IN THIS ISSUE: Biostimulants — boom or bull?

THE OFFICIAL PUBLICATION OF THE **SPORTS TURF MANAGERS ASSOCIATION**

SportsTurf

JUNE 2019

SPORTS FIELD AND FACILITIES MANAGEMENT / www.sportsturfonline.com

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Kamloops, BC wins FOY

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- Weather apps for daily use
- Overseeding strategies
- What is low-budget weed control?

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STARTING LINEUP

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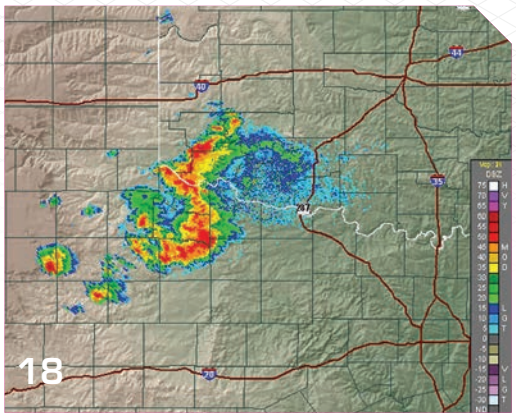

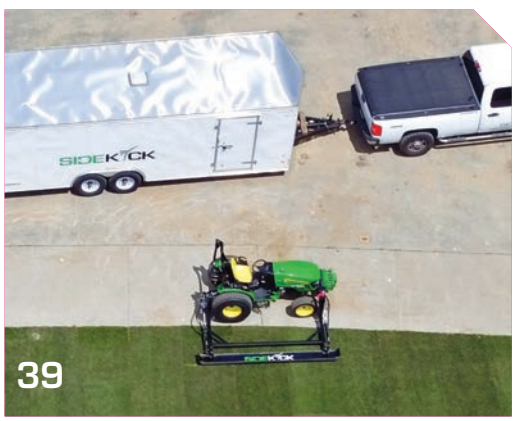

DEPARTMENTS

FEATURES

On the cover: "For my money this is the best amateur field in Western Canada. I enjoy watching American collegiate players enter the field for the first time. They take out their phones and immediately start snapping photos. They can't believe a field like this exists in Canada! It is a recruiting tool for our tournament, as teams that come here once, love to return. A top notch playing surface and facility overall. Meticulously maintained by City staff."-Dean Padar, president of the Kamloops International Baseball Tournament.

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FROM THE SIDELINES

Endings and beginnings

Eric Schroder / Editorial Director / Eschroder@epgmediallc.com / 763-383-4458

EACH YEAR, late May and early June bring graduation ceremonies (and parties!). Whether it's a college degree, high school diploma, heck even pre-school, graduation day marks the end of a period of life and the beginning of something new, for both graduates and their families.

"Bittersweet" describes perfectly the emotions of the big day. My only daughter last month said goodbye to high school (shameless Dad brag, she was valedictorian) and her mom's tears at the ceremony could have watered down a mound. Meanwhile, my daughter, after her speech at least, was jubilant in a way I had never seen before. What a difference between looking back and looking forward.

To those recent grads now facing either more school or your "first real job," please understand that you already have achieved success in earning that sheepskin. The "unknown" that you now encounter is an opportunity so please keep working hard and take advantage of it. Congratulations! Make your daydreams reality.

Adam Thoms is new Tech Editor

Adam Thoms, PhD, an assistant professor specializing in commercial turfgrass management at Iowa State, is *SportsTurf*'s new Technical Editor. Adam is back in Ames after earning his bachelor's degree there; both his MS and PhD degrees are from the University of Tennessee. He is also the Turfgrass Extension Specialist for Iowa State.

Big shout out of thanks to Joey Young, PhD, assistant professor of turfgrass science at Texas Tech, for serving in this volunteer role for the magazine for the past few years.

Salmagundi

Haven't used that word in a long time; it means a general mixture, or a miscellaneous collection:

- The Yankees vs. Red Sox series in London at the end of this month will be played on synthetic turf, which means Murray Cook and crew will have a bit different experience than on other international forays for MLB. They will have access to Olympic Stadium for 21 days before the games, the sport's first regular-season contests in Europe, and just 5 days after to clear out. The league concluded there was not enough time to install real grass. Starting June 6, gravel will be placed over the covering protecting West Ham's grass soccer pitch and the running track that is a legacy from the 2012 Olympics. The artificial surface will be installed atop that.

- Yuck factor: A new survey found that many knowingly contribute to making swimming pools dirty, a practice that can lead to bad pool chemistry for everyone in the water.

The survey found that more than half of Americans report using a swimming pool as a communal bathtub, either swimming as a substitute for showering or using the pool to rinse off after exercise or yard work. This habit has taken hold even though nearly two-thirds of Americans report they know that pool chemicals do not eliminate the need to shower before swimming. C'mon, people!

- Finally, for those readers who have responsibility for fields that may sometimes rely on parents and coaches to help maintain, please see page 34 in this issue. Beacon Athletics' Paul Zwaska offers some guidance on how to prevent/overcome most common volunteer groundskeeping mistakes made on your baseball fields. **/ST/**

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PRESIDENT'S MESSAGE

PROFESSIONALISM

Jody Gill / CSFM / jgill@bluevalleyk12.org / @JodyGillTurf

RARELY DO I wear a suit to work . . . OK, it's never. A few weeks ago though, I had to attend a special event that required a formal suit; the event was in the middle of the workday and since I did not want to change twice, I decided to wear the suit all day. There were more meetings than usual that day so it became sort of an experiment in professionalism. Of course, those who know me best asked where I was interviewing and when was I leaving? Sadly, one seemed disappointed I was not leaving!

There were a variety of people in the meetings, some I knew very well and some not at all. They seemed eager to know who I was and also slightly intimidated by me. Even those who I knew well seemed to treat me differently. I asked them later if I seemed different and they said I was more focused and business like. I don't remember acting or saying anything differently.

I also met with a school principal that day. I have met with him before and it has always been cordial but very informal. This time instead of following him to his office, we walked side by side and he held open the doors for me.

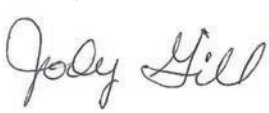
STMA works hard to enhance the professionalism of all Sports Field Managers, but it is really up to you to make this happen. Think about how you dress for the next meeting, how you answer the phone, and how you craft your emails. Be aware of all you say and share on social media. When someone is taking the time to talk to you in person, give him or her all of your attention. Everything you do or say can enhance or degrade your own professionalism and that of our entire industry.

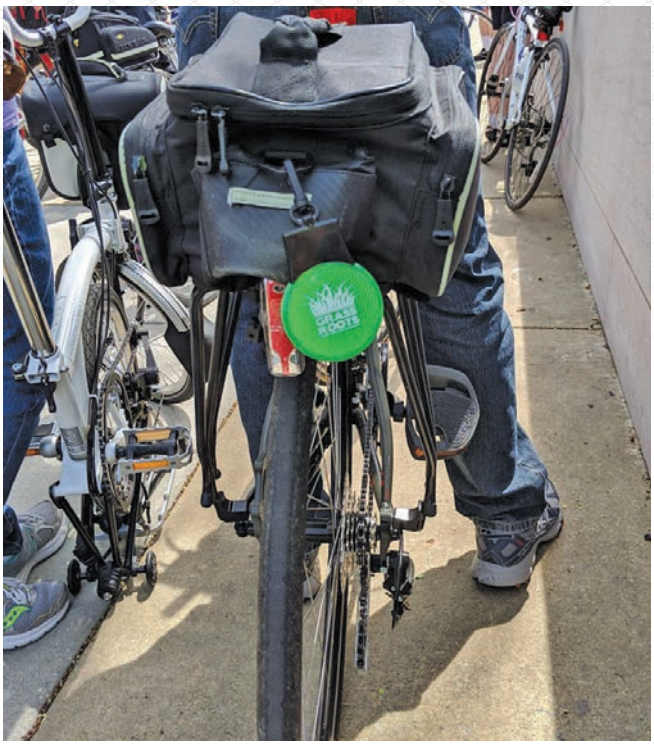
Being professional extends to associations, too. One strategy STMA uses to position itself as genuine and trustworthy is by collaborating with organizations that align with our mission. For example, for the seventh consecutive year, STMA has been named a Community Partner of the annual Green Sports Alliance Summit. The Summit will be held at Lincoln Financial Field in Philadelphia, June 19-20, and STMA members receive a $75 discount on registration fees by using the code STMA.

By connecting our brand with the Summit, we add credibility to their goal of sustainability for the sports industry. In return, STMA benefits through an enhanced standing in the sports world because of our members' strong focus on environmental stewardship. This year the Summit has three keynotes, a dozen breakout panels, six plenaries, a vendor showcase, and two pre-summit tours of sports facilities that have STMA members: Lincoln Financial Field and Citizens Bank Park. A third tour will be conducted of the indoor sports and concert venue, Wells Fargo Center. For more information on the Summit and the tours go to Greensportsalliance.org/summit.

Thank you for doing your part to help raise the professionalism of our industry. The sum of these efforts will positively influence how our employers, athletes, and the public view our profession. ***/ST/***

Jody Gill, CSFM





@KMORRIS_NTEP

Beltsville, MD April 7

Why a National Greenscape Corridor? To promote Turfgrass and the industry, maybe it is working!

@JAMESBEEVER2

Hoffman, IL April 9

Please be careful leaving your tarp on for extended periods of time.

@NATURALGRASSMAN

Fayetteville, AR April 18

Tahoma 31 bermudagrass, very cool!

@UKTURF

Lexington, KY April 25

I like a little diversity in a lawn, but not when it includes this little bugger. If it just wouldn't spread I wouldn't hate it so bad.

@GRASSYBRIT

Columbus, OH April 25

Turf conversation starter: mowed the same way for yrs, dandelions only grow between tire tracks. Why?

@CORNELL_TURF

Ithaca, NY April 23

Thermal treatment at 1400 degrees F got most of the fescue, but dandelion stood tough! We are hoping thermal treatment will offer alternatives to herbicides for thinning thicker/unplayable native areas, but we may have just made weed problem worse! #science

@IRRTURFSVCS

Orange County, CA April 25

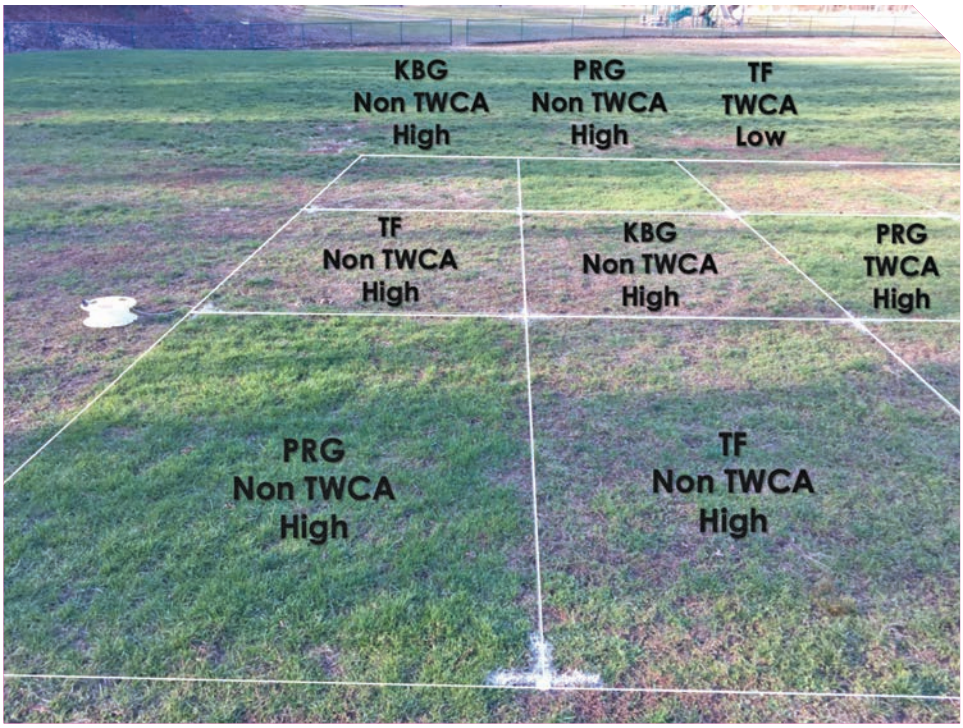
In a filing in California's Court of Appeal, First Appellate District, the company said that there was "no evidence" that glyphosate, a chemical found in the company's Roundup and Ranger Pro products, could cause cancer. "Bayer stands behind these...

Update on overseeding strategies for non-irrigated, pesticide-free fields

// By G.L. MAXEY, V.H. WALLACE, AND J.J. HENDERSON

Heavily used athletic fields receive intense traffic that can lead to increased soil surface compaction and reduced turfgrass density. Preventing turfgrass cover loss on athletic fields is important to mitigating the risk of injuries. Aggressive and repetitive overseeding has been recommended as a critically important tool for the municipal turf manager to utilize in lieu of pesticides.

It is important to determine if a difference exists in field safety and quality on non-irrigated fields overseeded with turf-type tall fescue compared to the preferred mixture of perennial ryegrass/ Kentucky bluegrass in New England. Additional research is needed for proven alternatives that can increase turfgrass cover and reduce weed pressure without the use of pesticides.



The objectives were to: 1) determine the effect of turfgrass species that meet the criteria developed by the Turfgrass Water Conservation Alliance (TWCA) and overseeding rate on turfgrass cover retention on non-irrigated athletic fields; and 2) demonstrate the effectiveness of aggressive overseeding on turfgrass cover retention on pesticide-free athletic fields.

