cold plunge tubs and fans. We position scissor lifts for the football video department so that there are not any unnecessary ruts. There are a lot of moving parts to synchronize for the start of the football season.

Sport turf managers play a vital role in preparing for the football season: making fields safe, playable and durable. We also dive into our job descriptions of "to do other duties as assigned." Good luck to all of you on the upcoming fall season. I look forward to hearing your stories at the STMA Conference and Trade Show in Orlando.

94 Salvano

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Discovering the leak.

HOW TO FIX AN IRRIGATION LEAK

BY SCOTT STEVENS, CSFM

s you are driving around your complex checking on fields, you notice a wet area. There hasn't been any rain; only your irrigation system has been watering the field. More than likely you have a leak in your irrigation system.

Ideally you did a routine check on your irrigation system before the summer was in full throttle heat mode and watering the fields was necessary. Now it's July and most irrigation systems are being used extensively. Whenever you go through each zone to ensure safe, uniform coverage of each head, check for leaks or faulty irrigation heads. Some areas of the country the irrigation is turned off in the fall completely and drained of all water before the winter months. Over the winter months there are lots of unnoticed changes in the ground from the heaving and thawing of the cold winter temperatures. This heaving and thawing action moves irrigation pipes causing leaks. When the irrigation system is refilled with water in the spring, this is the best time to check for leaks.

In other parts of the country wintertime temperatures do not require irrigation systems to be shut down at all. If this is the



Using a thrust block.

case, you should still perform a test on your system. Whether you are on municipal water or water from a pond, even the smallest leak in your irrigation system can cost your facility hundreds of wasted dollars in your water budget, as well as not being sustainable for the environment.

Here are seven quick steps in checking your irrigation system and repairing a leak:

Step 1: Identify that you have an irrigation leak. A leak can be difficult to identify. During the spring when there is lots of rain, leaks can especially be difficult to detect. Be sure to perform the irrigation test on your system when there are several dry days. Once your irrigation system is refilled, if you see wet areas on your field, there has been no rain, and no irrigation water has been running, then you probably have some type of irrigation leak. A quick way to confirm is by looking at your pump/water meter to see if the pump/meter is running and no irrigation cycle is turned on. If your pump/water meter is running and there is no irrigation cycle turned on, then you certainly have a leak somewhere in your system. Decide, based on the complexity of the leak, if you will engage your irrigation technician, a commercial technician, or repair the leak yourself.

Step 2: Isolate the source of water. After you have identified where the leak is located, try to isolate the source of water to the leak by shutting off the flow to where the leak is found. The leak is either in the main water line, a lateral line, a faulty irrigation head, or at the irrigation valve. Most leaks occur where pipes are joined together, at points of connection, or around irrigation valves. Occasionally a

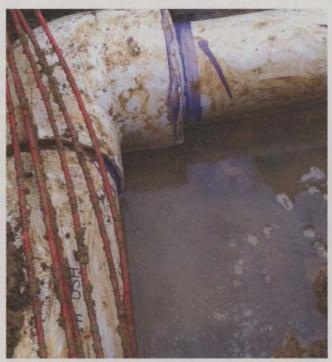


Removing the thrust block.

leak will occur in the middle of a pipe where the pipe has split or broken. This is often the case when a rock or other debris is rubbing against the pipe. Irrigation systems have isolation valves that can turn off different sections of the mainline, so the whole system does not have to be turned off. If the leak is on a lateral line, meaning within a certain irrigation zone that is past the irrigation/zone valve, turn the irrigation zone off on your irrigation controller until the leak can be fixed or shut down the irrigation valve. Irrigation/zone valves can act like isolation valves. If there are no isolation valves within your system, then just turn the pump or water meter off to stop all water flow.

Step 3: Determine how to repair the leak. Check the site plans for the irrigation layouts to determine what size pipe is in the area. This will help determine what kind of fix is needed to repair the leak. If no site plans can be found you will have to wait until the leak is uncovered to figure out what parts are needed to make the repair. Check the scheduled use of the field, then communicate to users that the field will be not be able to be used while the leak is being repaired.

Step 4: Dig up the area where the leak is located. Begin to dig up the area where you think the leak is located. Before excavating, cut the sod or remove the grass in sections. Try to keep your excavation hole small, so you are not disturbing unnecessary ground. This will help when you repair the area to restore its original look. Be sure your hole is big enough, however, to locate the leak and allow enough space to properly access and fix it. The goal is to avoid putting fixes in place that could jeopardize the pipes or cause the repair not to hold. If you still are having trouble finding the leak once the area is



Pipe pushing out at 90-degree angle.

dug up, turn the water flow back on slightly. Just turn the point of shut off on until you hear water flowing. Do not turn on full water flow as this could cause a bigger blow out in the area of the leak, especially with the dirt being removed. Usually, by slightly turning on the water flow, there will be enough water to go through the pipes to show where the leak is located. Hairline splits in pipe are difficult to detect and can be seen more easily with a minor flow of water running. Given that you have already dug around the expected location, your repair hole will more than likely require pumping or you will need to wait for the water to disappear. If the leak takes more than a day to fix, make sure to cone off/place caution tape around the area to prevent any accidental falls into your repair hole.

Step 5: Get the parts to repair the leak. Now that you have located the leak, see what type of fix is required. For valves that are leaking you may just need a rubber flange or to re-tape the threads on the pipes that connect to the valve using plumber's tape. If you found the leak is on a pipe you can use slip fixes, couplers, compression sleeves, mechanical coupling joints, or new piping to repair the break. The size/type of pipe and the expected water pressure through the pipe will determine which kind of repair is required. Most lateral lines can be fixed with slip fixes, couplers, or compression sleeves. Mainline irrigation pipe tends to be larger in size conducting higher levels of water pressure. A repair on this bigger pipe typically requires either a compression sleeve or a mechanical coupling joint as these two devices can handle more water pressure.

Step 6: Repair the leak. Measure twice and cut once. This carpenter's rule also applies to repairing irrigation leaks.

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Excavation.



Making the repair



Repair complete.

This will ensure that you remove exactly the right amount of pipe to repair the leak and then fix the leak. Once the break area has been removed, install the new parts to restore the irrigation system. If you use a slip fix, coupler, or new pipe you will need to use PVC cleaner and glue to reattach your parts. Using the cleaner first, even on new pipe, will allow the PVC glue to better adhere between connections. Use enough cleaner to remove the printed writing on the pipe. Once this cleaner has dried apply the glue. Allow time for your glue to setup before turning back on the water. If the break is at a 90-degree joint, a "T" fitting, or any other area where the pipe comes to a stop to change angles, install a thrust block behind the joint. A thrust block can be as simple as a bag of cement mix installed between the backside of the joint and the ground around it to keep the pipes from pushing outward. Once the thrust block is installed and the glue has set, which could take several hours depending on air temperatures, turn back on the irrigation. The warmer the air temperature the quicker the glue will set. Again, turn the water on slightly so that there is not full water flow. Also, to help relieve water pressure, you can turn an irrigation zone or two on beyond the repair before turning back on the water. The irrigation zone should be located past the leak. This will allow air to be pushed out of the pipe through the irrigation zone rather than back through the water flow. Leaving the air in the pipe without giving a place for the air to escape the irrigation system could result in another irrigation leak or the current leak to break again.

Step 7: Clean up the work area. Make sure to clean up the

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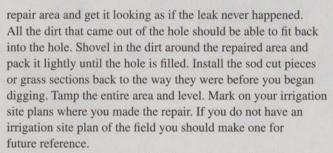
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New thrust block.



Take time in your schedule to do regular checks and maintenance on your irrigation system. Companies offer irrigation audit services that check the efficiency and effectiveness of your irrigation system. Irrigation systems, as well as environment changes over time, change how your system works. Whether your irrigation system is old or new this is a sure way to find out if it is working properly. As turf managers, fixing leaks and making systems work efficiently is a responsibility of the job. Even the smallest of leaks can cost lots of money and cause headaches, but they need to be fixed correctly and proficiently in order to be environmentally sustainable and to make fields safe for play. Always be sure to use the correct parts and make the area look like it was before you began repairing the leak. This will allow play to continue on your field safely, sometimes without users even noticing!

Scott Stevens, CSFM, MBA, is sports turf manager at Elon University, Elon, NC, and a member of the Sports Turf Managers Association's Editorial Committee.



Backfill.



Finished repair.



IRRIGATION "TRIGGERS" FOR TURF WATERING

BY MARK E. ATTARD, CID, CLIA

hat causes us as turf managers to "pull the trigger" on when to water the turf? With all the new technology available which one works the best? Our job as turf managers is to provide an adequate amount of moisture to the turf as to insure a healthy, green and safe playing surface. But proper irrigation scheduling is a tricky skill that many turf professionals have not mastered. By far the largest contributing factor to poor turf quality is improper scheduling. You might be surprised that the most common irrigation-scheduling problem is not too little water, or even too much water, it is watering too frequently!

So let's take a look at the various "triggers":

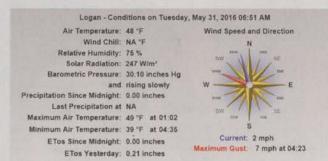
SMART CONTROLLERS

Smart controllers provide specific irrigation scheduling for every zone based on the unique characteristics of each. The controllers use ET (evapotranspiration) to make adjustments to the irrigation schedule based on hourly weather data. They measure solar radiation, relative humidity, wind, temperature and effective rainfall. Run times and frequency of irrigation are automatically adjusted. There are various ways to retrieve this ET data according to which controller you select. Some controllers communicate with an on- site weather station that provides site-specific weather information.

Other controllers use weather data from a network of weather stations that is transmitted to weather satellites and other weather- tracking sources. The information is analyzed and converted to location specific ET data (accurate to one square kilometer) of the site and then transmitted to the controller. There usually is a monthly fee associated with this service.

There also are "add on" weather sensors that wire into a controller to make them "smart." These weather sensors use a microprocessor to record and process weather data for use in establishing the watering schedule. Historical weather averages by zip code, rainfall amount, temperature and a solar sensor that monitors the sites sunlight exposure all factor into automatically adjusting the duration and frequency of the irrigation.

The ET or weather data received will only be useful if the controller has been programmed with the exact irrigation and site variables. Smart controllers and add on weather sensors both allow for programming the variables. These variables are: sprinkler type, efficiency rate, precipitation rate, soil type, plant type, root depth, microclimate, and slope factor. These variables are programmed into each zone so the irrigation



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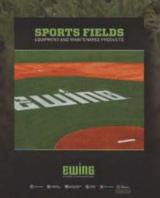
An example of a current conditions reading from a smart controller.



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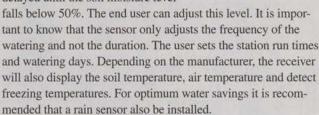
schedule will be calculated for the optimum performance. Failure to have these variables correct will result in water waste, over or under watering and inefficient application of the water.

SOIL MOISTURE SENSORS

These sensors are by far the simplest, easiest to install and operate. There are two components to the system, the sensor probe and the receiver. The receiver wires into the controller and the probe is installed into the soil. Some models are wireless and can be installed up to 500 feet from the controller and others are wired directly to the irrigation system control wires. Depending on the controller make and model, multiple

sensors may be operated off of one controller to match site variables.