A 3-year field study was conducted on three different athletic fields in Connecticut. All were non-irrigated, maintained with a pesticide-free management regime and received consistent high levels of traffic. The research project was initiated September 20, 2016 and then four individual treatments were repeated on May 1, 2017; August 23, 2017; May 9, 2018; and Sept. 7, 2018.

This experiment was a randomized complete block design and arranged in a 3 × 2 × 2 factorial with three replications measuring 8.2 m × 23.8 m. The first factor of the experiment included three turfgrass species: perennial ryegrass, tall fescue, and Kentucky bluegrass. The second factor, overseeding rate, was a high and low rate (Table 1, p. 13). The third factor was either inclusion or exclusion of turfgrass cultivars on the TWCA list. Individual plots were 1.8 m x 2.7 m.

Each overseeding event began with hollow-tine cultivation in one direction using a Toro 648 walk-behind greens aerator set to 5 cm × 5 cm spacing to a depth of 6.5 cm with the cores returned within each plot. Pre-weighed seed was applied using handheld shakers and was lightly incorporated into the soil with a leaf rake. Then the plots were rolled with a weighted roller to promote seed to soil contact. Lastly, the plots were fertilized with Shaw's Turf Food (14-25-10, Knox Fertilizer Company Inc.) at the rate of 5 g P2O5 m-2 and Harrell's Polyon (43-0-0; 100% Polymer coated urea) at a rate of 5 g N m-2. The total fertilizer applied with each overseeding event was 7 g N m-2 and 5 g P2O5 m-2.

Each location was evaluated for qualitative and quantitative measurements. Qualitative measurements included percent total green cover, turf cover, and weed cover. Overall turf quality rating and color rating were based on a 1-9 scale. Quantitative measurements of Digital Image Analysis (DIA) was used to calculate percent turfgrass cover and dark green color index (DGCI). One digital image per plot was quantified through Sigma Scan. Surface hardness was quantified with a 2.25 kg Clegg Impact Soil Tester and volumetric water content (VWC) using a Field Scout TDR 300 soil probe.

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Results

The results showed many interactions with the most consistent high-level interaction between species, rate, TWCA, and location. Perennial ryegrass, regardless of rate or TWCA, had significantly greater percent turfgrass than Kentucky bluegrass and tall fescue. Regardless of rate, TWCA or location, PRG exhibited the highest color rating, quality rating and least weed cover compared to KBG and TF. The DIA results showed an interaction of species and season. All species performed similarly in the summer (July-Aug.). During the spring (May-June) and fall months (Sept.-Nov.), PRG plots had significantly higher cover followed by TF and KBG. Averaged across years, locations and species, overall DIA results show the highest cover was in the summer (88%), then spring (83%) and fall (58%).

This project was funded with grants from the New England Sports Turf Managers Association and the New England Regional Turfgrass Foundation.

Garrett Maxey is working on his Master's in Plant Science and Turf Management as a graduate research assistant for the University of Connecticut. Vickie Wallace is Extension Educator responsible for the Sustainable Turf and Landscape Program, and Jason Henderson, PhD, is Associate Professor, Turfgrass and Soil Sciences, at UConn.

Overseeding realities

Here are some thoughts on overseeding from a few STMA members:

Michael Markulin, Athletic Fields Lead, San Diego State: Typically the past few years we begin our overseeding process at the end of October into the first week or two of November. Unfortunately this is during the season for football and during fall ball for softball and baseball. Our programming is pretty intense, so we don't like to close the fields down for any amount of time. The season kicks into full gear usually around the second week of January for those sports, so the earlier we can get the seed down the better chance we stand for full germination.

> "I HAVE USED BOTH DROP AND BROADCAST METHODS SIDE BY SIDE TO DETERMINE THEIR EFFECTIVENESS AND FOUND THAT AREAS DROP SPREAD TEND TO YIELD A DENSER MORE UNIFORM STAND."
>
> *– TJ Brewer*

The following steps are what we take for our overseeding process that has seemed to be the most effective:

1.) Scalping helps stunt the bermudagrass from growing and to help get a better establishment for the perennial ryegrass. Currently [early May] we are mowing at a height of 3/4", which we will drop down to 1/2".

2.) Pull cores, verticut and sweep; this helps to create holes in the ground for better seed to soil contact.

3.) Topdress with sand and follow behind with a broom.

4.) Starter fertilizer application once ryegrass begins to germinate.

5.) Once perennial ryegrass begins to grow will we raise the height of cut to 7/8" until a few weeks before the start of the season; we then lower the cut back down to 3/4". This also will depend on the weather as last year we kept at 7/8" for the season.

This year we decided to go with V.I.P. 3 from Simplot and couldn't be happier with the results. The first two years that I was here we used Ewing's perennial ryegrass blend and both years we got gray leaf spot on the infield. We decided to switch it up with a blend that was more tolerant to gray leaf spot, so we went with a perennial ryegrass blend from Target Specialty last year and we finally didn't get gray leaf spot on our infield, so I was very pleased to say the least. We decided to change it up again this year for really no particular reason other then the fact that we have a great relationship with Simplot. The V.I.P 3 is by far the best of the three, as we didn't get any diseases again, especially with the amount of rain we received this season. I was also very pleased with the color, texture, wear tolerance, and quality.

***ST:** Has severe weather impacted your overseeding schedule over the past year and if so, how?*

Fortunately we've had great weather every time we begin our overseeding process, particularly because we start at the end of October before all the rains usually begin. I'm sure that one of these years weather will play a role in our process that will make things difficult.

TJ Brewer, CSFM, Head Groundskeeper at Paul Brown Stadium in Cincinnati: I have been involved in many different methods of overseeding, from simply broadcasting seed to using the "latest and greatest" seeding machines. We have used different methods for different reasons including time, expectation, equipment availability and weather.

The fastest, easiest and probably most effective form has been with our Redexim Speed Seed 2100. This machine attaches to our tractor and allows for precise seed placement with good seed/soil contact and is very time efficient. This machine is ground driven and is very accurate regarding application rates.

The slowest, but also very effective method involves a drop spreader, dew on the grass and a lot of steps! This form allows for precise seed placement with low seed/soil contact and is very time consuming. This method also requires an early riser and dew on the grass for the duration of your application. Application rates can vary greatly depending on walking speed; accuracy depends on one's ability to maintain a consistent speed across a field.

Using a broadcast spreader is a little more time efficient, but is not as precise with seed placement and also has low seed/soil contact.

Table 1. Turfgrass species, cultivars and seeding rates evaluated at the three locations.

Species	Cultivar	Low[a]	High	TWCA rating
		---- kg ha^{-1} ----		
Kentucky bluegrass	Full Moon	146	292	TWCA[b]
Kentucky bluegrass	Brooklawn	146	292	Non-TWCA
Perennial ryegrass	Manhattan 5	391	782	TWCA
Perennial ryegrass	Divine	391	782	Non-TWCA
Tall Fescue	Falcon 4	391	782	TWCA
Tall Fescue	Aztec	391	782	Non-TWCA

[b]*Turfgrass Water Conservation Alliance*

I have used both drop and broadcast methods side by side to determine their effectiveness and found that areas drop spread tend to yield a denser more uniform stand. Both areas were seeded at the same rates, had the same traffic and maintenance practices, but the line from the drop spreader was evident until the stand was sprayed out. Although the quality was probably not noticeable to the common eye, there was a difference and if time is not a factor and quality is important I would suggest drop spreading.

My overseeding rates have varied greatly over the years, I have used application rates from 20 – 6 #/1,000. I have heard many different philosophies: more seeds = more plants that aren't allowed to mature creating less competition, to fewer seeds = fewer plants that create less competition for bermudagrass. I have found similar success with all rates from 20# to 6# depending on conditions and have not been able to correlate bermuda recovery to seeding rates.

My overseeding philosophy differs depending upon our situation. In one application we have applied 20#/1,000 all in one shot, our baseball team at U of M gave us a window in early September, and although not ideal we had to make it work… throw and go… it turned out great. But so did this past year when we made five applications totaling 6.5#/ 1,000. I split our applications to reduce the risk of our bermuda out-competing our rye, as our bermuda thrived pretty late into the fall, and also to reduce the risk of seeding too late and having immature plants damaged by frost.

Most of the time we have overseeded for aesthetics, rarely out of need. Maybe some day we will get away from it here, but I'm not going to hold my breath; plus the value of the stability the rye provides late in the year has to be considered.

ST: Any changes in past few years in how or when you're overseeding bermudagrass?

Bruce Suddeth, CSFM, University of South Carolina Upstate: No real changes in when we overseed our baseball/ softball stadiums, both are dictated by fall practice and tournaments. [That means] typically the first to mid-October for softball and late October for baseball. We've been keeping the PGR on the bermuda up until the weather turns cool so the height will stay down to 0.50". We used to verticut at overseed but don't do that anymore. We perform that task about a month prior depending on weather so it has time to heal before going into dormancy. We feel we get a better transition in the spring and it doesn't go into winter bruised up. All the other requirements such as fertilizer, topdressing, and water haven't changed.

We use a three-way blend of perennial rye and require good purity of >97% that is *Poa annua* free. We're always looking at price versus quality. We've cut the rates down to 10#/1000 ft/sq on baseball infield and softball and down to 8#/1000 in the baseball outfield.

ST: Has severe weather impacted your overseeding schedule over the past year and if so, how?

There were a few challenges during the early stages of overseeding with heavy downpours and moving the seed a little but overall it was one of our best years of overseeding due to the rains helping us keep fields hydrated. The intramural field was overseeded and we didn't turn irrigation on for the first time and it has never looked better. If you couldn't grow ryegrass in our area this year you can't grow grass.

Stephen Callis, The Hogan Company: For the vast majority of those overseeding bermudagrass there have not been any changes recently.

ST: What are you overseeding with and why?

Ryegrass (mostly perennial, but some annual) because it is easy to establish, has great color, and is cost effective. Only change is for a very small percentile of turf managers experimenting with KY Bluegrass.

Weather is only a factor in non-irrigated situations when we have a drier than normal fall. Severe weather is a non-factor. ***/ST/***

IMAGE ©ISTOCKPHOTO.COM/THOMAS BULLOCK

What is low-budget weed control?

// By JARED HOYLE, PHD

Working in Extension I communicate with many turfgrass managers about their weed control programs. I get to travel to all different types of facilities that deal with many different problematic weeds. But one question that keeps surfacing and becomes more common year after year is, how to control weeds on a low budget or with a minimal budget?

What is low budget weed control? Low budget weed control is a relative phrase. We all work at different facilities with different goals, objectives, responsibilities, expectations and most definitely different budgets. Therefore, "low budget" to a turfgrass manager that has a large financial budget is different then the turfgrass manager that hardly has a budget. Is it really low-budget weed control we are looking for, or is it how can we control weeds to our expectations and reduce how much it costs? As I thought about this issue more and more there were a couple common themes that came to mind, regardless of the size of budget.

Don't forget the basics

How many times have you heard, "The best weed control is a healthy growing turf"? I bet I have said it thousands of times. I get tired of saying it but the reality is we must do right by your turfgrass first. I am guilty of getting caught up in weed control and forgetting the basics of turfgrass management. As a turfgrass manager, we are growing turfgrass in stressful environments so we must do the basics to grow a healthy turfgrass before we try and find the "silver bullet" to kill the weeds that are invading our turf.

Another way to look at it is when we grow a healthy turfgrass we put less pressure on our herbicides to do their job. We don't want our herbicides to fail; we want them to work. If we apply an herbicide and it doesn't control the weeds when it should have, then we have wasted part of our budget in labor and chemical. Ultimately, start with the correct mowing, fertility, cultivation and watering practices.

"Ounce of prevention is worth a pound of cure"

That is a quote is from Benjamin Franklin. Dr. Scott McElroy at Auburn University used to have a slide in his

weed control presentations with this quote. It can really apply to preemergent herbicides. Many times our preemergent herbicide options are less expensive then postemergent herbicides but not all preemergent herbicides are created equal. Do your homework and know which preemergence herbicides work best for the weeds you have. For more information on preemergence herbicides check out the "Weed Control for Turfgrass Professionals," from Purdue University, which is available online at turf.purdue.edu/weed.

Combination products

A trend that has been going on for a while now in the herbicide world is combination products. You are seeing products on the shelf now that contain multiple active ingredients for control of grassy, sedges and broadleaf weeds. These products are nice because they have a broad spectrum, but then you look at the price tag. Many times these formulations are more expensive because of the multiple active ingredients for the broad spectrum of weeds on the label. What if you don't have all of the weeds on the label? Then you are applying herbicides that aren't needed, ultimately wasting money. Sometimes these combination products are cheaper then if you mixed the combination yourself. Always make sure that when you apply you have the minimum effective dose to kill the weeds present. For example, you need 0.75 lbs. of quinclorac per acre for effective control of crabgrass. Also, sometimes the combination products have a lower percentage active ingredient and don't result in control but only suppression. Vise versa, some of these combination products have increased control compared to the individual active ingredients alone.

Think about it this way. A 2-liter soda at the grocery store is $1 and a 20 fl. oz. soda at the convenience store is $1.50. Are you paying for the convenience or does that 20-oz. bottle taste better?