So how do they work? The sensor continuously measures the moisture levels in the soil and then determines when to allow the controller to water. Most sensors automatically detect the soil type and make all the adjustments accordingly. The sensor will calculate field capacity for your soil type and set it at 100%. When the moisture level in the soil exceeds field capacity, the controller prevents the system from watering. Watering is delayed until the soil moisture level



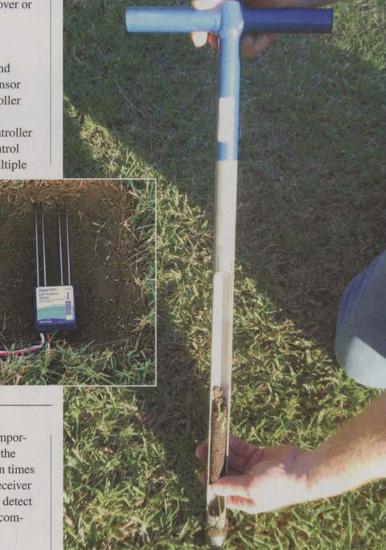
Soil moisture sensor.

SITE INSPECTION

Rather than depend on smart controllers, weather sensors and soil moisture sensors perhaps we should consider the "old fashion" way. Get out into the field and see for yourself! A walk around the grounds can assist you in scheduling your irrigation system based on several factors:

- Are there any wet or dry spots?
- Is the system operating and controller on?
- How does it sound when I walk across the turf?
- What does the color of the turf look like?
- Do I just know it needs water based on instinct?

A soil probe is a useful tool to determine soil moisture level. Insert the probe into the soil in multiple locations around the site. Feel the dirt and make your determination if soil conditions are too wet, too dry or just right. Measuring or calculating the precipitation rate of your sprinklers and soil type by zone



Soil probe.

can assist you in setting an irrigation schedule that works for you and the turf.

I feel there is no best way to "pull the trigger." A combination of irrigation water-saving equipment and regular site visits will result in an adequate amount of water being applied to the turf. This will give us the healthy, green and playable turf we strive for.

Mark Attard, CID, CLIA is an account manager with Kenney Outdoor Solutions, Grand Rapids, MI. Mark has more than 40 years of irrigation experience providing solutions and products to the turf industry.





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MANAGING RENOVATIONS IN-HOUSE: THE OUTLINE

BY MATT ANDERSEN, CSFM AND AMY FOUTY, CSFM

ver the years we have been involved in many different types of projects that require varying degrees of time, money, and resource. Whether you are doing a small project or a stadium build for the Olympics, successful renovations planning and execution follow a strategic pattern. We created the following outline from a presentation we gave at the STMA National Conference this past January.

1.) Big Picture/Strategic Planning

- a. Discuss Master Plan with senior administrators
- Discuss Program needs with sport administrators and coaches
- c. Determine priorities for each sport area
 - d. Deciding if Renovation is Major vs. Minor
 - i. What is driving the need to renovate?
 - ii. Major
 - 1. Total reconstruction
 - 2. Addresses major issues
 - iii. Minor
 - 1. Corrects minor problem
 - Could be Operational, Agronomic or Cosmetic

2.) Define the Stakeholders

- a. Who needs to be involved in the planning process?
 - i. Turf Manager
 - ii. Internal- Coach, Administrator
 - iii. External- contractors, Architect, consultants, and engineers
 - iv. Suppliers- Vendors and donations
- b. Discuss ideas and components
 - i. Objectives
 - 1. What is driving the change
 - ii. Scope
 - iii. Approvals
 - 1. Who has final say?

3.) Define Responsibilities

- a. What can you contribute?
- b. What is my staff capable of?
 - Have to understand strengths and weaknesses
 - 1. Technical ability/ knowledge
 - 2. "We want to think we CAN do it all... question is SHOULD we?"
- c. Do I need subcontractors?
 - i. Does the project require specialized equipment?



Opposite page: Adding a heating system to Michigan State's McLane Baseball Stadium at Kobs Field. Above: the finished product. PHOTOS COURTESY OF AMY FOUTY, CSPM.

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WideSpin* and Mete-R-Matic* spinner and drop-style models set the standards for productivity and ease of operation.

DEBRIS BLOWER

The **NEW Torrent*2** takes debris cleanup to a whole new level with unprecedented power, precision and control.







- 1. Survey
- 2. Laser grade
- ii. Are the tasks labor intensive?
 - 1. Sod install
 - 2. Irrigation install
- iii. Analytic services
 - 1. Soil testing
- d. Who else needs to assist/ be involved?
 - i. Trades
 - ii. Parking
 - iii. University Communications
 - iv. University Planning
- e. What about Specs?
 - Project Scope and Size will determine if spec needed
 - ii. Does organization require specs?
 - iii. Does bid process require specs?

4.) Plan the Project

- a. Process should not be rushed
- b. Define the "List"
 - i. Wishes vs. requirements
 - Good idea to prioritize things so cuts are easier to decide on

- a. Communication with stakeholders is CRITICAL during this step
- 2. What is best "bang-for-your-buck"
- c. Define the "Budget"
 - i. What is source of funding?
 - Sometimes project is defined, then funds raised to complete
 - Sometimes budget is set, then project designed to fit funding
 - ii. Cost/budget estimate
 - 1. Accuracy is important
 - 2. Can be time consuming
 - 3. Don't estimate low
 - iii. Plan for a 10-15% contingency funds
- d. Project Schedule
 - i. What are deadlines
- e. Identify Materials needed and sources
 - i. Procurement Rules can make this challenging
- ii. Availability and lead tie needs to be considered
- iii. Don't forget to account for Freight and Delivery costs
- f. Make sure plan is clearly communicated to all stakeholders
- 5.) Define the Schedule
 - a. Work schedule



Comments from Amy Fouty, CSFM

I do not think that you can discount the importance of building relationships and trust with those you work with. Over time, communication, and the trust and understanding that evolve, will enable you to become more active in the decision-making processes of your organization. Our particular skill set as sports turf managers are highly specialized and very different from the other operations within your organization. I have always felt it was my responsibility to educate those around me about what I do, so that they understood the complexity and wide variety of skills needed by the sports turf manager to create what they see on game days. We are a piece of a greater operation and need to be active in discussion for the organizations success.

By using this as an additional resource to your planning process many of the common issues should be addressed in planning process. If you wish to see and hear our power point presentation, it can be access through STMA.org.

- i. What is the hard deadline?
 - 1. What are key milestones
- ii. What is the sequence of events?
 - 1. What can be flexible
 - 2. What can happen simultaneously
- b. Identify peripheral needs
 - i. Permits
 - ii. Staging areas
 - iii. Access to site
 - iv. Haul routes
- c. Resources needed
 - i. Rental equipment
 - ii. Material lead time
- d. Sub-Contractor schedule and availability

6.) Review

- a. Review all aspects of schedule with stakeholders
- b. Get final approval from decision makers

7.) Communicate

- a. Address any questions or concerns
- b. Define expectations following project
 - i. Use concerns
 - ii. Maintenance impacts
- c. Important to keep people in the loop

8.) Execute ST

Comments from Matt Anderson, CSFM

In my experience, communication is the key to everything. It is listed as number seven on the list, but really it is a critical component of every single step in the process. I've had projects hatched from a simple conversation where an issue or need was clearly communicated. I think it is important to be honest and upfront when communication the needs of your facility. Sometimes people might not want to hear that thousands of dollars need to be spent, but that doesn't change the fact that there is an issue to be resolved. You need to put forth the best possibly solution and let the conversation unfold from there.

Another comment I would make involves the decision-making and planning process. This cannot be done in a vacuum. It is critical that everyone with a stake in the project has a chance to be heard. There will be many different perspectives on what is important and what the priorities are. You need to have a civil and honest discussion to ensure everyone is on board. You should always be open to hearing the ideas, concerns and comments from others. When people have inputs from different perspectives it can be helpful in making sure no details get missed. We always try and ask to see what other projects may be on the horizon at or near a facility we are planning to work on. A lot of rework can be avoided if simple things (like dropping a conduit or sleeve in the ground) are discussed and added into your project. When we renovated our softball field a couple years ago, a conversation with the project manager for a new clubhouse allowed us to coordinate a water line installation through the field with minimal disruption to either of our projects.





SYNTHETIC TURFMAINTENANCE BASICS

BY JIM CORNELIUS, CSFM

irst, let's begin by acknowledging that synthetic fields are NOT maintenance free and have more characteristics of a natural turf field than is believed. And, even though we call them turf, they are really carpeting that has been enhanced to play similar to natural turf. No matter what anyone says, synthetic turf does require routine maintenance. It is ironic that a school, township, parks department will spend a lot of money to install a synthetic field and then turn their back on it.

I look at synthetic as a carpet and I wouldn't install carpet in a school without understanding it needs routine maintenance to last its expected lifetime or beyond. Also, infill material will gradually disappear from the field as it is carried off by players, wind, rain, snow removal, routine maintenance, equipment tires, etc., and since it is a crucial element of a synthetic field, missing infill will need to be replaced.

REPLENISHING INFIELD MATERIAL

Most synthetic turf sports fields lack adequate infill material, whether the infill is all crumb rubber, rubber/sand mix, cork, or any other product being used today. On average, an athlete or end user will carry off two to three pounds of infill material during a playing season. Without infill support, the

turf fibers bend over too far under traffic and then break off prematurely. Also, ultraviolet rays from the sun are extremely damaging to synthetic fibers. By maintaining a proper amount of crumb rubber, you can help prevent the fibers from folding over, which minimizes the amount of each fiber that is exposed to the sun and reduces fiber

breakdown from ultraviolet rays.

To calculate your field's infill-replacement needs, you first need to first determine how much infill your field currently has. Measure the amount of crumb rubber in a variety of locations within the synthetic field's boundaries. There are several tools you can use to do this and most are easy to find; I recommend a three-legged measuring device. Your turf manufacturer can assist in where to purchase, or you can use a Starrett gauge, depth gauge or something as simple as a pen or pencil with a tape measure to determine how much infill is in the turf.

If your turf is 2-1/4 inches tall and you have less than 1-1/2 to 1-3/4 inches of infill, you need to add more; since there is no standard and each manufacturer's recommendation will be different, my experience is to maintain infill to allow 3/4 inch or less of exposed fibers above the infill level.

In each square foot a ¼ inch of infill is equal to approximately 0.55 pounds of crumb rubber.

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Natural grass can encroach your synthetic field and will be difficult to eradicate if it does.



Topdressing the field.

Synthetic fields wear just

like natural turf, except that

you can't grow the fibers

back in once they are gone.

Most rubber/sand infill systems will not need additional sand since sand tends to stay stable within the turf. On rare occasions, sand may be lost due to operations (snow plowing) or torrential downpours that cause flooding; in those circumstances, sand will need to be added to the mix.

GROOMING THE FIELD

Grooming the field is an essential maintenance task. We highly

recommend using a groomer designed specifically for synthetic turf, such as the GreensGroomer or the Wiedenmann units unless the turf manufacturer provides you with their recommended equipment. When using any groomer, adjusting it so that it only lightly touches the fibers will provide the best results — do not lower the entire weight of the groomer onto the turf unless you want to

level out uneven spots or move the crumb rubber to fill an area such as a lacrosse goal crease. When "tickling" the fibers with the groomer's brushes, the intent is to stand the fibers up to minimize their laying over from use.

We recommend that the field be groomed every 150 to 200 hours of use; some Internet articles suggest more hours, and much depends on your facility's available manpower. At minimum, the field should be groomed several times during the highest use periods and less often during the down times (if there is such a thing).

CLEANING THE FIELD

Trash and debris are additional constant nuisances. Timely removal is important to keep them from becoming ground into the infill material, causing removal problems later on.

Although largely overlooked, chewing gum on the field should be removed as soon as possible. Most chewing gums today never harden, and with the intense heat in the field, gum becomes gooey and eventually spreads across the turf surface. To remove

> gum, use either ice cubes or a freezing spray agent to harden the gum, chip it off and remove it.

When we deep-clean our clients' synthetic fields, our equipment most frequently removes items such as sunflower seeds, pistachio/peanut shells, candy wrappers, cigarette butts, wire ties from nets, buttons, fabric scraps, cleats, bobby pins, jewelry,

screws, nails, staples, paper clips and rocks (from broken stone bags that are used to weigh down goals and equipment). These items, plus dust, dirt, pollen, body skin cells, human hair, leaves and pine needles, can end up embedded in synthetic fields, where they remain for much of the life of the field.

It's astounding, actually, how quickly debris can accumulate — unseen — on a synthetic field, causing several problems. Such debris can create safety hazards for the athletes (particularly sharp metal items), abrade the synthetic grass fibers and degrade the crumb rubber (which, in turn, increases

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Grooming the field is an essential maintenance task.

the field's hardness), reduce water infiltration by clogging drainage pores and develop an organic layer that is conducive to the proliferation of bacteria, mold, moss, fungi and insects, as well as the germination of weed seeds.

Special deep-cleaning equipment with HEPA-filter vacuums can remove this type of debris from within the turf. Rain, snow, sleet and hosing will not wash it out.

Invariably, field managers ask if synthetic fields need to be disinfected. For the best answer, my suggestion is to review the research pages of Dr. Andrew McNitt at Penn State (http://cropsoil.psu.edu/ssrc/sportsturf-scoop).

CONTROLLING WEEDS

Weeds can exist and thrive in synthetic turf, especially if the field is not deep cleaned regularly enough to prevent an organic layer from developing. Also, if your turf is surrounded by bermudagrass or any other creeping grass variety, be prepared; the stolons and rhizomes of such grasses tend to seek their way into and under the synthetic turf. Synthetic field surfaces reach optimal growing temperatures before the surrounding turf does, providing a perfect greenhouse effect for creeping varieties to spread. After they start spreading beneath the synthetic field, they will find the drainage holes and send their shoots upwards for the sunlight.

The resulting sewing-machine effect makes removal of creeping grasses quite difficult, and in most cases, they will need to be chemically treated (as approved by the synthetic turf manufacturer) to kill them off. The simplest solution is to prevent them from growing in the first place; this can be



A clogged drain under synthetic turf.

done either by pulling them when young, spraying Round Up or an organic product designed to kill young weeds and grass, and then remaining vigilant so that you can act quickly if you discover an encroachment.

PATCHING WORN AREAS

Pay particular attention to maintaining adequate infill material in heavy wear areas. Synthetic fields wear just like natural turf, except that you can't grow the fibers back in once they are gone.

For instance, lacrosse players can destroy a goal crease in as little as one year if the turf is not maintained. The infill material gradually gets kicked or shuffled out, and then the fibers take a beating and break off quickly without the support of the infill material. Before you know it, you're left with a big black area (which is the backing for the synthetic turf), and now it's time to patch it. You could replace the area with either a piece saved from the initial installation, or you could cut a piece from outside the playing area so that it matches in color and type. Still, though, it won't be a perfect match because the fibers in the patch piece will not have had as much wear (so the "nap" won't be the same).

In addition, to make a patch in a synthetic field, you will need special materials, and your local home improvement or hardware store does not carry them. Don't use Gorilla glue, "liquid nails," styrene bonding agents and/or drywall screws or framing nails for repairs, since they are not designed for synthetic turf and may later become a liability nightmare. Instead, contact the manufacturer or a reputable service company to handle making the patch.



A sinkhole in the sub-base.

PAINTING THE FIELD

Painting may or may not be needed on these fields, depending on whether or not the painted areas (lines, logos, etc.) were inlaid during installation. If you need to paint, use only a paint product that is approved for synthetic turf. It seems that every year a new synthetic turf paint debuts, so do your homework by looking at each company's history, and get recommendations from other turf managers with synthetic fields. In case you later need to remove the paint, ask the supplier whether it can be done, how it is done, what will it cost, how long it will take and whether you will need special equipment and chemicals. Also ask if the product has been endorsed by any synthetic turf manufacturers and whether your turf's manufacturer is one of them.

If you have to paint, try to do so at times other than during the heat of the day. Also, removing lines works much best at night or early in the morning (when the turf is the coolest); otherwise, the chemicals will evaporate long before they start to work, and this will only cost you more time and materials.

DAMPING DOWN STATIC

Static on a synthetic field is common and can increase with humidity and (sometimes) field age. If you need to combat this, you can do so with one of several household products. Liquid Tide washing machine detergent and liquid fabric softener both work well when sprayed on the turf.

GMAX TESTING

Finally, unlike with natural turf, we can't see what is happening underneath the surface of a synthetic field. The American

No matter what anyone says, synthetic turf does require routine maintenance.

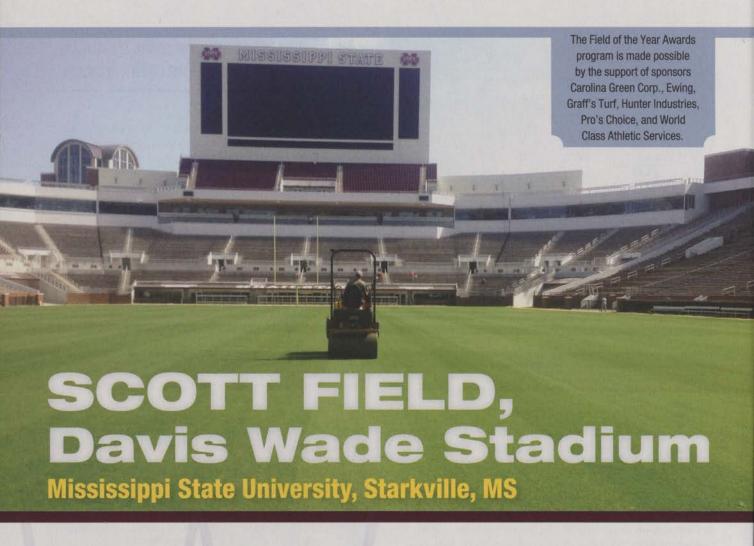
Society for Testing and Materials (ASTM) has recommended that synthetic fields be tested annually to determine their hardness in G force (better known as Gmax). Although some turf managers do not believe this is necessary, I can assure you that it is an important tool, much like soil tests with natural field.

If you don't test every year, you have no data to determine what has occurred over time.

If properly maintained, a synthetic sports field will provide years of use and play for all users. Just be aware that they do require regular care. If you have a concern, don't hesitate to ask a peer or your contractor for an answer; doing so can keep you from making a mistake that could significantly shorten the life of your field.

Jim Cornelius, CSFM, is services manager, FSC Professional Services, a division of Fisher and Son Co., Inc., Exton, PA. Jim also is a valued member of the STMA Editorial Committee.





WHY STMA SHOULD CONSIDER YOUR FIELD A WINNER?

In 2014, Scott Field at Davis Wade Stadium celebrated its 100-year anniversary. Davis Wade Stadium is also the second oldest on campus facility in the United States. Scott Field has always been recognized for its outstanding turf quality and maintenance while withstanding the demands of NCAA athletics. The demands have increased yearly with more events, media exposure, and recruiting importance. We have always taken pride in our ability to "do more with less", as our staff and budget numbers are at the bottom in comparison with other SEC schools. As of right now my staff includes myself, one full time employee, and seven students to manage approximately 21.75 acres of natural grass Athletic Fields plus another 10 acres of "common areas".

Having to utilize student labor brings its own set of challenges. Balancing each student's time is very important to me - after all, they are here to get an education not work full time. It is very challenging to ensure that everything gets done on the Athletic Department's requested schedules due to the students being in and out all day. It is imperative that we completely utilize the time that the students are here,

keep the overtime as low as possible while still providing the safest most aesthetically pleasing fields possible. When Scott Field is finished and the television cameras come on, the final product that everyone sees is done mostly by students.

Due to the push in recruiting, Scott Field hosted all six Mississippi High School Athletic Association (MHSAA) Championship Football Games. Scott Field was also host to the 2015 New Hope High School Jamboree (August 2015), which fielded 14 teams from the surrounding area. The biggest challenge we face is that the event schedule for Scott Field has increased steadily from year to year, making it very hard to do what we need to do to the field around all the events.

In a time where other schools around us perform "a complete field resodding" on a yearly basis, we still practice sound agronomics, sod the very minimal amount possible, and grow-in the rest. This summer I chose to go with an "old school" method of sprigging into the existing bermudagrass base; the sprigs helped speed up the grow-in and insured that we were one hundred percent covered by July first.

Scott Field has always had a great reputation as being one of the best playing surfaces in the country. My goal is



to keep its reputation as high, or higher, than it has always been while adjusting to the new higher demands of college athletics. I feel that we have always done an outstanding job of providing our student athletes with a safe, highquality playing surface that is also aesthetically pleasing.

SPORTSTURF: What attracted you to a career in sports turf management?

HARDIN: I am an ex-athlete who didn't make it to the next level. Sports turf management caught my eye when I knew I would no longer be a part of the sports world, so sports turf was another way of being involved in the sports world every day, all day.

One of the greatest treasures of our job is that at the end of the day we can see the fruits of our labor.



Category of Submission: College Football

Sports Turf Manager: Brandon Hardin

Title: Superintendent, Sports Turf

Education: Bachelors of Science in Agronomy

Experience: Mississippi State University (2003-2006)

Sports Turf Student Worker: Assisted in every aspect of daily Sports Turf Management for all of Mississippi State's Athletic Fields

Roger Dean Stadium Jupiter, FL (2005) Intern: Assisted in the maintenance of 12 baseball fields and Roger Dean Stadium. STMA's 2005 Pro Baseball Field of the Year

Louisiana State University (2007-2008)

Horticulturalist: Assisted in day to day maintenance of the Old Alex Box Stadium as well as four natural grass football practice fields (two 419 and two MS Choice)

Mississippi State University (2008-2014) Assistant Superintendent, Sports Turf: Assisted Bart Prather in the management of all Mississippi State University's Athletic Fields and surroundings. Responsible for all of Scott Field's maintenance, painting, as well as day-to-day operations.

Mississippi State University (2014-Present)
Superintendent, Sports Turf: Manage all of Mississippi
State University's Athletic Fields approximately 21.75
acres as well as common areas around the athletic fields.