Seed, seed, seed and herbicide use

Sports turf managers are consistently seeding thin areas to recover cool-season turfgrass. Thin areas can lead to weed invasions therefore seeding may be conducted throughout the year. In heavy use areas multiple fall seeding dates and even spring seeding are conducted to reclaim areas due to high traffic. Seeding multiple times can be problematic if fields are used throughout the season, but that can be used to the turfgrass manager's advantage. Seeding during times of field use allows athletes to 'cleat' in the seed. Ultimately, going back to the basics of seeding cool-season turfgrass throughout the year shifts the competitive advantage from weeds to the desired turfgrass species.

Jared Hoyle, PhD, Kansas State

As much as one seeds there still might be a need for herbicide applications. If an herbicide application is warranted, understand how that application is going to limit seeding in the future. There are always exceptions but preemergence herbicides are not selective between the weed seed and desired turfgrass seed. For example, Siduron can be used during seeding but pay close attention to the label of tolerant species and application timing. Also, don't use preemergence

herbicides within 3 growing months before sprigging bermudagrass. These preemergent herbicides will also inhibit the establishment of sprigs unless you use Ronstar (oxidiazon). If you think that you will need to be seeding, sodding or sprigging, postemergence herbicides maybe warranted to control weeds. Postemergent herbicides are also going to have restrictions on reseeding and when can be applied after seeding. Before planting, the label will specify how soon you can plant. After planting, the label will specify how soon you can apply. This could be days, weeks, months, number of mowings or growth stage of the turfgrass.

These are just some tips to consider when developing a low-budget weed control program. All of us have difference expectations and a financial budget to achieve our goals; therefore, the biggest bang for your buck is a great starting place. Doing right by your turf, considerations of combination products, preemergence herbicides and seeding are just a couple places to start.

I am not sure from whom this quote comes but it has stuck with me for a long time: "If you put 100% effort into a task, you should get 100% benefit. If you put 20% effort into a task and expect 80% benefit, then you can do five tasks at 20% and get 400% benefit." Can we put 20% effort or budget on multiple aspects of our weed control program and get 400% benefit or do we just put 100% effort or budget on only one aspect of our weed control program for only 100% benefit? **/ST/**

Jared A. Hoyle, PhD, is Associate Professor and Extension Turfgrass Specialist, and Director of the Rocky Ford Turfgrass Research Center, at Kansas State University. Check out the KSU Turfgrass Information Pages, ksu.edu/turf and Turfgrass blog, blogs.ksu.edu/turf.

WE WERE MOSTLY KIDDING ABOUT THE GOATS

An ancient idea made new again, using goats for lawn mowing is touted as a green way to keep lawns tidy. Environmentalists encourage using goats to mow because of their very small carbon footprint, and they fertilize lawns naturally as they go. While goats do an impressive job of clearing woods and thickets, they have strengths and weaknesses as lawn mowers. Goats are great for weed control, for clearing land, clearing brush, or just simply mowing the lawn.

These hardy animals love to eat the toughest weeds, even brambles or poison oak. They'll chomp on your grass, leaving fresh fertilizer in their wake. Goats easily scramble over rocks or hills to access weeds a lawn mower would leave behind. And their sharp hooves aerate and churn the soil, making it easier for water and nutrients to penetrate to the rootzone.

JOHN MASCARO'S PHOTO QUIZ

JOHN MASCARO IS PRESIDENT OF TURF-TEC INTERNATIONAL

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ANSWER ON PAGE 33

CAN YOU IDENTIFY THIS SPORTS TURF PROBLEM?

PROBLEM:
Green rectangular areas in front of soccer goalmouths

TURFGRASS AREA:
College varsity soccer field

LOCATION:
Fort Worth, Texas

GRASS VARIETY:
TifTuf bermudagrass

WEATHER APPS FOR DAILY USE

// By BRAD JAKUBOWSKI

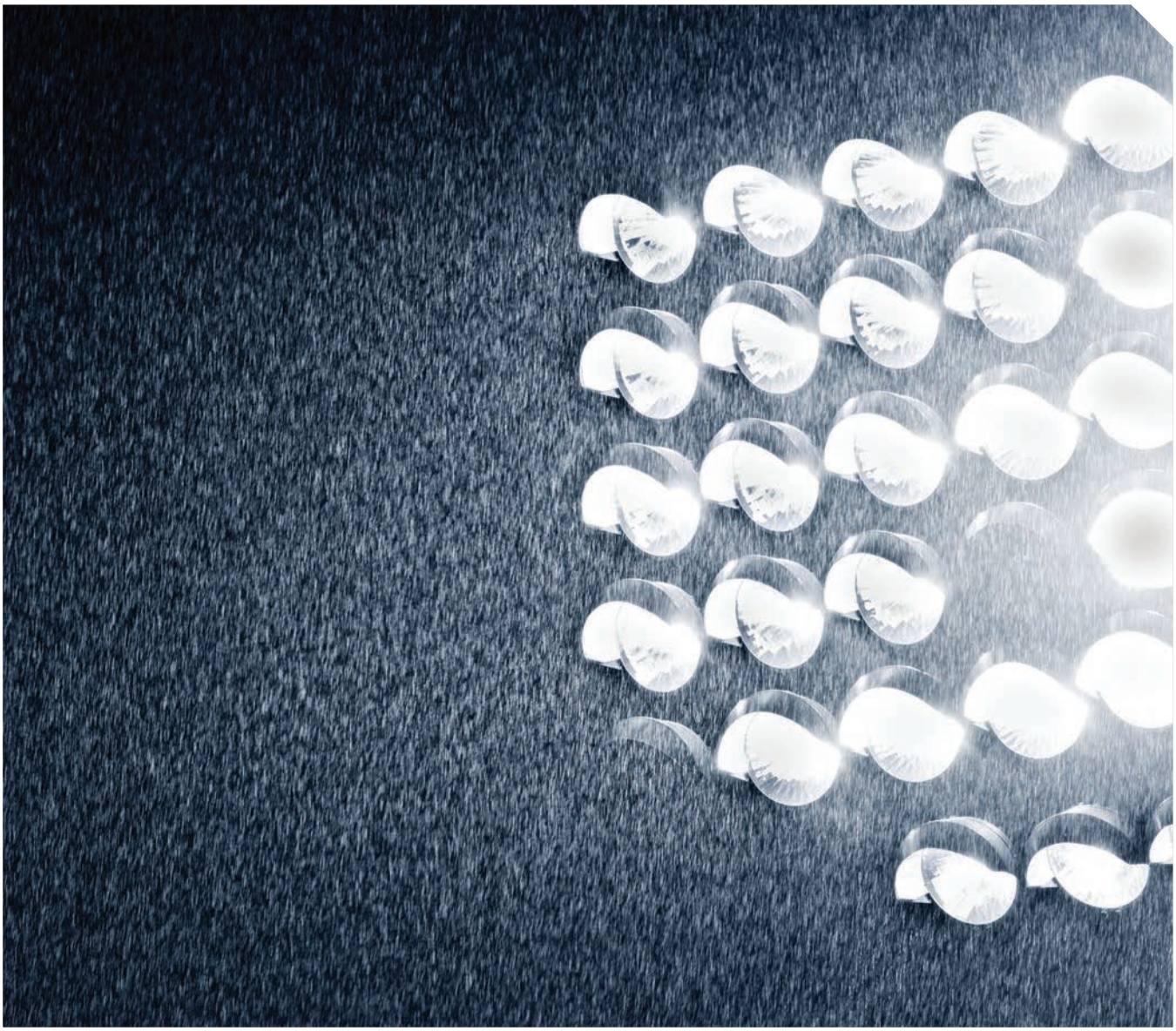


IMAGE ©ISTOCKPHOTO.COM/PGIAM

Keeping an eye on the weather is something we as sports turf managers have ingrained into our systems. Can I mow today? We check our phones for the most recent forecast. Should I spray today? We monitor dewpoints, humidity and temperatures. Will I need to pull the tarp before today's game? We study the weather radar. There is a tremendous amount of weather information out there, and nearly all of us have some form of a weather app on our phones or a link to our favorite weather website to help us make day-to-day management decisions. Let's take a journey to see what products are out there and what information will help us make the best weather-based decisions possible.

Which app is the best?

Honestly, there is no one best app, so it is important to find an app or a number of apps that will provide you the most reliable information that is also easy to find and quickly available. Basic information that is important to have available with the least number of clicks would be high and low

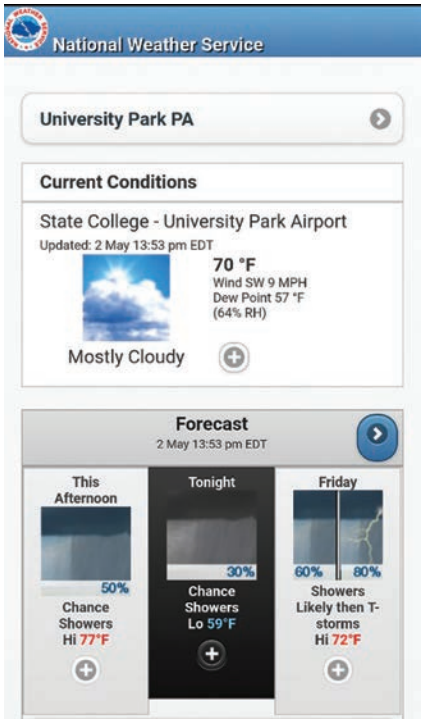


Figure 1. NWS mobile weather

temperatures (including overnight lows), dewpoint, relative humidity, and short-term weather forecasts. Intermediate information includes radar (base and composite reflectivity), satellite imagery, and severe weather (especially lightning). Advanced information would be echo tops, vertically integrated liquid, and digital storm accumulation.

Basic information

When looking for basic information, it is best to have all or most all of that data on the first screen of the app. That is often a good way to judge how well your app will benefit you over time. As an example, the National Weather Service includes much of the basic information (Figure 1). At a glance, you can get a good idea of what is happening now and what will happen in the immediate future. High and low temperatures provide a quick mental image of how the day (and night) may influence your maintenance plans, while winds, dewpoint and relative humidity provide a quick insight on irrigation requirements, disease potential, and infield skin management requirements.

It is beneficial to see both relative humidity and dewpoint together. For

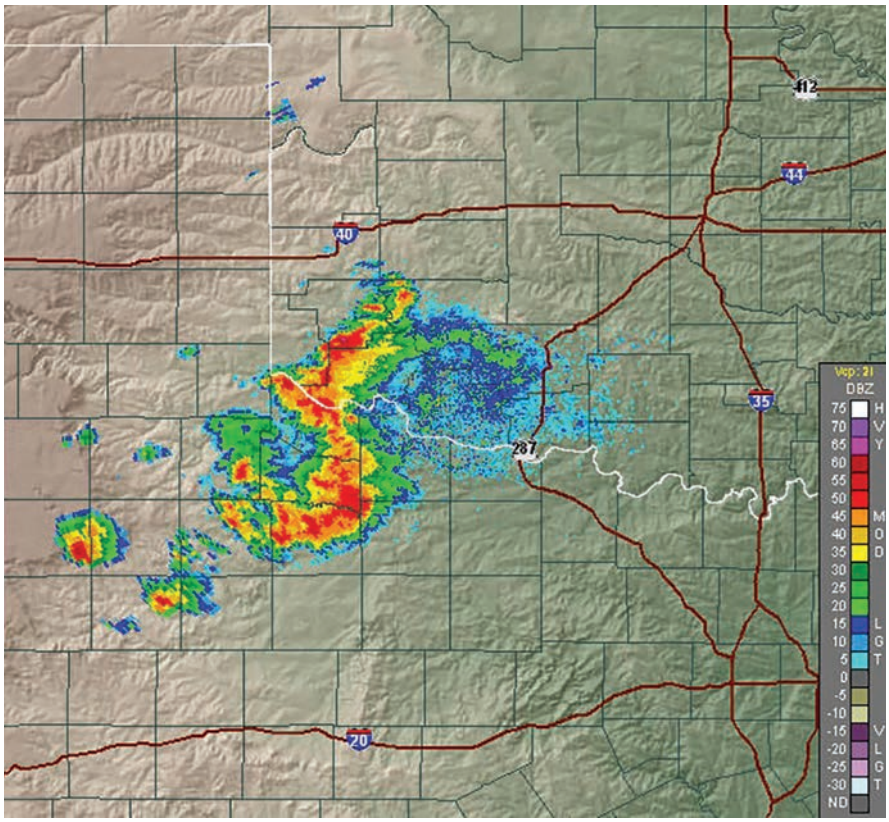


Figure 2. Base reflectivity radar

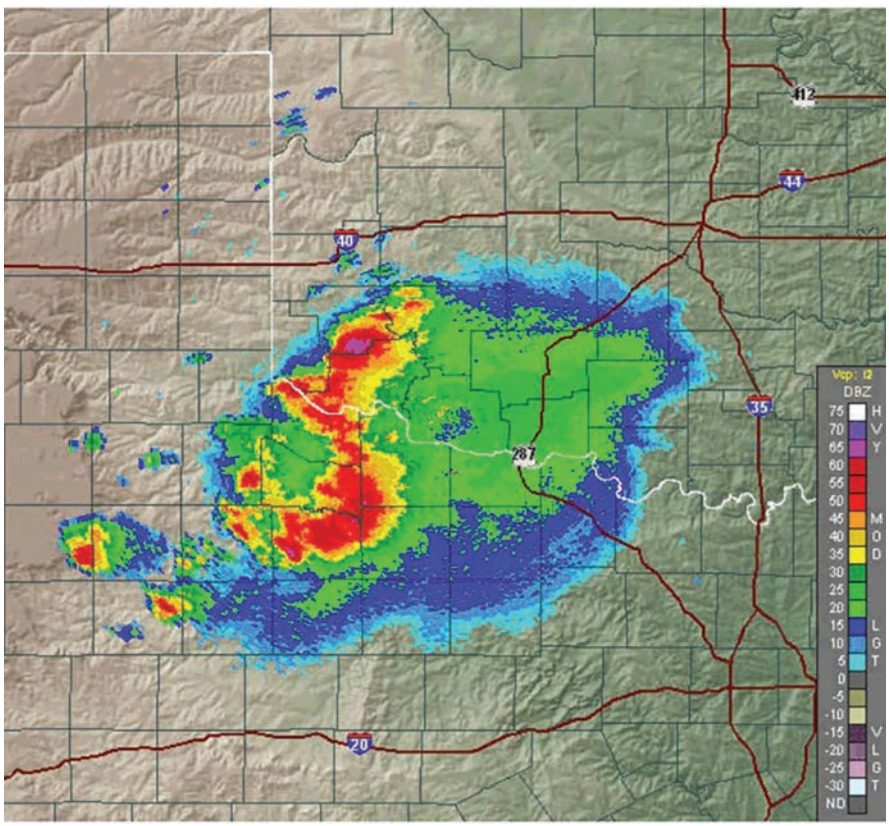


Figure 3. Composite reflectivity radar

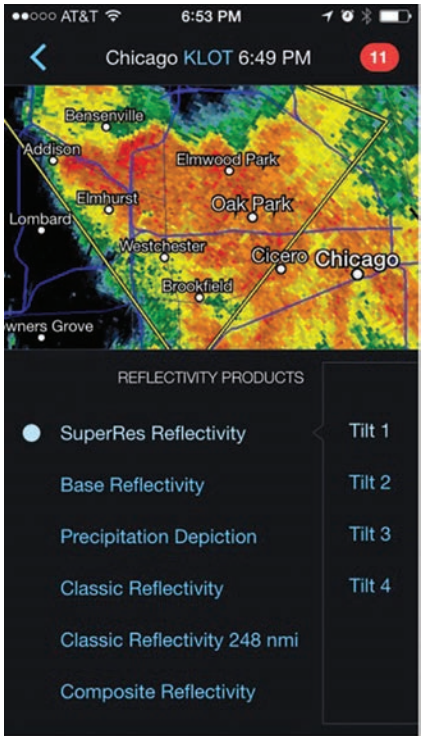


Figure 4. Radar selections

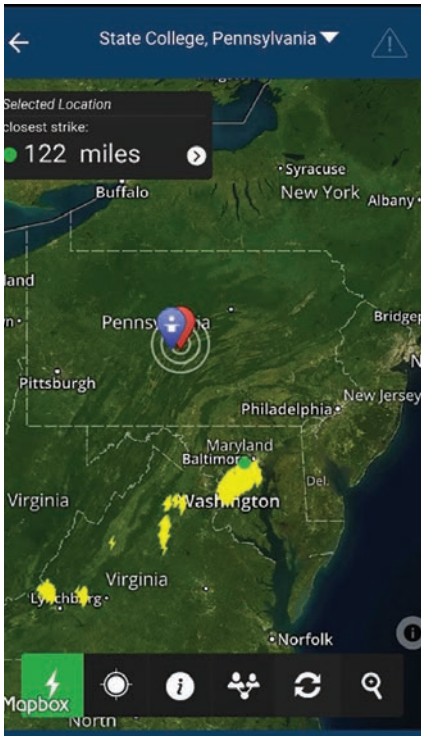


Figure 5. Lightning detection

Figure 6. Echo tops

example, a relative humidity of 65% with dewpoints more than 70 degrees indicate that less time may be spent watering the infield skin and possibly used to scout for diseases. The same relative humidity with dewpoints under 40 may indicate a majority of the day is dedicated to watering the skin and irrigating.

Intermediate information

When making game-time decisions such as tarp pulls or field evacuations due to severe weather, radar becomes an important tool. There are a number of good weather radar apps available. Many are free, and some require a fee with costs that hover around $10 or more. Many of the fee-based apps offer expanded functionality, precision and overall quality of information. Regardless of cost, when selecting a radar app, one of the most important characteristics to look for is the type of reflectivity the radar images are based upon. There are two types, base reflectivity and composite reflectivity. Each time a radar transmitter rotates, it sends out a microwave "sweep" at different elevations to get a complete picture of all elevations of the atmosphere. A base reflectivity image represents only a single sweep of the radar transmitter. This means that near the transmitter the radar "sees" low in the storms, and as distance increases the beam rises and can overshoot the core of heavier precipitation. Many of the high-resolution (hi-res) radar images are based on base reflectivity sweeps.

Composite reflectivity stitches together all elevation scans in order to create an image that represents a more complete picture of an oncoming storm. These are often lower-resolution images and may be more pixelated.

Figures 2 and 3 are of the same storm with Figure 2 a base reflectivity image and Figure 3 a composite reflectivity image. Notice the difference in the size and magnitude of the storm. In the upper portion of the composite image a small area (pink in color) containing 16-inch/hour rainfall would have been overlooked if only the base reflectivity image had been used.

Figure 4 shows the different reflectivity options you may have within a radar app; it is a screen from RadarScope and illustrates that not all radar imagery is the same. This app has both base and composite reflectivity available, but the SuperRes selection is from one tilt (base reflectivity), and will have good display quality but may not provide a complete picture of the storm.

So, when trying to make critical game-time decisions, a radar image using base reflectivity may significantly underestimate the significance of an oncoming storm. When selecting a radar app, be sure to investigate the types of radar images it provides and be prepared in spending a few dollars for a radar app that will save you time or headaches in the future.

There are numerous satellite imagery options as well. They provide visible cloud cover, infrared (or temperature-based) images of cloud cover (the most common that we see), moisture content, and all-in-one maps that include a combination of radar, infrared, and weather station models to tell a complete weather story. Satellite images can give you a broader perspective of how the weather is behaving on a wider, more continental scale. The images and

video loops illustrate airflow, cloud and moisture movement and overall dynamics of frontal systems. These large-scale images and video loops can help in longer-term planning. They can aid in project preparation and can be used as a tool to help protect fields when communicating with administrators who may be considering additional, unexpected events during non-use days. It is useful to compare these images with the common surface weather maps we normally see to get a good working knowledge of fronts and changing weather systems.

Severe weather

Lightning is the most critical facet of severe weather for sport turf managers. In 2009, one in five people struck by lightning were engaged in an outdoor sporting activity. Having an app that can provide you with lightning information instantly or within a click on your phone is important. The lightning information from the WeatherBug app (see Fig 5) only requires a short scroll down and a single click. An old AM radio is also good to have on-hand as a back up lightning detector. They create a large amount of static when lightning is in the area.

As we work at becoming more proficient with understanding weather and being able to make better weather-based decisions, we need to find more advanced tools to help us. Echo tops or cloud height is another function to help us assess the intensity of an oncoming storm. An echo top measures the overall height of a storm, which is an indicator of the strength of storm updrafts. Stronger updrafts make convective wind gusts and large hail more likely. When several storms are on radar, the Echo Tops tool by RadarScope (Fig 6) can point out the more severe storms and the direction they are travelling. This can be valuable information to report to the front office when asked about making a call on a game or whether the conditions will be safe to conduct a last-minute tarp pull.

Another tool to assess the strength of a storm is vertically integrated liquid (VIL).

> **"LIGHTNING IS THE MOST CRITICAL FACET OF SEVERE WEATHER FOR SPORT TURF MANAGERS."**
>
> *– Brad Jakubowski*

VIL measures how much water is being transported vertically throughout a storm cloud and is another indicator of a storm's updraft strength. Taller updrafts tend to have higher values of VIL and are more likely to produce hail.

One more tool that can be used to help determine the total accumulation of a precipitation event is digital storm accumulation. By allowing you to assess discrete accumulations over short periods of time, this tool may help you determine whether or not to pull a field cover for a particular rain event, saving time and energy that could be used elsewhere and avoid unnecessary delays. This tool may also aid in determining the potential of a flash flood event in your area.

Today, there are many new tools and information available at our fingertips to help us better plan daily field maintenance, irrigation, disease management and make game-time decisions. For any product that we use, it is important to investigate different apps and functions, ask questions of others using the products, experiment and calibrate any information you use with your specific location and facility. This will help provide us with the most beneficial information possible. **/ST/**

Brad Jakubowski is an instructor of plant sciences at Penn State's University Park campus.

PREPARE NOT TO REPAIR IRRIGATION:

The case for HDPE pipe

// By ASHLEY WILKINSON

When spring finally arrives, turf managers begin their agronomic practices that will prepare turfgrass for the grueling summer schedule. Pre-emergent applications, aerification, and fertilization mean another right of spring: the irrigation leak. Months of no or limited activity coupled with the changes in soil temperature reveal the weaknesses within the system that we have become so familiar with. While digging up these leaks, ringing our hands in anticipation of the cold water soon to numb our fingertips, the thought inevitably enters our heads: "There must be a better way." Well, to that I would like to reply with "there is!"

A not so new strategy to remove these leaks from your spring playbook is available in the form of HDPE pipe. Used for decades in the petroleum industry for its leak resistance, HDPE is now becoming more popular in irrigation applications.

While many of you were anticipating what I might share that could take away your acrimony for irrigation, the mention of HDPE has probably just as quickly turned a few of you off. "What is HDPE?" "Why would I switch to HDPE?" and "how much does it cost compared to PVC?" are common questions once I start discussing HDPE irrigation renovations.

HDPE, or high density polyethylene, is a thermoplast plastic that is safe for the environment, limits product waste, and can be installed and maintained through what is known as "fusion" or a more traditional coupling method.

I'm often surprised to find out how few of us understand the variety of dangers that PVC poses on us and the world around us. PVC, or poly-vinyl chloride, is a pipe that uses dioxin in its creation. Dioxin is a known carcinogen and has been linked to numerous health issues like birth defects, neurological disorders, and a variety of cancers. Just breathing the fumes of PVC is extremely toxic. Burning PVC pipe exposes you to dioxin and chloride. While this may seem trivial to you now, will you feel that way in 20 or 30 years?

Most irrigation designers who are familiar with HDPE will say that it should last 40 or more years, doubling the life expectancy of PVC.

Conversely, HDPE releases no noxious gases either during its creation or during its use and potential degradation. When HDPE is burned it simply returns to carbon, a basic element that surrounds us all in our daily lives. Resistance to degradation, resistance to leaks, and environmental safety are all reasons why HDPE has been a staple in petroleum and more recently in municipal infrastructure as a potable water delivery source.

The use of HDPE is also better for

the environment as very little pipe is wasted during installation. HDPE has no bells, no male or female ends. Each pipe is fused together to make a monolithic single piece of pipe. When cut, no matter the length, HDPE can be reconnected through fusion. This means that every inch of HDPE is usable. We can also create our own directional fittings. The need to order specific-sized tees, reducers and bushings is nearly nonexistent.

When installing PVC, we use pipe connected by glue or gasket. Both connections use a bell on the end of the pipe and a lubricant or solvent to assist with the connection. We "bump" the pipe together, male end to female end, and hope our precautionary preparation will reveal no leaks after pressurizing.

But what many of you may not know is that PVC has an "allowable leakage rate" from its very first day in use. You read that correctly. When studying PVC you'll learn that it is not expected to be

Horry-Georgetown graduate Chandler Hartwell setting up fusion for large mainline. Once fused, the pipe will be dragged to the installation area. No damaged to the pipe occurs from dragging and it can't pull apart. Both would be issues with PVC.

100% leak free like HDPE. The connection points for PVC, be it glue or gasket, are expected to exhibit minimal leakage. This becomes more of an issue because as PVC gets older it becomes more brittle. PVC also "de-rates" with use. What that means is that as water moves through the pipe via the starting and stopping of the pump station, isolation through valves, and the on-and-off sprinkler usage, PVC loses its sustainability.

Our modern accounting principles allow us to depreciate an irrigation system. The life expectancy of pressurized PVC is roughly 15 years according to the Golf Course Builders Association of America. By comparison, we do not have such an allocated life expectancy for HDPE pipe. The monolithic fusion process of HDPE removes the couplings, creates one singular monolithic pipe, and removes pipe de-rating from the equation entirely. Most irrigation designers who are familiar with HDPE will say that it

Photo courtesy of Horry-Georgetown graduate Tradd Jones, head sports turf manager for the Double A Bowling Green Hot Rods.

should last 40 or more years, doubling the life expectancy of PVC. In fact, those HDPE life expectations may be conservative. Doug Zak, director of sales for CMF Global, a large HDPE producer, states, "AquaFuse HDPE is rated to well over 100 years. While PVC was an amazing advancement in irrigation years ago, the attention given to water conservation and the fact that many sports turf complexes purchase water or use effluent water is enough to initiate more interest in HDPE."

Fusion

Perhaps the biggest hurdle many sports turf managers face when discussing HDPE is the fusion process I mentioned before. While you may hate digging up leaky PVC and speculating what type of repair coupling to use, the fact that you have familiarity with it instills confidence that you are able to service and repair it.

"What if I have a leak?" is a legitimate question that every turf manager should ask. The answer is that fusion isn't as complicated as perceived. To simplify fusion, it is simply a connection process that uses heat and pressure to connect HDPE pipe. While several fusion methods exist, the theory behind them all is that simple. Butt fusion is used in connecting pipe that has been butted up to each other end to end.

The author standing over a leaky PVC pipe that he's waiting to drain down so that he can repair it.