Part-time staff: Benjamin Baker

Original construction: 1914

Rootzone: 100% sand

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Turfgrass variety: Tifway 419 bermudagrass

Overseed: Champion Fine 80/20 Blend of Perennial Ryegrass/Chewing Red Fescue not to exceed 20 pounds per 1000 square feet

Drainage: Herringbone with Hydraway drain lines on 7-foot centers

SPORTSTURF: What are your biggest challenges working in the high-profile SEC and how do you approach those challenges?

HARDIN: Television has to be the biggest challenge. Whether it is working around their staff for setups, changing of times for broadcasts, or even the stop and go work procedures to make sure all of their interviews are not interrupted. Since the creation of the SEC Network, every event every day is on television. That puts enormous pressure on us every day to make sure no stone is unturned and everything is perfect.

SPORTSTURF: What's the greatest pleasure you derive from your job? What's the biggest headache?

HARDIN: One of the greatest treasures of our job is that at the end of the day we can see the fruits of our labor. Or as the late Leo Goertz used to put it, "We are blessed with a job that we can turn around and instantly see the results of our work." The biggest headache is the fact that college athletics now has no "seasons"; every sport is year round, which puts enormous stress on our crew to keep up throughout the year with very few slow times.

SPORTSTURF: What's the best piece of turf management advice you have ever received?

HARDIN: A wise man once told me, "Growing grass is the easy part, it's the managing of people (coaches, players, administration, staff, and students) that is the hard part." And that statement has held true. Of course there are issues with the grass from time to time but the overall headaches of daily work involve dealing with different personnel.

SPORTSTURF: How are you using social media at work?

HARDIN: I am very selective about what I put out on social media from day to day. We as turf managers aren't in the PR department so we have to be careful what we put out there for the world to see. But, we also have to take the negatives with the positives and keep on rolling; we don't do what we do for the glory of likes and shares or retweets, we do it for the student-athletes, to keep them safe and to help them win championships.

SPORTSTURF: How do you see the sports turf manager's job changing in the future?

HARDIN: The turf manager's job is an ever-evolving merry go round. It will always be changing whether negatively or positively. With the increase in social media and all the exposure that we turf managers are now getting, it seems as if people are becoming more informed on what we actually do, the hours it takes, and work that actually goes into keeping these athletic fields safe and game ready year round.

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MAINTENANCE PLAN

JANUARY

■ Apply 0.5 #N/1000 sq. ft. (UMAXX) 47-0-0 slow release

FEBRUARY

■ Apply 0.5 #N/1000 sq. ft. (UMAXX) 47-0-0 slow release

MARCH

- Preparation for Spring Football begins.
- Roll with 4-ton roller to ensure surface is smooth
- Apply 0.5 #N/1000 sq. ft. (UMAXX) 47-0-0 slow release

APRIL

- Following Spring Game, spray out Ryegrass with Monument/ammonium sulfate mixture
- Deep tine coring 1.25 inch cores on 3 inch spacing
- Vertical mow two directions 0.5 inch depth
- opdress two loads of topdressing sand
- Apply 1#N/1000 sq. ft. 30-0-0 Ammonium Nitrate/Sulfate Blend

MAY

- Sod minimal areas needed (logos, coach's boxes, cheer area)
- Deep tine aerify with pencil tines on 2-inch spacing
- Apply Georganite organic fertilizer 1000 lbs. per acre
- Top Dress two loads of topdressing sand
- Foliar fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed
- Vertical mow
- Roll with 4 ton roller to ensure surface is smooth

JUNE

- Deep tine aerify pencil tines on 2 inch spacing
- Apply 1#N/1000 sq. ft. 30-0-0 Ammonium Nitrate/Sulfate Blend
- Deep tine core aerify 1/2 inch coring tines on 3 inch spacing (after camps)
- Apply Denali Foliar Organic fertilizer after coring 10gal/Acre
- Foliar fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed
- Roll with 4 ton roller to ensure surface is smooth

JULY

- Apply Acelepryn Insecticide for Fall Armyworm control
- Deep tine aerify pencil tines on 2 inch spacing
- Apply 1#N/1000 sq. ft. 30-0-0 Ammonium Nitrate/Sulfate Blend
- Deep tine core aerify 1/2 inch coring tines on 3 inch spacing (after camps)
- Apply Denali Foliar Organic fertilizer after coring 10gal/Acre
- Roll with 4 ton roller to ensure surface is smooth
- Foliar fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed

AUGUST

- Deep tine aerify pencil tines on 2 inch spacing (Following Scrimmages and Jamboree)
- Roll with 4 ton roller to ensure surface is smooth
- Apply 1#N/1000 15-5-10 every 7-10 days as needed
- Foliar Fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed

SEPTEMBER

- Mow, roll, and repair field immediately following games
- Apply 1#N/1000 15-5-10 or 30-0-0 every 7-10 days as needed
- Foliar fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed

OCTOBER

- Roll and repair field immediately following games
- Apply 1#N/1000 15-5-10 or 30-0-0 every 7-10 days as needed
- Foliar fertilizer application 3 oz./1000 sq. ft. every 7-10 days as needed
- Overseed with Champion Fine 80/20 Perennial Ryegrass/Chewing Fescue Blend Usually around October 1 depending on schedule
- Initial application is 9#/1000 sq. ft. using the Redexim Speed Seed
- Overseed after each game as needed not to exceed 20#/1000 sq. ft.

NOVEMBER

- Fungicide and Insecticide applications are made as necessary following standard IPM practices, Primary insect pests are Fall Armyworms and Bermudagrass Mites
- Pythium Blight on overseeded Ryegrass and Leaf Spot on Bermudagrass are the most common diseases
- At the completion of the Egg Bowl vs. Ole Miss we will continue our mowing through the winter as we try to catch our breath from a long season



EMERGING TECHNOLOGIES:A LOOK INTO THE FUTURE

Editor's note: The author is managing director for the Center for Advanced Turf Technology (CATT) at The Toro Company.

BY DANA LONN, PE

ports field managers, superintendents, equipment managers and other turf professionals are consistently interested in the future of the turf industry and what lies ahead for the next generation of products and solutions. This innate curiosity is driven in part by the resourcefulness of the profession itself, and constant efforts to improve efficiency and productivity.

With that in mind, manufacturers, including Toro, continue to look at the immediate and long-range needs of the industry and focus on developing meaningful solutions to address the challenges of today's sports field managers and superintendents.

TROUBLED WATER

One of the main challenges we face as a society is water conservation. It's an important issue that impacts everyone around the world. At Toro, being good stewards of the land and water is a key focus in everything we do and the innovations we bring to market. Turf professionals have an important role to play when it comes to water use efficiency, and are increasingly turning to new technology and methods to

make sure they are part of the solution.

Dwindling water supplies and increasing costs are already forcing professionals to manage turf with less water. What we have found at Toro's Center for Advanced Turf Technology is that there is an opportunity to improve the current situation. By increasing efficiency and improving application practices, turf managers are able to maintain green spaces with less water and other inputs, while still achieving the results they desire.

According to the University of Nebraska – Lincoln (UNL) and the National Drought Mitigation Center, drought conditions are expected to persist in the coming months throughout much of California, western Nevada, southeast Oregon, southern Arizona and New Mexico (http://drought.unl.edu/NewsOutreach/MonthlySummary/April2016DroughtandImpactSummary.aspx).

Furthermore, many communities across the Southwest have implemented mandatory water use restrictions for residents, businesses and communities alike. This has had an impact on sports fields and golf courses in the region, and has encouraged practitioners, irrigation manufacturers, researchers, and water purveyors to take a hard look at how they can help tackle this issue — both in the short-term in dealing with the current drought and in the long-term by focusing on water conservation as a much larger and permanent solution.

We believe that data is, and will continue to become even more important in understanding how best to manage turf with less water. Soil sensors are a simple way to precisely measure soil moisture and provide the necessary information to deliver a more accurate figure on how much and how often to water. Soil sensors tell turf professionals how much water is available in the soil for the plant to use, much like the fuel gauge in a car indicates how much fuel is available. Sensors help turf managers make decisions on when water is required, and not needed to prevent overwatering.

We have also developed a solution that maps soil moisture, as well as salinity, compaction, overall turf quality and elevation data. This additional information can help turf managers make more informed decisions on where to place sensors, what areas may be under stress, and how to improve irrigation uniformity to improve overall turf health.

Thanks to technology, turf managers are now able to install networking infrastructure on sports fields or golf courses to provide real-time data regarding the status of the turf. We can even run different programs by irrigation zone to deliver precisely the amount of water needed in a particular area, essentially eliminating water waste. The next generation of this process could include changing the way we monitor the turf completely, through placing sensors on mowers and the use of drones and advanced sensors that can provide important supplementary or complementary data to help manage precious resources with a simple fly-over.

ADVANCES IN BATTERY TECHNOLOGY

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decreasing battery weight have been a continuous effort for decades. Research teams around the world, from a variety of different sectors, have been trying to develop the next groundbreaking battery solution, and the research is promising. Lithium-ion batteries have made significant progress in the past few years and continue to improve. Lithium batteries have made electric vehicles possible for city vehicles, such as the Nissan Leaf, Chevrolet Volt and the Tesla. Experimenting with new metals and chemistries has helped develop a long list of emerging technologies that may surpass the lithium-ion battery. Materials like aluminum and zinc have entered the realm as potential solutions. As alternative fuel sources continue to be a driver for manufacturers, distributors and end users alike, we can expect battery research to be an area of focus for research and development teams for years to come

ASSISTED AND AUTONOMOUS VEHICLES

With significant investments from organizations like Google, Uber and most of the major automobile manufacturers, autonomous vehicles are making a name in mainstream media as the "next big thing." Although there are hurdles to be crossed, the day when driverless vehicles take to the road is within sight. Adaptive cruise control, collision sensors, and lane departure warnings are all appropriate steps to autonomous vehicles. Turf care is a potential early adopter of autonomous technology. Turf care is very routine and we do not have to interact with other non-automated vehicles. The main challenge for manufacturers is centered on making existing technology both productive, affordable and safe.

Autonomous vehicles may be able to fill employment gaps as sports field managers often have an increasingly difficult time finding skilled turf care professionals. At sports complexes where there can be a shortage of labor, an autonomous mowing unit would free up the available workforce to take on additional tasks. Another area where autonomous vehicles can prove value is in their ability to deliver better overall consistency. Automation takes human error out of the equation and can help keep operators off of steep slopes or from other potentially hazardous terrain.

ART VS. SCIENCE

Professional turf care is considered an art by many in the industry, and we're encouraging turf managers to move more towards science and rely on measurements and data to provide the best solutions. The future of successful turf care is firmly rooted in precision turf management. Given the growing importance of taking care of our environment, sports field managers and superintendents, along with manufacturers and other professionals, must continue the adoption of technology to make more informed, efficient and productive decisions when it comes to managing turf.

The transition from art to science in the sports turf industry won't be an easy one, but turf care professionals who can successfully accomplish this and thrive in a wireless, interconnected world will be better equipped and informed to take action with their turf where and when it is needed.

The industry has made great progress, but the future is even more exciting in terms of what we can do, together, to care for the turf and our outdoors!