A second fusion type, saddle fusion, is used primarily when changing pipe direction or pipe size. Saddle fusion does just as the name implicates, where a fitting will ride on top of the HDPE pipe like a saddle, and be fused to the pipe. Socket fusion offers a type of fusion where a coupler can be heated and pressed into the HDPE pipe. Most socket fusion is done on smaller diameter pipe.

The last style of fusion is electrofusion. Electrofusion also uses a coupler that allows the HDPE pipe to be slid into it, then uses electrical contacts to heat the coupler and pipe into the same seamless monolithic pipe just as the other styles of fusion offer. Electrofusion is the simplest and removes the experience level that can be so crucial to proper fusion. While it is the most expensive, it is also the safety net that turf managers can rely on to fix that critical leak when unforeseen circumstances, like drainage work, compromises the pipe. The electrofusion device takes the guesswork out of how long to heat or what pressure to use when pressing the HDPE pipe together.

Repairing irrigation or coupling new irrigation can also be done with special compression type fittings available in many different brands and types, among them are fittings from a manufacturer named Phil-

mac. Using these compression fittings can serve as a huge safety net for the turf manager who wants complete control over repair and installation without implementing some form of fusion. A Philmac compression fitting tightens down on each end of the pipe, biting or gripping into the HDPE and providing a leak free connection. The only drawback to the Philmac fitting is that it doesn't come in larger sizes; a 3-inch Philmac fitting is the largest I am familiar with. What is not commonly known is that other "knock-on" or joint restraining couplers can also be used on HDPE. The outside diameter of HDPE and PVC are the same, allowing turf managers to use traditional gasketed couplings to be used, even if it's only temporary until some form of fusion is completed.

40-foot sticks

Whichever coupling decision you make, know that HDPE pipe comes in sticks no shorter than 40 feet. That already reduces fail points by at least half as rigid PVC pipe comes in sticks no longer than 20 feet. I have used 2-inch HDPE in 500-foot rolls on numerous occasions. This means that no or limited connection points will even be necessary. Imagine the ease of installation on a sports turf field where the majority of pipe is 3 inches or less. With the traditional pipe layout found in most football or baseball fields, HDPE quickly becomes a viable option.

No matter how much you may like something, the ultimate question we must all prepare for is "What does it cost?" The answer is not as much as you think. In the past, the cost difference was a factor. But with increased demand for HDPE, the attention given to PVC and its associated health concerns, and a better understanding of what true "apples to apples" comparisons are between HDPE and PVC pressure ratings, we see the cost difference is shrinking considerably. "HDPE resins are now about the same as PVC resins pound for pound," says Zak.

When comparing the installed price difference between an all-fused HDPE system (pipe, fittings and valves) you have to keep in mind that 90 plus percent of HDPE systems are joined above ground, not in an open trench. This usually speeds up installation times and allows for full and complete inspection of the fusions long before it's rolled into a trench. Fused HDPE pipe can be fully pressurized one hour after completion, as opposed to waiting 24 hours on a glued PVC joint.

Ashley Wilkinson, Horry Georgetown Technical College, Myrtle Beach, SC

HDPE also offers expandability. Hybrid systems using PVC mainlines and HDPE laterals have been a common design strategy over the last few years. This allows turf managers who are concerned with fusion as an installation or repair strategy to maintain control over their systems with traditional coupling devices for both PVC and HDPE. This could make renovations cheaper by keeping existing mainlines and marrying new HDPE laterals to the system as a temporary or permanent strategy depending on your properties wants and needs. So, when you get the irrigation repair blues remember, there may be a way to avoid it or at least minimize it. That is, unless you really like to dig holes each spring. **/ST/**

Ashley Wilkinson is a Professor, Golf and Sports Turf Management, at Horry Georgetown Technical College, Myrtle Beach, SC.

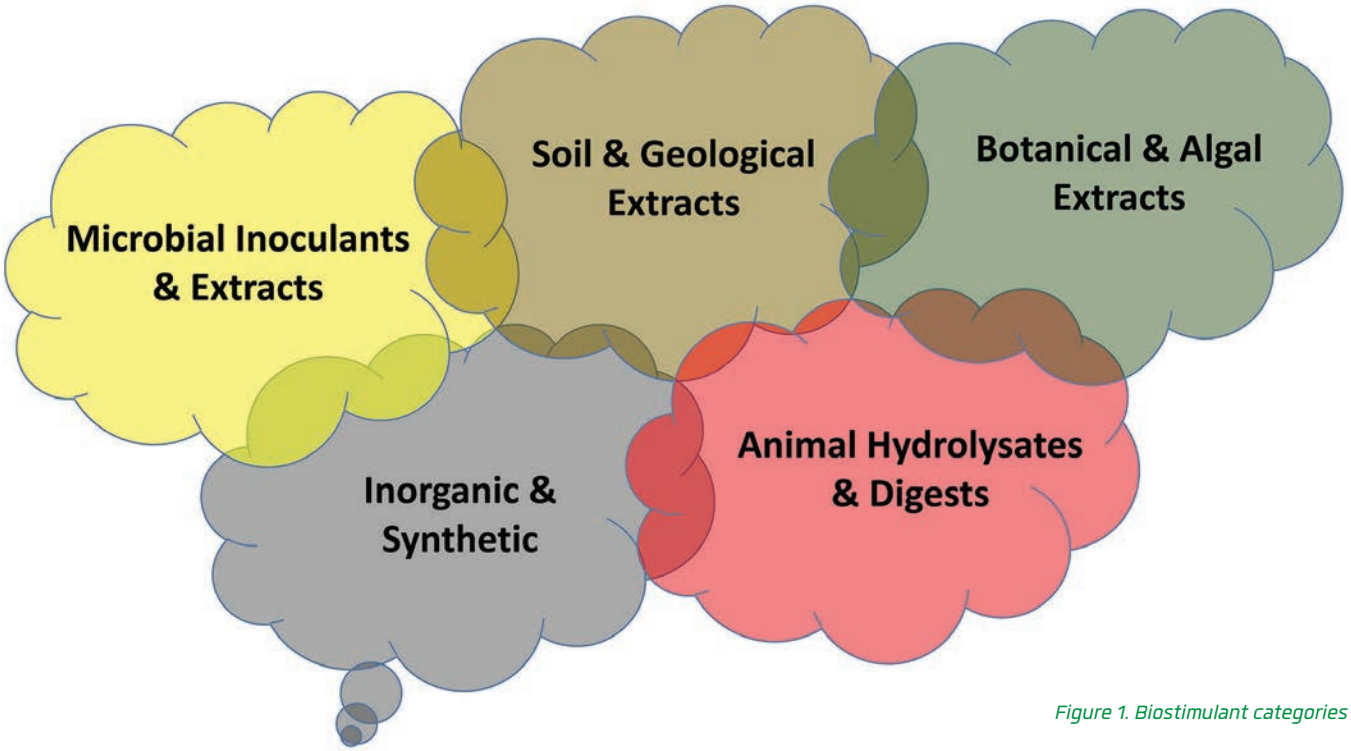


Figure 1. Biostimulant categories

Biostimulants—boom or bull?

// By BRYAN G. HOPKINS, PHD AND ELISA A. WOOLLEY

"Biostimulants" are taking turfgrass and other plant disciplines by storm. Most green industry retailers sell biostimulant products with a wide range of claims. We surveyed major fertilizer companies asking, "What are the main trends you see in industry?" Without prompting or exception, they answered biostimulants are one of the top trends, with millions of dollars invested and billions in sales.

This investment wouldn't likely occur without something valuable behind it. However, there is significant misguided and missing information. We don't have all the answers, but the following serves as a general guide with suggested readings for those that want to explore more deeply.

What is a biostimulant?

Most major dictionaries and encyclopedic references do not define "biostimulant." The USDA National Agricultural Library does not list it in their glossary of terms. A definition was added to the current farm bill that a biostimulant is "a substance or microorganism that, when applied to seeds, plants, or the rhizosphere, stimulates natural processes to enhance or benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress, or crop quality and yield."

This definition is too vague because it fails to exclude traditional products. After reviewing the definition in various scientific papers and company web sites, we propose the following definition that biostimulants are microorganisms and/or chemical substances which enhance plant growth and quality, often due to abiotic stress tolerance; excluding traditional pesticides, fertilizers, and soil amendments, such as limestone and gypsum. Biostimulants generally fit into five categories (see Figure 1).

Do they work?

The answer is "it depends." There are several reviews on biostimulants listed below. Yakhin et al. (2017) shows more than 100 sources with over 300 ingredients and bioactive compounds that have been studied. Many are currently in the marketplace. The Hopkins research lab has conducted 178 field and greenhouse biostimulant trials, on a variety of plant species, over the past two decades. The average yield/quality increase was 0.9%, which was not statistically significant. When separating by type, the only category showing a significant response was the soil and geological extracts, with all of these applied as humic or fulvic acids (Table 1, p. 28). However all categories had at

least one trial with a positive response. This shows potential for biostimulants, but also suggests caution due to so many trials not showing a positive response.

For humic and fulvic organic acids, we found they worked consistently when mixed with phosphorus fertilizer and applied to soil with low soil test phosphorus levels and generally with low organic matter and high pH. Theoretically, sites with strongly acidic soil pH would also be responsive. It is imperative to cut the fertilizer rate by a third to half to prevent toxicity. The mode-of-action we have shown for these organic acids is that phosphorus is more soluble in soil solution and, therefore, more mobile. We show the effect was likely due to this and not some other biostimulation. However, the work of Olk et al. (2018), conducted in an environment very different than ours, suggests stimulation in other ways.

In field trials with microbes (bacteria or fungi), we recognize the potential for these to be beneficial, but we didn't measure such in our trials. The main problem was that the microbes originally in the jug were dead-on-arrival. A large percentage of the products we tested were packaged with fertilizer and, as such, had extreme pH and/or salt content, killing the microbes. Additionally, an important fact when considering microbial biostimulants is that soils are highly microbially active even with applications of fertilizers and pesticides. There are more than a trillion microbes in a teaspoon of soil. Adding a few more typically doesn't work, although we do have proven success when inoculating legume seeds with Rhizobium to facilitate nodulation and nitrogen fixation and when adding Mycorrhizae fungi to soils, especially those with low fertility and/or water supply. The potential is there, but largely unsuccessful in our trials.

BEWARE OF FALSE DATA

We ran across a company sharing some of our data. Unfortunately, they were only showing part of the data to shed a more positive light on their product we had evaluated. Yes, their product showed improved rooting and color in comparison to the negative control without anything added. However, it didn't show any difference compared to the positive control. When we ran our tests we were aware that their product had fertilizer nutrients in it. Thus, we crafted a treatment that had equal fertilizer (positive control) amounts using more traditional sources. Both our version and the biostimulant we were testing performed well, although the cost of the biostimulant was exorbitantly higher. In this case, there was no measurable biostimulation. Rather, it was simply a fertilizer response.

Deep turfgrass roots from BYU's LaVell Edwards Stadium.

Table 1. Summary of field and greenhouse trial results as a function of biostimulant type.

		Number of Trials	Significant Positive Response	Significant Negative Response	Average, %
1	Soil & Geological Extracts	87	28	4	1.9*
2	Animal Hydrolysates & Extracts	26	5	1	0.1
3	Botanical & Algal Extracts	19	2	1	-0.1
4	Inorganic & Synthetic Chemicals	15	1	0	-0.3
5	Microbial Inoculants & Extracts	31	3	1	-0.1

Table 1. Summary of field and greenhouse trial results as a function of biostimulant type.

In the case of silica, it is not an essential nutrient, but it is known to be beneficial to plants. However, the average soil is comprised of 28% silica. Most of this is in a solid form that is not accessible immediately by plants, but there is ample soluble silica floating in soil solution. Not surprisingly, we did not measure any plant response or increase in silica content in plant tissues in our research trials.

We tested dozens of products claiming to loosen soil compaction. None of them improved the compaction, which is not surprising. Compacted soil is a physical problem that is not likely solved with a chemical solution. Rather, aeration and topdressing continued to prove effective.

We tested dozens of products claiming to alleviate salt stress. Again, none of them worked, although there are many reports in the literature declaring biostimulants help with drought and salt stress. In contrast, salt problems were effectively alleviated with leaching with non-saline water. Keeping the soil relatively moist, blending saline water with non-saline water, and/or using salt tolerant species/varieties are also known to be effective. We recommend these solutions as first choices before trying biostimulants.

Again, we had at least one statistically positive response for all of the biostimulant categories. And, there are many reports in the scientific literature of documented benefits. Thus, we do not want to be too pessimistic despite the majority of our studies failing.

Buyer beware

There is potential for biostimulants to be effective. In the case of organic acids, the research is a bit further advanced than the other categories. We generally know how to use organic acids in crops, although there is more to learn. Although we've measured many positive responses to organic acids in row crops, we have only rarely (twice out of 18 studies) measured it in turfgrass. We feel the reason for this is that the roots of turfgrasses are exceptionally efficient at finding phosphorus in the surface soil. Also, over 95% of turfgrass soil samples coming to the BYU Environmental Analytical Lab have enough phosphorus in them to last over 5 years without any additional phosphorus fertilization. According to this, adding organic acids and expecting a benefit is a bad bet if there is ample phosphorus already.

Another consideration is that informal observations suggest that biostimulants do not hold much promise for a well-managed turfgrass that is not in distress. The likelihood of biostimulants working is slim if plants have near optimal conditions, including light; water; oxygen in the rootzone; mineral nutrients; temperature; and minimal presence of toxins and pests.

Admittedly, the majority of our studies occurred under good conditions, which may be a reason for so few showing a positive benefit. More work is underway to evaluate their response when under stress.

William Edwards Deming, a major player in the Japanese post-World War

Well managed, stress free turfgrass. Left side is control and right is biostimulant, with no measured response.

II economic boom, is famous for saying "In God we trust, all others must bring data." He attributed his success to listening to "experts," but not just believing them blindly unless they had data to back up their claims.

In some cases, biostimulants work. In many others they do not. It is the responsibility of the companies selling these products to provide third party independent testing and reliable management guides. If they are proven, the next question is when and how do they work? Under what conditions? Stress? If a product looks promising and has this data backing it up, conduct your own trials by partnering with a scientist that can help set them up correctly. Be sure to compare it to both a negative and a positive control, as in the "Beware of false data" sidebar.

Biostimulants are an exciting trend with lots of promise. However, don't abandon proven practices for promises that seem too good to be true. Be optimistically pessimistic. Keep an open mind, but realize that most of these won't likely work, especially if the turf is well managed and healthy. In the meantime, independent and industry scientists will continue to search for reliable products and ways to manage them. We advise to not be on the cutting edge of the biostimulant world to the point of throwing caution to the wind and chasing every new product with miracle claims. On the other hand, don't be so pessimistic that you miss good quality products. Remember, fertilizer used to be considered a "snake oil." **/ST/**

Bryan G. Hopkins, PhD, is a Certified Professional Soil Scientist (CPSS) and a professor in the Plant and Wildlife Sciences Department in the College of Life Sciences at Brigham Young University. Elisa A. Woolley is a graduate student at BYU.

EVER CONSIDER A WHOLE NEW SPECIES OF GRASS?

Editor's note: *Some experts were kind enough to respond to a few questions about grass species rather than specific variety or cultivar. John Sorochan, PhD is a Distinguished Professor of Turfgrass Science and the Director of the Center for Athletic Field Safety at the University of Tennessee. Eric Watkins, PhD, is a professor of Turfgrass Breeding and Genetics at the University of Minnesota. Jerad Minnick is lead advisor for the Natural Grass Advisory Group.*

How do buyers best identify what characteristics they should seek when considering a new grass species for their field?

SOROCHAN: Hopefully, buyers are using evidence-based data from sports specific research that has help identify the best turfgrass species for their environment, including the best varieties as well. Using turfgrass researchers and extension professors is the best source for unbiased data driven guidance.

WATKINS: Managers looking for grass seed should think carefully about the most important traits for their site. For some, it may be resistance to a disease that is common and difficult to control; for others, it might rapid recovery from damage incurred during a sporting event. I would recommend focusing less on turfgrass quality and more on specific traits. For example, it will be little comfort to a sports turf managers to have a grass with top turfgrass quality if it isn't able to recover from regular game play.

MINNICK: It is important for a buyer to identify the specific demands put on their field(s). But not just demands now –what are the demands that the field surface needs to meet in the next 18 to 36 months? The characteristics for a new grass species then should be selected as a solution to meeting that demand. And this isn't a determination that should be made specifically by the sports field manager or architect. Athletic directors, coaches, and other field users all should have input. Changing grass species creates an opportunity to create a long-term dialogue about fields and meeting the needs of field users. Each grass species comes with positives and negatives. The ongoing dialogue will reduce the impact of those things.

Buyers must be honest with themselves about the maintenance budget that they are working with. Changing grass species can help tremendously, especially in

Dr. Yanqi Wu wins breeders award

Thanks to Sod Solutions and its Sod University website (www.soduniversity.com) for allowing us to reprint this from their blog.

Dr. Yanqi Wu was the co-recipient of the 2018 Breeders Award, presented by the Turfgrass Breeders Association, for his part in the development of Latitude 36, which was released by Oklahoma State University alongside NorthBridge bermudagrass. These two bermudagrasses have taken the sports and golf world by storm and have given homeowners the option to enjoy the benefits of the same beautiful looking, hardwearing, cold tolerant, drought resistant bermudagrass found on NFL and MLB stadiums and NCAA field venues throughout the country.

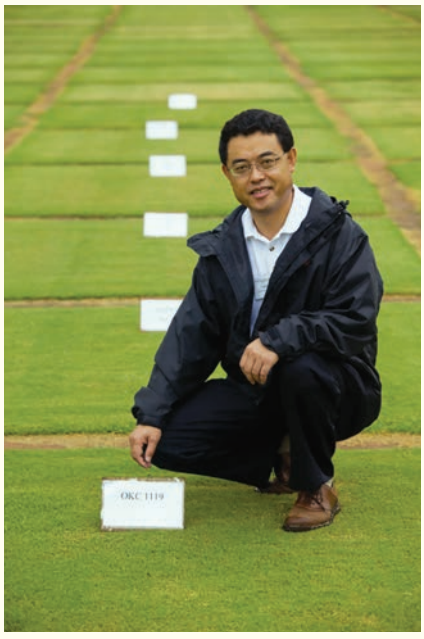
We recently caught up with Dr. Wu at the 2019 Sport Turf Managers Association's Annual Conference and were able to ask him a few questions about his path to bermudagrass research and development and his vision going forward. Thank you for chatting with us, Dr. Wu!

How did you wind up studying turfgrass?

Wu: I grew up in China. I had a Bachelor of Science in Animal Science and a Master of Science in Forage Science from two Chinese institutions. Then, I was hired to work as a faculty member to do research and teach forage science related courses at Sichuan Agricultural University in China in 1988. In the 1990s, a new turf industry started to appear and grow in the nation. I saw potential in the turf industry and went on to earn a PhD degree in turfgrass science. More specifically, I planned to be a turf bermudagrass breeder because bermudagrass is the most widely used warm season turfgrass in the world.

When you came to Oklahoma State, what was your first priority?

Wu: In 2000, I decided to pursue a PhD in the US because of the world-class turfgrass science programs that have been developed in this nation. I searched literature and communicated with professors in turfgrass science who might be able to recommend bermudagrass breeding programs in the US. The search guided me to Oklahoma



State University and Dr. Charles Taliaferro. I contacted Dr. Taliaferro, and soon after, he offered me a PhD graduate research assistantship. My first priority was to earn a doctoral degree.

What were the challenges when you came to OSU?

Wu: I performed research work and studied under the direction of Dr. Taliaferro beginning in 2001 and earned my degree in 2004. As a matter of fact, I greatly enjoyed my course study and scientific research. From 2004 to 2006, I completed 2 years of postdoctoral research at the USDA ARS Plant Science Laboratory. I was hired as an assistant professor in 2006 and lead the OSU turfgrass breeding program after Dr. Taliaferro retired. A major challenge was how to breed and develop new turf bermudagrass cultivars that were better than the best existing commercial varieties such as Patriot, Tifway, and others.

How did Latitude 36 and NorthBridge come about? Were you looking for something or some attribute in particular?

Wu: Dr. Taliaferro left numerous advanced bermudagrass experimental selections for us to work on. 11×19 (OKC 1119, later named Latitude 36) and 11×34 (OKC 1134, NorthBridge) were two of more than 30 selections tested in a replicated field trial by Dr. Dennis Martin, a professor of turfgrass science of OSU. We submitted these two selections to the 2007-2012 National Turfgrass Evaluation Program National Bermudagrass Test because the two grasses exhibited exceptional turfgrass quality, early spring green up, excellent sod tensile strength, and some other favorable characteristics.

Was the goal to find something more cold tolerant than Patriot?

Wu: One of our breeding goals was, and still is, to improve cold hardiness in new experimental selections. The more improvement for cold hardiness, the less risk of winterkill when bermudagrass is used in the northern portion of the US transition zone. We tested and characterized advanced selections for winter survivability and freeze tolerance. We knew it was possible to make improvement in the trait because our bermudagrass germplasm at OSU arguably is one of the largest collections in the world, in which some contain cold hardiness genes.

Did you imagine that your grasses would someday be on major sports fields and golf courses all over the world?

Wu: Yes, I did, that has been part of my working dream. Dr. Taliaferro's breeding program made a reputation in the world. As I mentioned before, I knew his name and reached out to him for my education even before I met him in person. My working goal has been to continue and improve on his established breeding program.

What's next for you?

Wu: We, a team of scientists and collaborators, work hard in an attempt to combine high turf quality, drought resistance, and cold hardiness into new experimental varieties. In addition, we are working to develop new fine bermudagrass for green use on golf courses. In the next 10 years, we will see more drought resistant bermudagrass varieties and new ultradwarf varieties from our breeding program going to the turf industry. These are long time efforts needing a lot of support. I sincerely appreciate the US Golf Association, the US Department of Agriculture, and the Oklahoma Center for the Advancement of Science and Technology. Additionally, I appreciate turf industry partners like Sod Solutions and my colleagues of OSU and other universities for their funding, support, and collaboration.

situations with limited budgets. But if the maintenance budget does not allow for even a minimum amount of maintenance, the grass species is not the problem. The commitment to maintenance is the problem.

What do you think are the most important characteristics to consider, regardless of site?

WATKINS: Disease resistance. In many cases, turfgrass breeders have made significant improvement for disease resistance. This is a great way for a turf manager to improve turf performance and reduce inputs.

MINNICK: Great question! The single most important characteristic for a grass species is stress tolerance. Obviously stress is different in different situations; disease is a stress, drought is a stress, traffic is a stress. The stress of a professional stadium field in Washington, DC is much different than the stress of a non-irrigated park field in Las Vegas. But our business is a results-specific one. So both fields are judged the harshest at their weakest point. So the species selected to go on each field should always be up to the stresses that it will be subjected too. Thankfully there are universities and private companies working to drastically improve the varieties of nearly all grass species to be able to deal with specific stress points. That is an important change. Historically grass breeding was focused more on color than on specific stresses. And then grasses were selected with color in mind. But no field user cares how "dark green" a field is. Users need their playing surface to be covered completely in grass, no matter the stress that is put on the field.

SOROCHAN: I think the most important characteristics to look for in a sports turf is wear tolerance. The ability of the turf to withstand traffic is key. Secondly, would be recuperative potential since grass is a living organism, and too much traffic can be damaging. Therefore, it is also important that the grass can recover or be reestablished from seed (i.e., perennial ryegrass) quickly.

Where do you recommend finding the best information on new and existing species?

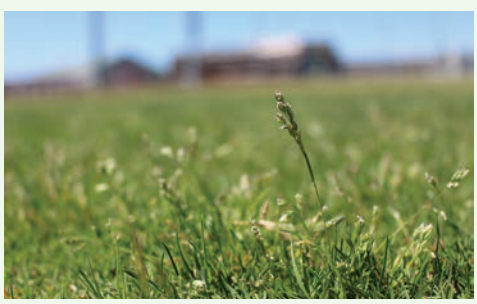
SOROCHAN: I think the best source to find information on existing species it through university extension and by contacting turfgrass professors directly. Also, the National Turfgrass Evaluation Program (NTEP.org) is an excellent resource for identifying the best species and varieties for different locations. NTEP has also begun to include ancillary traffic test locations.

WATKINS: Turfgrass managers should seek species and cultivar performance information from an unbiased source such as a local university testing location or the National Turfgrass Evaluation Program. Using these data sources will allow a turfgrass manager to find the best grass for a particular site, not just the best grass for that site that happens to be available from a single vendor.

MINNICK: Finding the best information on new and existing species is the biggest challenge that faces a buyer. It is not because of a shortage of information. It is because there is actually too much information. In the industry today, it is hard to separate fancy marketing from actual results. NTEP is a great starting place. The work of the entire NTEP team, led by Executive Director Kevin Morris, is excellent. They are working hard to standardize data collection across all sites. Additional tests have been added for traffic tolerance, recovery, etc. Great, great information. But trials in small square plots with consistent soil types are not reality for most high-use fields. Thus the best information that a buyer can collect will come from peers and colleagues in the industry. Doing this in person is important before making a selection. We live in the age of photo filters and glamour shots. Seeing multiple fields that are similar, or even a bit different, to see a grass species in action with your own eyes should have the biggest impact on your decision-making. ***/ST/***

Breeder's perspective

Dr. Brian Schwartz, associate professor and plant breeder, University of Georgia, says:



"Most sports field managers are professionals and likely know the limiting conditions for their specific field. The first step would be to invite a regional sports turf researcher or their state turfgrass extension specialist to the field in person so that they can determine together why the turf struggles in some areas and performs well in others. Only after these conclusions are drawn can the turf researcher or extension specialist best meld site-specific needs with cultivar performance that has been determined over years of previous research and hopefully real-world performance. A trusted peer would also be an excellent sounding board for site evaluation and cultivar selection.

"Rooting and recovery are the traits that many sports field managers ask me about, usually in the context of player injury. Stadium managers often reference shade-tolerance, where those that manage municipal fields with limited resources often ask about drought/stress tolerance. Stand establishment of overseed, as well as spring transition of the bermudagrass base also seem to be topics of interest."

JOHN MASCARO'S PHOTO QUIZ

JOHN MASCARO IS PRESIDENT OF TURF-TEC INTERNATIONAL

ANSWERS FROM PAGE 17

These green rectangular areas in front of these soccer goalmouths are not really a problem, they are actually a solution to a problem. This bermudagrass college varsity soccer field is located in Fort Worth and was rebuilt about 2 years ago. The first winter, the sports turf manager did not want to overseed the field and stress out the newly planted turfgrass, and it seemed to perform well over the winter while being dormant. The second winter, it was decided not to overseed the field again; however, since the soccer goalmouths are most susceptible to wear, he decided to cover these areas in the wintertime with growth blankets to protect the areas from frost and encourage a good healthy root system. No additional inputs were applied to these areas other than a fungicide application for spring dead spot that was applied preventatively over entire field. He left the blankets down all of December and most of January, and only removed them when the team trains. Since this part of the country does not receive any extreme heat during these months, excessive heat does not build up under the blankets. The coaches were really impressed with the results and they did ask if they could cover the entire field; the sports turf manager supplied the price of the blankets and they are now considering funding it. Another benefit of covering the goalmouth revealed itself during the spring after a few heavy frosts knocked the rest of the field back, but these areas remained dark green.