ABOUT TORO'S CENTER FOR ADVANCED TURF TECHNOLOGY (CATT)

Focused on advancing the company's innovative leadership, Toro's Center for Advanced Turf Technology (CATT) has responsibility for developing technologies that benefit both customers and the environment. Comprised of a team of leading agronomists and product development professionals, CATT identifies emerging trends in turf care markets and, through the application of appropriate technologies, helps discover new solutions to increase productivity, conserve water, reduce fuel consumption, and improve growing conditions. In working with customers, academic institutions and leading researchers, the group has been influential in the area of robotics, hydrogen fuel cells, advanced battery technologies, precision irrigation and soil moisture sensing.



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of injuries happen during practice

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SO FAR. WE'VE GIVEN OVER

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We rely on individual donations for of our total funding

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Sources: Centers for Disease Control and Prevention (www.cdc.gov) & The American Academy of Orthopaedic Surgeons (www.aaos.org)



SEED: WHAT'S IN THE NUMBERS?

BY DAVID R. HUFF, PHD

eed serves as a remarkable means of plant propagation, particularly in terms of commercial application of plant material. It ships well, it stores well, and large-scale establishment can be achieved relatively quickly at low cost. In the turfgrass industry, it is most typical that cool-season species are propagated by seed, whereas warm-season turfgrass species are propagated vegetatively through either sprigs or sod. While there are exceptions to this general tendency (i.e., vegetatively propagated cool-season species and seeded warm-season species), for the most part, our industry uses seed to establish cool-season turfgrass species like bentgrass, perennial ryegrass, tall fescue, Kentucky bluegrass and fine fescues, while vegetative propagation is commonly used for warmseason species like bermudagrass, St. Augustine grass, zoysiagrass and seashore paspalum.

Much has been written about using seed as a means of turfgrass propagation, including the basic importance of various aspects like purchasing, applying and establishing seed; for example, being able to properly understand and use the important information contained on a seed label like the calculation of the percent Pure Live Seed (PLS) for comparing the true costs of different seed products (example, see

http://plantscience.psu.edu/research/centers/turf/extension/factsheets/seed).

However in this article, I would like to present some of the different, though no less important, aspects of using seed to establish areas of turf. For example, over the years, I have found that most turf managers view their seed as an individual cultivar or variety, in that all the seed in a bag, of say "Penncross" creeping bentgrass, is genetically all the same. The truth is that each individual seed gives rise to a genetically unique individual plant. By genetically unique, I mean that some plants will be big and others small, some will be dark green and others light green, some will tiller more while other stay less dense, etc. This is because each seed in the bag was the result of a fusion between a sperm from the pollen-donator parent plant and an egg from the seed-bearing parent plant. And just as in animals, insects and human beings, each individual is genetically unique and different from all others because each was derived from a unique combination of sperm and egg that gives rise to their genetic uniqueness.

A NUMBERS GAME

I often like to tell my students that there are more stars in the universe than all the grains of sand on all the beaches of planet Earth and that there are more genetically different individuals of Penncross creeping bentgrass than there are

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5 x 10¹⁸ GRAINS of SAND on BEACHES

00 trillion m³ of beach on Earth 8,000 grains = cm³ (1 cm³ = 0.06 in³)



5 x 10²² STARS in the UNIVERSE

250 billion stars in the Milky Way x 200 billion galaxies



1 x 10^{30,000} GENOTYPES of BENTGRASS

(Number of allelic combinations) # of genes



1 x 10¹⁰⁰ GENOTYPES in PENNCROSS

More than 2/3 of all creeping bentgrass genetic variation resides within cultivars divided by approximately 200 cultivars.

stars in the universe; but that statement seems to lose its impact unless you do the math, so let's do the math (see above).

There are approximately 700 trillion cubic meters of beaches on planet Earth, and using an average medium sand particle size that is equivalent to 8,000 sand grains per cubic centimeter, that equals 5 quintillion (5 x 1018; in this decimal notation, 1018 is a 1 followed by 18 zeros) grains of sand on all the beaches of planet Earth. Now, there are approximately 250 billion stars in our Milky Way galaxy, and there are approximately 200 billion galaxies in the known universe. That equals 50 sextillion (50 x 1021) stars in the universe (give or take).

These are very large numbers of things, too large really to even comprehend; however, they pale in comparison with the number of genetically unique individuals of sexually reproducing species, like creeping bentgrass. To estimate the number of genetically unique individuals of creeping bentgrass, we'll apply a standard genetics formula that uses the number of different combinations of different forms of any given gene to the power of the total number of genes that an organism possesses. On average, this number is 1 x 1030,000, or 10 different combinations per gene to the power of 30,000 genes per organism. I don't even know that there is a name for this number, but I do know that it is a very large number.

Finally, of the total amount of all this genetic variation

within the creeping bentgrass species, approximately 2/3 of the genetic variation have been found to reside within cultivars, while 1/3 has been found to reside between cultivars. And thus, if we assume that there are roughly 200 cultivars of creeping bentgrass in today's market (there really aren't that many, but it helps to make the numbers work better), then the total number of genetically unique individuals that might exit within the Penncross cultivar would roughly be on the order of 1 googol (or 1 x 10100; that is a 1 followed by 100 zeros). Thus, there is way more number of genetically unique individuals of Penncross creeping bentgrass, or any cultivar of creeping bentgrass for that matter, than there are stars in the universe.

The point of this exercise is to illustrate the importance of managing your young seedling plants during establishment. If, for example, you plant creeping bentgrass, which possesses 6 million seeds per pound, at a recommended rate of say 1 lb. per 1,000 sq. ft. on an average sized golf course putting green of 5,000 sq. ft., then your initial establishment will give you 30 million genetically unique seedlings. Over time, it is unrealistic to believe that all 30 million seedlings will survive. Some seedlings will succumb to disease, other will die from heat or cold, and many will simply be outcompeted by their neighboring brothers and sisters. There is immense competition for the limited resources of light, nutrients, water and simply space to grow on a golf course putting green. Therefore, over

time, those 30 million seedlings will be reduced to some lower number, maybe thousands or maybe hundreds. In addition, the surviving plants will very often tend to look very different from one another due to their genetic uniqueness. This is one explanation of how and why putting greens tend to segregate over time into a network of patches.

THE MAINTENANCE FACTOR

However, the most important force for determining the level of competition and subsequent survival among these bentgrass seedlings is most likely the type and level of maintenance given by the turfgrass manager. Are these greens initially mowed at 1/8 inch or at 1/10 of an inch? Are these greens regularly cultivated, fertilized and irrigated, or are they kept lean and hard? These different management parameters have an extremely important impact on the final composition of the resulting bentgrass population because the genetically unique individuals will have different abilities to respond to different levels of management.

For example, some individuals will tolerate lower mowing heights better than others, some will respond more to increased levels of nitrogen fertilizer than others, some will tolerate traffic more than others, etc. And thus, the original seedling population, which initially started at 30 million plants, will be steadily winnowed down to a much-reduced number of plants depending on the level and type of management received.

Additionally, once a particular genotype has been eliminated from the population, it cannot be resurrected because turfgrasses like creeping bentgrass do not typically flower and set seed underneath our mowing heights. Thus, if management practices are abruptly changed, after say 10 years, to a different level of intensity, then the genotypes best adapted to the new management practices might have already been eliminated from the existing population. And once these individuals are gone, they are gone, never to come back again.

It is at this point when my students typically ask, "But what about overseeding?" Well, in some cases overseeding can add or replace lost genetic variation, but in the case of creeping bentgrass, it is surprising to me how little genetic variation can actually be added through overseeding (see Sweeney, P. and K. Danneberger, Introducing A New Creeping Bentgrass Cultivar Through Interseeding: Does It Work? It sounds like a good idea, but there are drawbacks. USGA Greens Section Record Sept-Oct 1998). Thus, the point of all this is for superintendents to know and value their seedling population and to appreciate the fact that their management techniques will greatly influence the resulting plant population for a long, long time to come.

This same principle described above also holds true for home lawns and landscape turf. However, for lawn and landscape turf, the seed numbers game is initially more important during the act of initial establishment. This is because most lawn and landscape turfs are established as a mixture of different species, the most common of which in the Northeast is a mixture of Kentucky



Segregating bentgrass putting green.

bluegrass, perennial ryegrass and fine fescue. The important point here is that these three species have very different sizes of seed and that the available information on the seed label provides only the percentage of each type of seed by weight.

Thus, when calculating out the final composition of species in the final product (the lawn itself), the Pure Seed component that is listed on the seed label as percent by weight of each species, in combination with PLS, must be converted to percent by number. This is because each pure live seed, regardless of its weight, gives rise to an individual seedling plant, and thus, the numbers are often very, very different.

As can be seen in photo on page 35, the number of Pure Live Seed per pound of each species is very different than the amount of Pure Seed that is listed on the seed label as a percent by weight. For example, as a percent by weight, Kentucky bluegrass only registers 10% of the above bag of seed. Moreover, when the percent germination is included into the calculation in order to determine PLS, Kentucky bluegrass is only 7.5% of the seed mix. However, when we take into account that Kentucky bluegrass has 2.2 million seeds per pound, then the final species composition of the resulting lawn is a whopping 43.1% Kentucky bluegrass. This example demonstrates the importance of knowing about the effect that seed numbers have on establishing various turfgrass species.

David R. Huff, PhD, is Professor of Turfgrass Breeding and Genetics at Penn State. This article originally appeared in the Winter 2016 edition of Pennsylvania Turfgrass, the publication of the Pennsylvania Turfgrass Council.

John Mascaro's Photo Quiz

Answer on page 47

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Dark green/light green turf

Turfgrass area: Football stadium

Location: San Diego, California

Grass variety: Bandera bermudagrass/ryegrass



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 - Brad Morrison Sportsfield Construction Division | Maumee Bay Turf Center

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CRUMB RUBBER: SEEING IS BELIEVING BUT WHAT IF NO ONE

CAN SEE IT? Editor's note: This viewpoint on crumb rubber's use on athletic fields is from the Turfgrass Producers International; next month we will present the viewpoint of the Synthetic Turf Council.

BY JIM NOVAK

hen Environment and Human Health, Inc. (EHHI), released a report last year that was done at Yale University showing there were 96 chemicals in crumb rubber used as surfacing in toddler playgrounds and on sports fields, more than a few people weren't surprised. But what was surprising was the fact that of the 96 chemicals detected, nearly half had NO previous toxicity assessments done on them for their health effects. Of the half that had toxicity assessments, 20% are probable carcinogens; 40% of the chemicals in that group were found to be irritants. Twenty-four percent are respiratory irritants, some causing asthma symptoms; 37% are skin irritants; and 27% can cause eye irritation.

That assessment would seem to be enough cause for alarm, but EHHI went on to note in their summary statement that they "did not analyze for the carbon black that makes up to 30% of each tire, nor did it analyze the carbon black nanoparticles or the nanotubes that are now used in the manufacture of tires."

Just how small are nanoparticles and why can't we see them? They are smaller than 100 nanometers in diameter. A nanometer is a billionth of a meter, about the size of six carbon atoms in a row. For comparison a human hair, is about 80,000 nanometers

wide and a strand of DNA is two nanometers wide. To visualize it another way, a nanometer is to one inch as one inch is to 400 miles.