Photo submitted by Andrew Siegel, Athletics Field Manager at Texas Christian University in Fort Worth, TX.

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

Top 6 most common volunteer groundskeeping mistakes

// By PAUL ZWASKA

Parent coaches and volunteers, god love 'em, the games of baseball and softball usually can't go on without these dedicated people who are there to either teach or just help out. Most are genuinely trying hard to do the right thing, others are just there to fill a void. In either case, they can cause issues when they appoint themselves groundskeeper for a day. If not properly trained, and very few are, the potential damage they can inflict on a ballfield can erase weeks of investment in preseason field prep. It is no wonder that sports field managers cringe when they find out that the coaches and volunteers worked together to get a game in after a rain event. Instead of throwing caution to the wind and doing whatever it takes to get *your* game in, consider the consequences to the quality of the field surface, those who must fix it and the other teams that are affected by your actions. Let's visit some of the more common groundskeeping mistakes committed by those who think they are helping the groundskeepers:

Zwaska, center, has donated thousands of hours working with West Madison (WI) Little League, which plays a critical role in Beacon's research and development efforts.

Using a broom or squeegee to push standing water off your infield skin.

Infield soil and topdressing are picked up along with the water and pushed off into the lip. This ends up building the lip higher, creating a natural dam, and also making the low spot, where the water collected, lower due to infield material being pushed out along with the water.

The correct action is to use a puddle pump or puddle sponges to suck up and remove excess freestanding water in the low spots.

Using excessive amounts of drying agent.

The only thing this does is waste large dollar amounts of drying agent to get games played. Excess drying agent remains on the field afterward, which can increase the speed of the field drying, but it can also help store more water at the surface in a rain event as the calcined clay drying agent gorges itself with water. This may actually slow the drying process if too much is sitting on the surface. On a field without a water source, you can actually suffer from the field getting too dry and hard as the calcined clay sucks every bit of moisture out of the infield skin.

If you walk on an infield and it is soft enough that your feet sink, it is too

soft to play on. Incredible amounts of damage can occur on a ballfield when it is played on when the infield skin is too soft. Let Mother Nature do her evaporative magic first. Once the field is stable enough to walk on, then you can work to dry the low spots by removing the freestanding water first. Only then should you use drying agent to finish the drying process and it will take much less material to do so.

Dragging an infield without removing bases, then pulling a drag right over the top of them.

This causes infield soil to build up around the bases, slowly burying them and making them harder to remove. This also destroys the consistency of the surface grade across the infield. This is just plain lazy.

The correct action is to remove the bases and place in dugouts. Install base plugs in base anchors before dragging infield. Cut down any high areas under or around bases with an iron rake or aluminum field rake.

Dragging infield material into the turf edges.

When dragging the infield, if the drag wanders onto the turf edges, it deposits infield soil and topdressing into the turf edges which is then glued in by rainfall and irrigation cycles, unless cleaned out fairly soon afterwards. As this material builds up in the turf, it creates a lip that becomes a natural dam impeding the free flow of rainfall off the playing surface.

Stay a minimum of 6 inches away from the edge of the infield skin where it meets the turf. This will help to reduce the incidence of lip build-up. Additionally, use a push broom, leaf rake, backpack blower, yard vacuum or power broom to pull loose material out of the turf edges after you drag the skin area. Finish grooming the edges with a hand drag or field grading rake.

Packing dry mound spoils back into the wear holes on the mound slope.

This is basically wasted effort, pure and simple. Water and clay are the glue that binds a soil together. Without those, no binding will take place, no matter how hard you pulverize and pound the old clay that has been kicked out of the wear areas. Additionally, if you pull the old clay laying on the surface of the mound back into place, it undoubtedly has also been contaminated with other materials, like topdressing or infield soil, which drastically reduce the binding power of the used material.

The correct action, and the *only way* to patch a clay area that produces an effectively sturdy and stable patch, is by using fresh new clay and water. The process is as follows:

- Sweep all loose material away from the wear holes.
- Use water to adequately moisten the sides and bottom of the holes. Allow some time for the water to absorb into the established clay.
- Add fresh clean clay to the wear areas and tamp into place. Level as needed.
- Sprinkle some water over the entire surface of the patch.
- Pull old topdressing and other material back over patch and finish groom.

Not using available tarps on the clay areas on the mound and home plate at the end of the day.

The clay areas are left open to the atmosphere where evaporation will pull the moisture out of the mound and batter's box clay. Without the moisture in the clay, it fractures and chunks out of those areas very easily, drastically reducing its effectiveness of providing proper footing for a pitcher or hitter.

If area tarps are available, place the mound and plate tarps on *whenever* you finish a game or practice and no one else is around to use the field. It is always important to minimize evaporation on the clay whenever possible. BONUS: If water is available, add some water to the clay areas on the mound and batter's box to replace what Mother Nature evaporated during the time you were using the field. Just don't overdo it.

Sports field managers have a tough and challenging job to do, especially at schools and park and recs where their time is limited for working on each field they manage. Let's hope that coaches and volunteers respect what these field managers do in order for the rest of us to play our games, both competitive and recreational. I've never met a sports field manager who didn't have incredible pride in the work they do, no matter the situation handed to them. **/ST/**

Paul Zwaska, a former head groundskeeper for the Baltimore Orioles, is director of education and strategic initiatives for Beacon Athletics since 2000. In 2012, Paul authored and oversaw the launch of "Groundskeeper University," the first online ballfield maintenance-training venue.

VOLUNTEER TRAINING

To avoid these common groundskeeping mistakes, coaches and volunteers should only perform minimal work on a field — unless they have received some training. An excellent and free resource for basic game day groundskeeping skills is available through Beacon Athletics at GroundskeeperU.com, which offers eight modules covering the basics of ballfield maintenance. The training is geared toward coaches, volunteers, summer help or new grounds employees; users can signup for a free account and track their progress through the modules and lessons. In the end, you can take the final exam to gain "certification," but you must be a logged in user to track your progress.

GOING COMMERCIAL

Turf manager turned sales rep: what's it like?

Editor's note: *We asked several STMA veterans who went to work for industry vendors after years as turf managers a few questions recently and here what they said:*

ST: ***What were the main factors in your decision to leave turf management for the vendor side?***

Marcus Dean, CSFM, Advanced Turf Solutions

My kids: Carter, Riley and Collin. My wife, Jill, she has lived through the "sports turf manager spouse" lifestyle for almost 20 years. I was missing out on some of my children's development. I got tired of seeing what my kind of a weekend my family had via Facebook or Facetime or text message. I have a saying: I was/am a better dad than I was/am a husband (not to say that I am an excellent dad or perfect dad but that I did/doing a way better job as a dad than as a husband). I was cheating my wife and robbing her of the opportunity to have an excellent relationship with her husband plus putting most of the parenting burden on her. Don' worry folks, I have made some strides but still have lots of room to grow in both roles! And to be clear, just because you start spending more time at home, things automatically do not fix themselves. It takes time for your family to get adjusted to your being at home more and you to get adjusted to being around them more.

Patrick Coakley, CSFM, DuraEdge Products

I think I finally realized what burnout really means. After being in MiLB for as long as I have, Ripken Baseball added the dynamic of youth tournament baseball and 8 other fields. A nice challenge and change. After 7 or so years and some great progress, the energy and desire to take it to the next level just left. Complacency and stagnation set in. I don't want to say I didn't care, but the urgency was not there. I started to feel like a hypocrite. Now I was preaching ideals I couldn't follow and it wasn't fair to my employees, my employer and I did not want to become a cancer in the organization. I knew it was time to go. Better for my own health and better for the group of people I was working with.

ST: ***Sales looks easy if you've never done it, and it takes a certain type of person; why did you (and your employer) think you would be successful?***

Dean: I knew I would be successful because of my experiences and my ability to relate. I have worked in high school athletics through the NFL, spending most of my time in NCAA Division 1 athletics. Just because I have taken care of "high profile" fields doesn't mean we didn't have our own challenges that took an army to overcome and mask. Poorly draining soils, uneven and inconsistent grades, overuse, snow removal, and coaches that didn't listen to your advice are just a few examples. One of the greatest qualities a sports turf manager at any level MUST HAVE is the ability to adapt, change plans, and figure out how to get the job done given the present situation (regardless of what level you are at). A lot of people think that because your fields were on TV that you had perfect growing conditions and everyone listens to all the advice and knowledge that gets passed on to the end users daily. I believe in myself and Advanced Turf Solutions! I put my reputation with them for the last 10 years and their product line did not disappoint. They were partners in our operation, and I look forward to partnering with new sports turf managers.

Marcus Dean, CSFM

Patrick Coakley, CSFM

One of the biggest misconceptions as a sports turf manager is that we aren't in the sales industry. The reality of the situation is that we have sold ourselves to our current employer to get the job, we sell a game plan to our staff each and every day, and you sell yourself to your coaches. We sell ourselves each and every day in our actions and our words. Looking back, I have had some good and bad sales days as sports turf manager, husband, father, son, friend and neighbor. You have been selling yourself your whole life in different forms and ways.

Coakley: Early in my MiLB career I did sales. So I was under no delusion that it was easy. The big difference is I am not selling fence signs and season tickets. I was lucky enough to find a company that deals with solving problems with infield skin. I have been doing that my whole professional life. As a Sports Turf Manager I am a specialist, having done only baseball; I am a dirt guy through and through. So I completely stumble into the opportunity with DuraEdge and the approach they have fits my personality and background perfectly.

It is still a completely different lifestyle that takes time to adjust to, but I feel I have reached a maturity level to handle the change that I didn't have earlier in my career. I know that because I tried it once and it didn't work! When you do sales, the immediate perception of your expertise diminishes because now you are selling a product. People do not care that you used to work for the "Local Big Time Team." I suppose you have to be old enough to learn how to keep your ego at the door.

ST: What do you miss most (if anything!) about not having your own fields to manage?

Coakley: Comparing managing fields to sales is like comparing parenting to being an uncle. When you are a parent you never stop worrying, never stop nursing, always hovering. An uncle can just play around for a while and then walk away and let the parent worry! I have concern for the fields I see and want everyone I am in contact with to succeed. But I don't jump out of bed at 2 am because I had a dream it was raining. Or run into work sweating on Monday morning because I dared not to go in to "see if everything is ok" on Sunday and was worried the field was on fire.

"IT IS STILL A COMPLETELY DIFFERENT LIFESTYLE THAT TAKES TIME TO ADJUST TO, BUT I FEEL I HAVE REACHED A MATURITY LEVEL TO HANDLE THE CHANGE THAT I DIDN'T HAVE EARLIER IN MY CAREER. I KNOW THAT BECAUSE I TRIED IT ONCE AND IT DIDN'T WORK!"

– Patrick Coakley

So, it will sound cliché or maybe corny, but I miss the people I worked with. Putting in an effort with others you grow to respect and love is what I realize I miss the most. A sales position is pretty autonomous, which most MiLB sports turf managers should be comfortable with. But sometimes you find yourself "jonesing" for a tarp pull.

Dean: I miss the staff that I worked so closely with daily: Tommy Davis, Dave Thomas, Chuck Stivers, Josh Barnes, and Marcus Elswick. Those guys are my family, I spent more time with them in the last 20 years that I did my own wife and kids. I miss aerifying, spraying, and painting the most BUT I don't miss dealing with the rain, snow, or getting calls from various coaches regarding the weather. I viewed Mother Nature and our schedules as my competition, now I am partnering with our sports turf managers to succeed against their competition. Occasionally, I miss reporting to the same place each day but getting to see other facilities and fields is pretty good.

ST: What advice might you offer a colleague considering making a similar jump?

Coakley: Do some very honest self evaluation. In any job, you are always trying to improve. You try to improve the playing surface, the culture, the company. To do that you look weaknesses and how to change them. By default, you start to focus on negatives. Pretty soon, all you see is the negative and you don't see the positive until you are gone. Take an honest look at what you have accomplished and all the good things associated with your job. Then look at what you still have to do to get the complex/field where you want it. Then ask yourself if you have the energy and commitment left to do it. And that doesn't mean giving up your family or everything outside work to do it. Working 100 hours a week is absurd and unnecessary, even in MiLB. You might realize you have it pretty good. Otherwise, like me, you will know in your heart its time to go.

Dean: Don't let your work define you; take pride in what you do and give it the best effort each day. We, individually, create our own stress. You leave one set of stresses and find another set of stresses; it is all self created. I don't have to stress about how we are going to overcome this or that and get the fields ready, but I do have work-related stress (again self created in my opinion, we are who we are). TRUST IN GOD, BELIEVE IN YOURSELF, AND DARE TO DREAM. The "work" in sales is very different than being a sports turf manager but it is still there. The work is just behind the scenes in preparation and organization. ***/ST/***

Automation and our industry

Editor's note: *We asked some sports turf industry members for examples of how automation has changed or is changing their jobs, and how they anticipate it might change things in the future. We're going to keep asking folks this question.*

TinyLineMarker robot from Pioneer Athletics

Boyd Montgomery, CSE, CSFM

Boyd is Regional Business Manager Sports Fields & Grounds, North America, for Toro, and currently serves as Vice President-Commercial for STMA. "Autonomous equipment will be a reality in the turf business. On the golf side, they have had greens reel mower for a few years. The biggest question is the technology that is used. GPS can't get you there alone. It needs to have a correction service to be precise. That technology continues to come down in price but is not cheap. Think of your car GPS when you are on a multilane highway. Sometimes it locates you on the wrong lane. GPS is about +-10 feet accurate.