But even when they took into account the fact that no nanoparticle evaluations had been taken into consideration the comments by individuals associated with the study reveal a valid concern:

"Not surprisingly, the shredded tires contain a veritable witches' brew of toxic substances. It seems irresponsible to market a hazardous waste as a consumer product."-Gaboury Benoit, PhD, Yale Professor of Environmental Chemistry and Engineering

"From the data of this new study, it is reasonable to assume that persons playing on synthetic turf fields with rubber tire infill or toddler play-grounds surfaced with rubber tire mulch are being exposed concurrently to multiple chemicals."-David Brown, ScD, Public Health Toxicologist

"This study should give pause to all those schools, towns, and government agencies that have told the public these fields are safe. Exposing toddlers, students and athletes to this many chemicals, many at the same time, seems like an incredibly irresponsible experiment in people's health and needs to come to an abrupt end."-Nancy Alderman, president of EHHI

California funds synthetic turf research

In June 2015, the state of California announced they had authorized spending \$2.9 million to study the health effects of crumb rubber. California's Office of Environmental Health Hazard Assessment (OEHHA), under contract from CalRecycle, the California Department of Resources Recycling and Recovery, is conducting the evaluation which, according to Washington D.C.'s WJLA ABC 7 News reporter Joce Sterman, is being designed to deliver the kind of information states, communities and parents are looking for so they can make informed decisions about installing synthetic turf fields that use crumb rubber infill in their community and in recreation areas.

Sterman reported the California assessment will involve a series of scientific studies to determine if chemicals in tire crumb can potentially be released under various

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environmental conditions and what, if any, health risks these potential releases may pose to players who use synthetic fields constructed with tire crumb. The evaluation includes expert solicitation and stakeholder participation to help guide the design and EPA and other federal agencies are actively engaged in that process. Sterman added, "The EPA and other federal agencies are collaborating with California as they design and carry out their assessment. For example, scientists from EPA have been providing technical advice on the design of the studies and the EPA stated they "will continue to engage with California on the implementation of the studies as well as the interpretation of the results."

TPI reached out to contact Dr. Melanie Marty, Acting Deputy Director for Scientific Affairs, Office of Environmental Health Hazard Assessment (OEHHA),

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regarding the California Synthetic Turf Study and inquired if carbon black nanoparticles in crumb rubber were going to be assessed as part of the Synthetic Turf Study. The question was presented because, as previously noted, nanoparticle testing was not reflected in the recent Yale University study nor was it in a previous crumb rubber study conducted by CalRecycle in 2010. TPI also made inquiries as to who assisted OEHHA in establishing their guidelines for the proposed study because it is important for the credibility of the study that it be science-based and that numerous sports turf and parks and recreation professionals and scientists provide input.

On the issue of nanoparticle research we received a prompt response from Patty Wong, PhD, Senior Toxicologist, Chief, Special Investigations Section, Pesticide and Environmental Toxicology Branch Office of Environmental Health Hazard Assessment, who wrote: "OEHHA has received several suggestions on the concerns of carbon black from crumb rubber. We are in the process of collecting public input on the study. We are compiling the public input for review by the Synthetic Turf Scientific Expert Panel. The Panel will advise the project plan. In the meantime, any specific input or your thoughts on how these substances should be investigated will be helpful and appreciated."

TPI forwarded Dr. Wong a substantial list of past and more recent studies related to nanoparticles research which contained the names of numerous research scientists and/or research-related firms who have, or who are now, exploring this issue.

In addition to health consequences that might be related to chemicals released from crumb rubber, concern persists about the heat given off by artificial fields and the health risks that the heat poses to athletes and children.

OEHHA expects to report their results in 2-3 years.

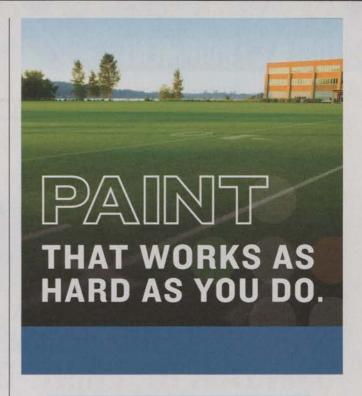
UNANSWERED OUESTIONS

Numerous professional groups are identifying the need for additional research on the safety of crumb rubber; specifically, carbon black nanoparticles. These professional groups not only include the scientific community, but insurance professionals and attorneys.

At the 2015 Annual Meeting of The Federation of Defense & Corporate Counsel (FDCC), an organization composed of recognized leaders in the legal community dedicated to pursuing the course of a balanced justice system and represent those in need of a defense in civil lawsuits, did a presentation titled, "Nanotechnology: the challenge of insuring against a multi-faceted and poorly understood latent exposure." The presentation went to considerable length to state that further research about nanotechnology is needed.

The information the authors presented it the FDCC Annual Meeting suggested that in the not too distant future, it's conceivable that manufacturers and possibly communities will

Continued on page 46



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USING AIR TO "PRINT" ON YOUR TURF

e ran across an item on the Internet about a company called New Ground Technology, which provides green-tech equipment and creative services that might enable turf managers to create promotional imagery. In an effort to understand better how the technology works, we asked a few questions of the company's owner and founder, Pete Davis of Pleasanton. CA:

SportsTurf: How does the technology work (without getting too info tech-y)?

Davis: High contrast stripes seen on sports fields are simply organized reflections from blades of turf that are typically generated with striping rollers which continuously tilt the blades of turf in the direction of a mower's path. New Ground Technology's Terra Print system uses air to gently enable or interrupt this natural lay into 5 x 5-inch square "pixels," much like a dot matrix (fax) printer.

SportsTurf: Does it require a special type of machine or computer to attach to a mower or utility vehicle?

Davis: Our machine is based on a commercial Cub Cadet PRO-Z tractor model. It is fitted with a blower that delivers air to the machine's printing module. Our production models have three printing modules located where a mowing deck usually resides. Each module has four channels that are controlled by an on-board

processor. The processor uses an image file to direct each channel while interpreting Topcon GPS information to track the machine's path and position. All the operator has to do is monitor the display's position "ight bar" and steer to keep it centered whole printing each track.

SportsTurf: How is the technology "sold"? By each separate design? Does it start with a photo or image of what the

customer wants the final to look like?

Davis: More about your sold question below but NGT will provide customers access to a library of "standard" images such as baseball, football, soccer, players, kind of like clip art. Other, easily acquired optional graphics including lettering, numbers, symbols will be available for the end user to build

a semi-custom image file. Current and future options include custom imagery created through our creative suite. Our target is to have 1 hour, worldwide service.

The customer provides Google Earth location, desired image location and orientation, as well as providing ideal viewing direction for cameras and/or

spectators. This data is related to the sun's position or lighting configuration. Our geo-positioning software app is used to determine the printing (machine) direction. The direction of printing is critical for producing maximum viewing contrast. Today we load geo-positioned image file, set-up our graphic boundaries and print, say, a 120 x 120-foot graphic within about 1 hour.

SportsTurf: Do you or one of your reps

need to be on-site to produce the grass graphic?

Davis: No, the simple file upload process is straight forward. Pacing off, or the machine's onboard GPS system, can be used to lay out the field. Hop on and drive the machine to a corner, headed in the general direction and hit GO. Easy, just like mowing

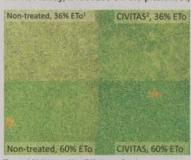


SportsTurf: Can you provide a typical cost of the service?

Davis: Our current model is to lease the complete system to venues or regional service providers on a yearly basis for less than \$6K a month. Venues with limited needs or budget can contract projects through a future network of NGT providers.

Product aids water conservation

CIVITAS Turf Defense is an innovative product that enhances a plant's ability to tolerate stress. Unlike many products on the market today, it focuses on the plant first, not the problem, which



pesticides and water.
Numerous academic
studies have shown
that using CIVITAS
Turf Defense allows
the turf to tolerate
periods of water
stress. It increases

results in a healthier

plant that requires less inputs such as

Texas A&M Water Use Efficiency Study

the threshold of what a plant can endure during drier periods, potentially allowing the turf to tolerate up to 40% less water replacement compared to calculated evapotranspiration (ET) rates. The product can help sports turf managers soften the peaks and valleys of the summer season by helping create a stronger plant system that can better withstand biotic and abiotic stresses.

by Matt Cimino, senior technical services advisor, Intelligro



AVANT 420 + MINI DIGGER

The Avant 420 is perfect for light professional use and homeowners. This articulating, easy-to-ride loader offers telescopic boom with joystick control. The 20 hp unit is just over 2100 lbs., is 86.4 inches from front to back, and has a lifting capacity of 1200 lbs. The Mini Digger is an efficient solution for projects where digging depth is 59 inches or less. The digger mounts directly on the quick attach plate of the loader and operates through the auxiliary hydraulics control lever. Extra options: Three bucket options available range from 9.8 inches with teeth to 39.4 inches straight edge and a bucket tilt adapter. **Avant Tecno USA**

ALL-NEW HR800 WIDE-AREA ROTARY MOWER FROM JACOBSEN



the industry's lightest in-class weight powered by a rugged and reliable 74.3 hp Kubota engine, the HR800 sets a new efficiency and power-to-weight ratio standard," said product manager Ben Bruce. "That efficiency provides a massive cutting capacity of 100+acres per day." The new mower is almost 2 feet narrower than its competitor. The exclusive Tilt Sensor Technology automatically monitors and adjusts mower decks to prevent rollovers on hills. Q AMP variable rate steering provides optimal response to operator input to mow effortlessly around obstacles. In addition, a new AdaptiCut system automatically adjusts mow speed to ensure consistent cut performance, even through the thickest grass.



K-RAIN INTRODUCES NEW BLUETOOTH CONTROLLER

K-Rain is pleased to announce the new BL-24 Bluetooth operated controller. Available in 4,69, and 12 station models, this indoor

controller is perfect for both residential and light commercial applications. Simply download the K-Rain BL app for IOS or Android devices, and begin

programming via your smart phone or tablet. The full program display is straightforward and simple to follow, turning your mobile device into a remote control! Easily monitor or manipulate multiple systems whether your clients are available or not- increasing your productivity to new levels. Bluetooth technology is rapidly gaining popularity in many markets and K-Rain is excited to be on the forefront of introducing this convenient and timesaving application to the irrigation industry. K-Rain will provide full training and technical support.

CLASSEN'S PRO HYDRO-DRIVE OVERSEEDER

Classen's PRO HTS20 hydro-drive overseeder is a self-propelled

machine that features the industry's tightest blade placement, providing 13 seed rows in a 20-inch swath for a thicker, carpet-like coverage. The unit's double-edge double-blade reel spaces the blades a narrow 1.5 inches apart to provide greater than 15 percent more rows of seed than competitive units. Depth can be set in any of 10 settings from 0 inches to 1.625 inches, to attain the proper depth for the seed. Units feature a 40-pound-capacity floating seed box that follows the contours of the terrain to ensure consistent seed placement. The floating seed box also locks in place for hill or slope seeding. A seed agitator inside the seed box breaks up seed clumps caused by dew and humidity, allowing seeds to drop from the hopper through the seed box slits.

Classen

SIOUX ALL-ELECTRIC PRESSURE WASHER IMPROVEMENTS

Sioux Corporation continues to improve their line of industry leading all-electric pressure washers and steam cleaners by obtaining additional certifications. Sioux's explosion-proof pressure washers and steam cleaners are now approved for Class I, Division 1, Group C and D, and Class II, Division 1, Group F and G hazardous environments. Sioux Corporation has also added third party certification on the full line of EN Series all-electric explosion-proof hot water pressure washers and steam cleaners as well as explosion-proof cold-water washers for use in Class I Division 1, Group C and D, and Class II, Division 1, Group F and G hazardous environments. Class I, Division 1 environments are areas where ignitable concentrations of flammable gases, vapors, or liquids can exist under normal operating conditions. Class II, Division 1 environments are areas where ignitable concentrations of

combustible or conductive dust can exist under normal operating conditions.

Sioux Corporation

CATERPILLAR NEW NATURAL GAS GENERATOR

Caterpillar Inc. has released the new Cat G3512, the first natural gas generator set on the

market engineered to meet a full suite
of critical standby market requirements
including NFPA 110 Level 1 Type 10
compatibility, a UL 2200 listing, as well as
EPA and CSA certifications. Rated for standby
power at 750 kW or 1000 kW at 60 Hz, the
generator set is suitable for the emergency
standby market in North America. Ideal
for emergency, legally required or optional

standby systems, the G3512 is appropriate



for schools, universities, etc. and other public facilities. The G3512 is modeled after the standby diesel solution to minimize installation costs and commissioning time on-site. A high power density 12-cylinder engine offers market leading load acceptance and transient response.

Caterpillar

UNITED TURF ALLIANCE DEBUTS TWO NEW HERBICIDES

United Turf Alliance announces the addition of two new herbicides. ArmorTech SULF 396 is an herbicide notable for its ability to provide quick control of sedges and many other weeds. The active ingredient sulfentrazone launches a two-pronged attack against troublesome sedges with aboveground foliar control and tuber interaction below the soil. ArmorTech SULF 396 also provides excellent control and suppression of a long list of other grassy and broadleaf weeds. It can be used on established cool-season and warm-season turfgrass and applied in early spring, late summer and fall. The herbicide is labeled for use on athletic fields. TRIONE is an herbicide absorbed



through roots, shoots and leaves and offers both pre-emergence and post-emergence control of grassy and broadleaf weeds. It is often used during turf establishment and renovation projects to prevent or eliminate weeds and reduce competition with emerging turfgrass. It delivers both pre-emergence and post-emergence control of crabgrass and can be used to eliminate bentgrass growing in unwanted environments.

United Turf Alliance

PLANT GROWTH REGULATOR FOR TREES

Arborjet has begun distributing Shortstop systemic plant growth regulator for trees. Shortstop slows aboveground tree growth by 80 to 95% by inhibiting the production of Gibberellic Acid, resulting



in less frequent pruning and maintenance. Rather than trees expending energy on top growth, Shortstop fosters increased root production, improving drought tolerance and reducing environmental stresses like the impact of construction damage. Shortstop

is most effective when applied to the soil near the base of the tree either by soil injection or with basal soil drench. The formula is effective for treating a variety of trees such as Sweetgum, Bradford Pear, Maple, Elm, Oak, Birch and Dogwood, among numerous others.

Arborjet

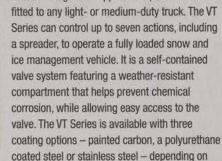


KIOTI TRACTOR INTRODUCES MID-MOUNT MOWER FOR COMPACT TRACTORS

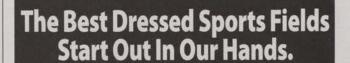
KIOTI Tractor introduces a new drive-over mower for compact tractors with the launch of the KIOTI KM2560 mid-mount mower. Compatible with the CK2510 and CK2510H of the brand's CK10 Series, the new mower attachment is KIOTI's first mid-mount mower option for the CK10 line. Ideal for mowing turf, the KM2560 mid-mount mower provides precision cuts and increased maneuverability in tight environments. The suspended mower deck gives the operator 1.5-inch to 4.5-inch cutting control, for a clean cut every time, while eliminating hassles when moving from job to job or riding over curbs. Additionally, this innovative midmount mower can easily and quickly attach and detach thanks to its drive-over attachment deck. With a 60-inch cutting with and a spindle speed of 3,334 RPM, the mower's three-blade system sheers grass with a tip speed of 18,343 feet per minute.

DEWEZE VT SERIES HYDRAULIC VALVE SYSTEM

Harper Industries introduces the DewEze Valve Tank (VT) Series System featuring a PosiFlow reservoir. This labor saving tank-mounted valve system excels in snow and ice management applications, and can be



the end-user's application requirements. And the PosiFlow reservoir assures oil is constantly forced to the pump for peak performance and efficiency. The VT Series is offered in several configurations and is completely customizable. Choose from double- and single-acting valves, electric and manual valves, central systems, plow and hoist, electrical spreader controls and more. There are hundreds of variations, making the VT Series a truly versatile hydraulic valve system to fit any work truck. **Harper Industries, Inc.**





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STMA ROLLS OUT ENVIRONMENTAL FACILITY CERTIFICATION PROGRAM

fter 4 years in development by its Environmental Committee, STMA is rolling out its Environmental Facility Certification Program. Different from the Certified Sports Field Manager Program (CSFM), this program certifies a facility, not a person, and it solely validates environmentally responsible management practices.

The program assesses the environmental management practices for an individual grass field or for a complex of natural grass sports fields and facilities. It can also be used to provide strategic suggestions on how to improve upon current environmental operations in use at fields and facilities.

Environmental Committee Chair Jimmy Simpson, CSFM, believes that this program will help to position STMA members as environmental stewards. "Our members have always been leaders in their environmental practices, but until now there has not been a mechanism to document that stewardship," says Simpson. "We now have tangible proof to support and promote our

member's commitment to protecting and preserving the environment."

HOW THE PROGRAM WORKS

The program has three components: an online assessment completed by the sports turf manager; validation of that assessment by an attester; and recertification.

The initial assessment must be completed electronically by the sports turf manager. The assessment covers 10 environmental practice areas. Those include storm water management, fertilization, pesticides/ Integrated Pest Management (IPM), recycling, composting, mowing, energy conservation, shop buildings and storage areas, irrigation and water quality testing, and educational outreach. Within each of these areas there are best management practices stated and questions that evaluate how well the sports turf manager has implemented those practices at the facility.

To achieve certification, an 80 percent score of complying must be attained in each section. However, composting will not be counted. While reviewing the responses from the final broad-based pilot, the Committee determined that for those facilities that have sand-based fields, composting may not be a valid practice.

"We definitely want to raise awareness of the importance of composting," says Simpson, "so we left the section in and the best management practice statements. For those facilities where composting is not relevant, we ask that the sports turf manager documents in the assessment 'why' the practice isn't relevant."

The other nine sections also provide areas for the sports turf manager to document "why" a particular practice does not apply to the facility.

The second step is the attester's validation of the sports turf manager's answers. This on-line form is completed on-site during a walk-through of the facility by a qualified attester with the sports turf manager. The attester can be a CSFM, an academic, extension agent, or a member of an environmental group, as long as he or she is not employed at the facility seeking certification.

STMA Congratulates & Thanks You

The number of those who have maintained membership in STMA through the years continues to grow. This is the largest class of 20-year members in STMA history! A big Thank You to all who are listed below for your extensive support of STMA, and to the entire membership. We sincerely appreciate your commitment to STMA.

20 YEARS	
Mike Andresen, CSFM	
Rene Asprion	
Shelby Bartlett	
George Bernardon, CSFM	
Richard Calarco, CSFM	
Bob Campbell, CSFM	
Paul Carlson	
B. Scott Clark	
Joe Collins, CSFM	
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Marshall Jennings
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Steve Wightman
/

Recertification takes place in a 3-year cycle, and the facility must go through the same assessment and attester validation process to continue certification.

There is no cost to apply. Once the assessment and the attester's forms are evaluated and determined to have achieved the 80 percent passing score, a \$100 fee will be assessed to the facility. This fee includes the choice of either a banner or plaque designating the facility as Certified Environmentally Responsible. If the facility does not achieve certification, the sports turf manager has up to 1 year to implement the practices that are deficient and can resubmit those sections only. If it is more than 1 year before the best management practice is put into operation, the entire assessment will need to be completed.

"Our Committee and our Board of Directors realize that this certification program will continue to evolve," says Simpson. "We'll tweak as necessary, and we welcome feedback from those who participate." Applicants have the opportunity to appeal if they have concerns with the process, and a review panel has been designated.

THE JOURNEY TO ROLL OUT

STMA's external focus on environmental issues began in 2010 with the appointment of an Environmental Task Group under the leadership of Jody Gill, CSFM. The Task Group began defining an environmental strategy. Kevin Trotta took over in 2011 and under his guidance the task group developed an environmental policy statement and began exploring alliances with other green organizations. In 2012, the Task Group became a full standing committee with Mike Tarantino, CSFM, leading the creation of the concept of an environmental facility certification program. During this time the committee developed a list of federal and state-by-state environmental regulations affecting sports fields and an advocacy manual to help members communicate with legislators and community groups. By 2013, a general framework for the certification

Continued on page 46

STMA Affiliated Chapters Contact Information

Now Forming Chapters: (for information, contact STMA, ph. 800-323-3875)
Mid-Atlantic, Mississippi, Nevada

Sports Turf Managers Association of Arizona: www.azstma.org

Colorado Sports Turf Managers Association: 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

Florida #3 Chapter (Central): 407-518-2347, Dale Croft, dale.croft@ocps.net

Gateway Chapter Sports Turf Managers Association: www.gatewaystma.org.

Georgia Sports Turf Managers Association: www.gstma.org.

Greater L.A. Basin Chapter of the Sports Turf Managers Association: www.stmalabasin.com.

Illinois Chapter STMA: www.lLSTMA.org.

Intermountain Chapter of the Sports Turf Managers Association:

http://imstma.blogspot.com/

Indiana - Contact Clayton Dame, Claytondame@hotmail.com or Brian Bornino, bornino@purdue.edu or Contact Joey Stevenson, jstevenson@indyindians.com

lowa Sports Turf Managers Association: www.iowaturfgrass.org.

Kentucky Sports Turf Managers Association: www.kystma.org.

Keystone Athletic Field Managers Org. (KAFMO/STMA): www.kafmo.org.

Michigan Sports Turf Managers
Association (MiSTMA): www.mistma.org.

Minnesota Park and Sports Turf Managers Association: www.mpstma.org MO-KAN Sports Turf Managers
Association: www.mokanstma.com.

New England STMA (NESTMA): www.nestma.org.

Sports Field Managers Association of New Jersey: www.sfmanj.org.

Sports Turf Managers of New York: www.stmony.org.

North Carolina Chapter of STMA: www.ncsportsturf.org.

Northern California STMA: www.norcalstma.org.

Ohio Sports Turf Managers Association (OSTMA): www.ostma.org.

Oklahoma Chapter STMA: 405-744-5729; Contact: Dr. Justin Moss okstma@gmail.com

Oregon STMA Chapter: www.oregonsportsturfmanagers.org

www.oregonsportsturfmanagers.org oregonstma@gmail.com

Ozarks STMA: www.ozarksstma.org.

Pacific Northwest Sports Turf Managers Association: www.pnwstma.org.

Southern California Chapter: www.socalstma.com.

South Carolina Chapter of STMA: www.scstma.org.

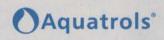
Tennessee Valley Sports Turf Managers Association (TVSTMA): www.tvstma.com.

Texas Sports Turf Managers Association: www.txstma.org

Virginia Sports Turf Managers Association: www.vstma.org.

Wisconsin Sports Turf Managers Association: www.wstma.org.

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STMA IN ACTION

News from the Sports Turf Managers Association

Continued from page 45

program was formed, and BMPs began to be documented. In 2014, Tim Van Loo, CSFM, led the Committee in the development of the instrument, and initiated the first pilot of the program. Adjustments were made and a broad pilot was conducted in 2015. This year, under the guidance of Chairman Simpson the Committee made the final revisions to the instrument based on the results of the pilot.

"Our Committee set the goal of having 50 facilities environmentally certified in 2016," says Simpson. "That is a sizable number, but one that we feel is achievable."

Members who participated through the years in the program's development and implementation include: Ryan Adams, Chris Bell, Dan Bergstrom, Ryan Bjorn, Jason Bowers, CSFM,

"Our Committee set the goal of having 50 facilities environmentally certified in 2016," says Simpson. Amy Brackin, Philip Busey, PhD, Richard Calarco, CSFM, Jim Catella, Pam Driver, Steve Dugas, CSFM, Blair Elliott, Beth Guertal, PhD, John Halloran,

SCPS, Alpha Jones, Jack Karlin, Joshua Koss, Gerald Landby, Dan Leonard, Mark Lucas, Scott MacVicar, Donn Mann, Joel McKnight, CGCS, CPRP, Kevin Mercer, Kevin Meredith, CSFM, David Minner, PhD, Justin Moss, PhD, Jason Mueller, Brian Oliver, Paul Patterson, Dean Pearson, Blake Phillips, David Pinsonneault, CSFM, CPRP, Chad Price, CSFM, CFB, Zach Ricketts, Joel Rieker, Danielle Scardino, Matt Schiller, David Schwandt, Jimmy Simpson, CSFM, Jim Sluiter, Doug Speed, *Gwen Stahnke, PhD, Mike Tarantino, CSFM, Waldo Terrell, Mike Trigg, CSFM, Kevin Trotta, Gary Tubesing, Tim Van Loo, CSFM, Sean Veilleux, Brian Walker, *Vickie Wallace, Clint Waltz, PhD, Jay Warnick, CSFM, *Rich Watson, Barret Werner, Kevin White, Trent Whiting, and Dan Wright, CFB.

*Several of these members have been participating since the original Environmental Task Group was formed.



FACILITY & OPERATIONS

Continued from page 39

see the cost of artificial turf fields and playgrounds, that have used crumb rubber, increase to cover insurance costs against future liability claims.

WHERE IS THE EPA?

Last October the US House of Representatives Committee on Energy and Commerce sent a letter to Gina McCarthy, administrator of the US Environmental Protection Agency, addressing the growing concern regarding crumb rubber and they wanted immediate answers.

McCarthy was advised to respond to a series of questions by this November 6. The following are but of a few of the questions submitted to McCarthy for a prompt response:

- Has the EPA conducted additional testing to fully assess the hazards and exposures associated with crumb rubber on artificial turf athletic fields?
- Is the EPA aware of other scientific studies on the hazards and/or exposures associated with crumb rubber on athletic fields?
- To the best of your knowledge, do chemical substances, or a chemical substance in crumb rubber present a hazard to human health? If so, has the EPA determined whether exposure to such a chemical from crumb rubber presents an unreasonable risk to human health?
- To the best of your knowledge, is the incidence [of cancer or other health issues] for persons who play on fields treated with crumb rubber higher than in the general population?
- Has the EPA identified a specific pathway of exposure to hazardous materials in crumb rubber, e.g., inhalation, ingestion, or skin absorption?
- Are you aware of any industry standards that set limits for exposure to crumb rubber based on potential health hazards? What analysis supports those standards?

The EPA failed to adhere to the deadline. In November EPA spokesperson Liz Purchia told NBC News that the agency was "in the process of responding" to the Energy Committee's list of questions. As of this writing, and to the best of our knowledge, the EPA still has had not responded.

And so the debate continues, as do the questions. Is artificial turf crumb rubber safe? Is there a relationship between life threatening health issues and crumb rubber? Are we putting our children and athletes at risk by letting them play on crumb rubber surfaces? Are we creating small heat islands?

Those who are concerned about the safety of crumb rubber used on artificial turf fields and children's' playgrounds want definitive answers. But for now there's only one certainty, and it's a sobering one: while everyone waits for some answers, the kids are still playing on these fields.

Jim Novak is public relations manager for Turfgrass Producers International, http://www.turfgrasssod.org.

Answers from page 37

This photo is from Qualcomm Stadium, home of the NFL's San Diego Chargers as well as the San Diego State University Aztecs football team. It also hosts several bowl games, soccer matches, concerts and even tractor pulls. The base turf on this field is Bandera bermudagrass, which has been overseeded with ryegrass. The dark green grass is new sod that was installed in preparation for the US Women's National Soccer Team vs. Ireland matches. The areas that were replaced were thin and worn out areas caused by heavy traffic during the football season. The rye in the new, darker colored sod is older and more established and most likely better fed with nitrogen, therefore greener. Before the soccer matches, the sports turf manager dyed the entire field green to match the different shades of the grass and to give them an overall greener field. After the soccer games, they painted the soccer lines green and painted a football field again in order to film a Pepsi Super Bowl commercial in which football players parachuted out of a plane and into the stadium while they played football in the air and then the ground. After the ryegrass transitioned out, the bermudagrass base color matched perfectly.

Thank you to Bill Gibbs, sports turf manager at Qualcomm Stadium in San Diego, for allowing me to take these photos.

It 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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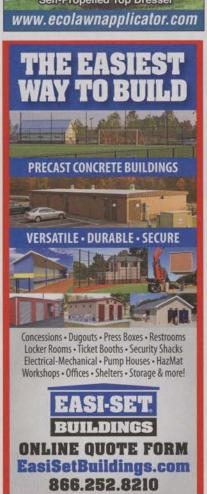
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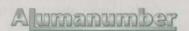




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School's out, what now?

As the head football coach, I get to maintain our high school's athletic fields during the year. I am new to this so I'm looking for whatever advice you can provide. What should I be doing this summer so that our fields are ready for use in the fall? — North Carolina

While many of our readers
have appreciable turfgrass
management knowledge,

a number of the people that manage sports turf surfaces do so as a second or third job responsibility. These people often have a passion for coaching or an academic subject but approach turfgrass management like I would a dead mouse in a trap — I'll take care of it because I have to, but wished I didn't.

I have met a few coaches that are enthusiastic turfgrass managers. More frequently coaches just want to get the basics accomplished so their fields are considered above average. Every coach wants a safe field for their athletes. Several school visits I make each year play out like this question. It usually goes much better when I visit with them as school is ending for the year as opposed to a late August visit when there is not enough time to get a management plan in place before the field is needed for fall practice.

I should also mention that generally these schools that use coaches for turfgrass managers rarely have much money dedicated for turfgrass maintenance. Money for fields is often left to the booster clubs to provide. These clubs often raise money for uniforms and other basic expenses, so there is rarely enough money to go around for everything that is needed for field maintenance.

Your first thought may be why I am writing about this question in *SportsTurf* magazine. The simple answer is so that you can help. These coaches routinely travel to other stadiums. They are almost always avid sports fans. In addition to traveling to other schools with their

games, they often attend games played at higher levels to observe and learn more about coaching. So, while they are attending the community college, university, and professional games learning about formations and play calling, they will also take notice of field conditions — your field conditions.

Coaches want to be winners. They will look up to winning coaches and emulate them when possible. Just the same, coaches are in total awe when the see well-maintained university and professional sports fields. Talented turfgrass managers have a lot to offer these coaches. They know that they may never have the material resources that you have at your disposal but they will appreciate you sharing some of your knowledge and wisdom.

Let me get back to the original question. This story reminds me of a Little League coach that used to tell his players, you can't win a game in the first inning, but you most certainly can lose one by digging yourself into a 10- or 12-run hole. The same situation is true with turfgrass management. If field management is approached with a plan that encompasses the entire year, the likelihood the field will perform at its peak is much greater than if the turf manager does nothing all summer and then tries to get a field in shape in August. Summer is the time to work the hardest to ensure the field is in shape for fall season. So, my initial approach is to outline a season-long maintenance plan.

My second approach with this inexperienced turfgrass manager was to help him gather people resources. He found me because I had helped out

another coach in the area turn their field around 2 years earlier. That coach passed on my contact information. A season-long maintenance plan is a good start, but he will benefit from local support (I am a 2-hour drive away). People with knowledge that can easily drop by to help him calibrate a sprayer, identify a weed, loan him an aerifier, etc. For instance, the coach did not realize he has a great county extension person within a 20-minute drive. He also has one of our state's most prominent sod producers within a 30-minute drive. There are a couple of golf courses in the general area with great superintendents. These folks know chemicals, fertilizers, equipment, turfgrass culture, and other turfgrass managers. I provided contacts for a couple of contractors that aerify and/or spray that are just a couple of towns away. Having competent people nearby with good turfgrass knowledge is so important for a novice turfgrass manager.

While cultivating his people resources, the coach needs to increase his technical knowledge and procure additional material resources. The technical knowledge started that day and can continue with his support group as he has questions. Our University has bulletins and website information he can easily access that can help. I also encouraged him to join a STMA group that can provide him more contacts and information.

The material resources may be his biggest hurdle to overcome. I suggested he identify one field and make as many improvements as possible, documenting his efforts. He can then take that success story to his athletic director and booster club as evidence of what he can accomplish with additional resources. Next year other coaches will be asking him how he turned his fields into "fields of dreams."





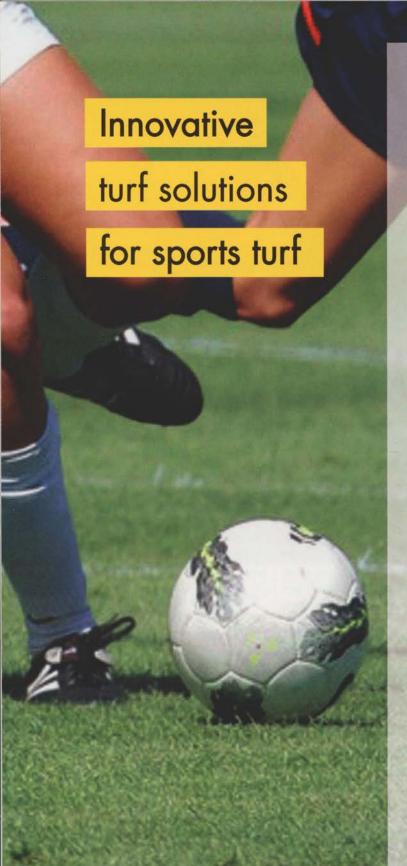
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