"With the increased pressure on trying to find people to work in this industry, there will be a tipping point where autonomous gains fast traction. It probably is a little slow to be adopted in the parks and rec segment, as there will be unions that may push back.

"In the not too distant future, autonomous equipment will help drive consistency, quality, and efficiency; all things that are subjected today to human interaction and possible error. That's not to say that autonomous machines won't makes errors, but you will at least know when they do.

"The equipment continues to get smart as technology is put on it. Again, think of your car 25 years ago. Pretty easy to crawl under it and work on the engine. Now you need to have diagnostic equipment and be trained. The car practically tells you what is wrong today."

Jeff McManus

Jeff is Director of Landscape Services at the University of Mississippi. "We have Toro Sentinel System, we have just started using the Big Belly trash systems and in the future we are looking at upgrading to "rumba style" lawnmowers.

"The training system Landscape University has changed the way we manage, because it has systematize our training. It has reduced our labor cost and given us higher staff motivation. It is less techie and more people development system."

Jeremy Husen

Jeremy is Executive Director of the Alliance for Low Input Sustainable Turf. "When I was at Barenbrug we were one of the first companies to bring in automated packaging, which absolutely did impact things in the warehouse and production end. The idea was to reduce manual labor and increase efficiency; an automated line can be run with 2-3 people while a traditional line needs 8-10. With the seasonality and on-demand needs of customers automation was easier to start up and shut down than hiring employees."

TJ Brewer, CSFM

TJ is Head Groundskeeper at Paul Brown Stadium in Cincinnati. "At my previous position we were seriously looking into purchasing a robotic painting machine, the "TurfTank." These machines can paint all types of fields with little to no supervision depending on the type of field. Throughout the year we were regularly painting 2-3 football fields and 2 soccer fields per week. We also had baseball and softball along with an annual painting of track sectors for our track and field event.

"With conventional equipment a regular week's painting would take 3-5 people 1 ½ to 2 days. We demo'd a robot and found that it would paint the fields in less time and with less paint than our crew. The robot, once set up, only needed one person in the area to keep an eye on it and make sure the machine didn't run out of paint. This person didn't need to be constantly attentive to the machine, they could be performing other work while the robot was painting. This time could be used for mowing, field

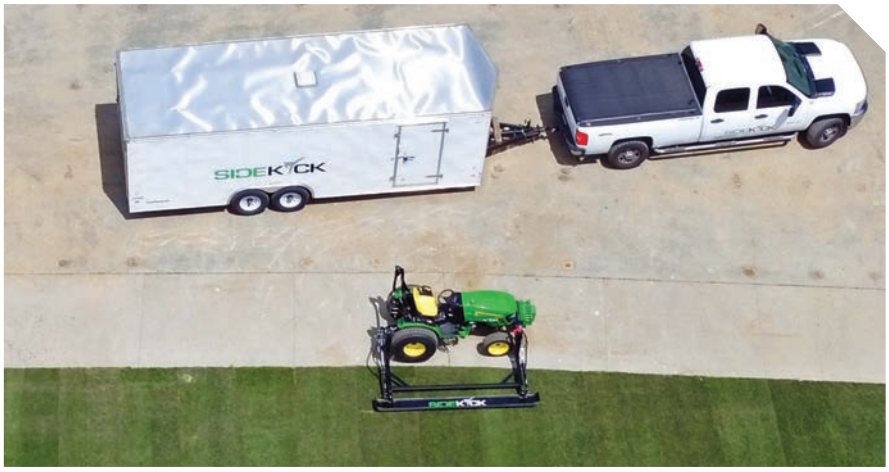
repair, divot filling, or any other work that wouldn't have been done if the field was being painted conventionally. The machine is also very precise, ensuring that lines were straight, on target and consistent.

Machines like these will be a game changer. The amount of labor they can save along with the accuracy they bring will help improve the quality and consistency of many complexes. With the ever-evolving push to reduce costs and reliable labor becoming harder to find these types of products will become a force.

Former Innovation Award winner SideKick USA goes international

2013 STMA Innovation Award winner SideKick USA and President and CEO Paul Carlson report that in March two of their John Deere 1025 R SideKick units were employed at state-of-the-art Al Wakrah Stadium, soon-to-be-home of the 2022 FIFA World Cup in Doha, Qatar. As soon as the two units arrived in Doha they were immediately put to use; Urban Concept Design and Aspire Sports Turf, armed with two SideKicks, were able to cover the entire playing surface in just 9 hours and 15 minutes.

"In the space of just 13 and a half hours, the pitch measuring around 7,800 square meters was moved from the Supreme Committee for Delivery and Legacy and Aspire Zone Foundation Turf Nursery and laid down inside the venue," one report said.



SIDEKICK removes the need for a team of workers armed with rakes (sometimes as many as a dozen) to manually pull and push the turf into place. When installed using only rakes, there will be seams between the turf that need to be filled in using sand or some other solution but not with this machine. Its turf compression plate pushes the turf from the side at a 90-degree angle using hydraulics. Now it takes roughly 7 hours to install 100,000 square feet of turf using one SIDEKICK, the company says.

Users report reduced damage to turf during installation and lower labor costs.

As stadiums continue to host multiple special events in a year to generate more revenue, the speed and quality of turnarounds becomes even more important. For example, if a concert is held at a stadium on Sunday, the field can be removed, replaced, and ready to play on Wednesday, the company says.

THEY SAY . . .

"It's just an outstanding machine. It pushes the turf together with a consistent amount of pressure eliminating any seams and provides the field with tighter seams and the first year of using it I was able to reduce my overall costs. It's one of the biggest innovations in turf field replacements since the introduction of big-roll sod."

— Will Schnell, Turf Superintendent, Rose Bowl

"The finished product on our field is better and safer when using SIDEKICK!"

— Tony Leonard, Director of Grounds, Philadelphia Eagles

"SIDEKICK was so easy to use! After a short demo, my guys were using this machine as if they've been using it the entire year. Best innovation in our industry in the last 20 years!"

— Wayne Ward, Turf & Grounds Manager, Raymond James Stadium, Tampa

"We use to have to constantly walk the field after a re-sod to check all the seams, and now 95 to 99 percent of it is solved with this machine."

— John Nolan, Head Groundskeeper, Soldier Field, Chicago

PRODUCTS

KUBOTA RTV-X1120

Kubota Tractor Corporation introduced the RTV-X1120 in 2018 as Kubota's most well equipped utility vehicle offered at a value price point of $13,999 MSRP. Designed for the commercial customer and daily heavy-duty work, the Kubota RTV-X1120 combines Kubota quality with enhanced power, torque and performance at a never-before price point. Kubota-built and all-terrain proven, the 24.8 horsepower, 3-cylinder liquid-cooled diesel engine has a well-earned reputation for providing extra acceleration. The engine and VHT-X transmission provide a top speed of 29 mph as well as plenty of hill-climbing power. Designed for reducing operator fatigue during long work days, the RTV-X1120 features adjustable ergonomically designed 60:40 split bench seats, digital dashboard display, power steering, easily accessible parking brake and large under seat storage compartments.

PROGATOR 2020A AND 2030A

The John Deere ProGator 2020A and 2030A utility vehicles were designed to provide sports turf professionals with the versatility and power needed to maintain grounds. The 2020A and 2030A models boast 34 HP and 22.1 HP respectively, and have a max speed of 19.1 mph and bed capacity of 5,400 pounds. The 2020A is equipped with a four-cylinder liquid-cooled gas engine, while the 2030A model featured a three-cylinder liquid-cooled diesel engine, providing customers with a solution regardless of their needs. Both models can be used with the John Deere SelectSpray series sprayers, offering spraying flexibility and control. Additionally, the 2020A and 2030A models can be equipped with a variety of attachments and implements, providing professionals with the tools needed to keep turf pristine, even in the harshest of conditions.

WORKMAN GTX UTILITY VEHICLE LINE

The all-new Toro Workman GTX utility vehicle is one of the most versatile grounds and turf crossover vehicles in its class. Equipment managers are able to select from gas or electric models to match the right vehicle to their specific needs. Among these options are two- and four-seat configurations, a variety of front and rear attachments for garbage cans, hose reels or walk spreaders, and a number of box bed and flatbed options to haul a wide variety of materials. With over 300 configurations to fit almost any application, the Workman GTX is a highly versatile and cost-effective work machine. Operation is simple, thanks to an automotive-grade rack and pinion steering system that provides exceptional control with minimal steering effort, allowing operators to focus on the task at hand and get the job done efficiently. In addition, coil-over shock absorbers suspend the vehicle and provide a smooth ride that minimizes operator fatigue.

KIOTI K9

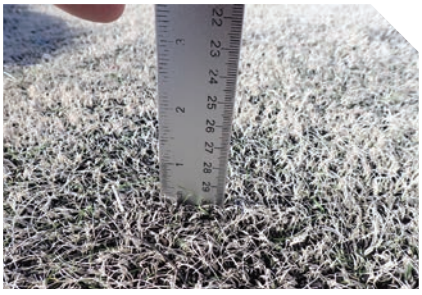
A fully featured, tough and reliable companion, the KIOTI® K9 2400 is a landowner's best friend. It offers an abundance of storage, an ergonomic design and contemporary styling. The 24-hp., three-cylinder diesel engine, which makes

way for ground speeds up to 31 mph, allows operators to tackle any task with strength and efficiency. The K9 2400 also has one of the largest all-metal beds in its class, with an impressive 1,102-lb. capacity, a standard spray-in liner and an optional hydraulic dump kit, allowing for a full range of towing and hauling capabilities. Access to critical controls and functions has never been easier with the K9 2400's ergonomically designed dash. It comes standard with in-dash storage as well as power and USB sockets, meeting a variety of operator needs, from towing tools to housing and charging electronic devices. Full-coverage skid plates, a front grill guard and a contoured bench seat add to the overall look and feel, matching the K9 2400's appearance with its powerful performance.

DIESEL UTVS FROM POLARIS

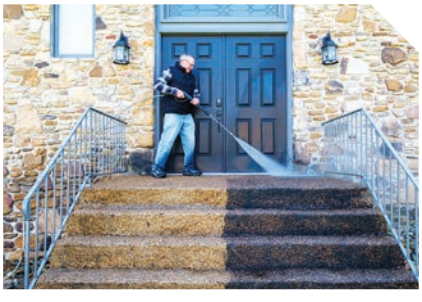
An all-new diesel UTV line-up from Polaris is engineered for work, with durability, serviceability and safety in mind, along with industry-leading payload of 1,930 lbs and 2,500 lbs towing for any jobsite. The recently launched Pro XD line from Polaris offers three diesel-powered models built to withstand tough duty cycles and usage – 2000D 2 passenger vehicle, available in 2-wheel drive or all-wheel drive, and the 4000D 4 passenger vehicle, available in all-wheel drive. The durability of the Pro XD drives productivity and profitability by decreasing downtime, and the ability

to easily identify issues and conduct simple service tasks on the vehicle at the jobsite is critical to keeping the machine running efficiently and delivering a better return on investment. And reducing accidents and injuries, avoiding mishaps, and enhancing situational awareness are key focus areas for improving jobsite safety. It's how the Polaris Pro XD delivers real value to hard-working customers in the rental, construction, commercial and government sectors.



NEED SYNTHETIC TURF OR RUNNING TRACK ADVICE?

Yes it's free from Baraka Sport! Use www.freeturfadvice.com and www.freetrackadvice.com to connect to our sponsor and submit information on the issue or issues your synthetic turf or running track facility is experiencing. Our sponsor will do their best to respond quickly and help advise or guide you with independent expert consultation. Our sponsor is not associated with turf or track suppliers and offers decades of experience. All information exchanged is confidential and will not be shared with any vendors unless authorized. Helpful advice with NO corporate agenda.



SIMPSON INDUSTRIAL PRESSURE WASHERS

Simpson launched their new line of Industrial Series pressure washers with Honda or Simpson engines with AAA or Cometindustrial triplex pumps, select models feature built-in PowerBoost Technology which delivers higher pressure at the nozzle, an external unloader with bypass hose for ease of maintenance and longer run time. These machines are equipped with Simpson's best-in-class steel-braided hoses, which are three times more abrasion resistant than rubber hoses. Some units include professional spray guns with side assist handle for better control and comfort during longer cleaning tasks. Simpson offers a competitive protection plan with up to 5 years of total engine coverage, up to 7 years of commercial pump coverage and 10 years commercial frame coverage.

UNDERHILL WATER REMOVAL SUCTION PUMPS

Whether you need to remove water from sprinklers and valve boxes or other areas or devices, UltraMax Series Pumps from Underhill International are the ideal tools for the job with huge capacities and the smoothest pumps you will ever use as well. Features include unique plunger seal and O-ring wiper seal, and the ability to completely disassemble and clean for longer life. Replacement seals, O-ring kits, and bottom valves all available. Gulp mudguard fits both Big Gulp UltraMax models with 36 and 72-inch discharge tubes.

TURFEX SKID-MOUNTED SPOT SPRAYERS

TurfEx offers a line of skid-mounted spot sprayers. Designed to mount into the bed of any utility vehicle or pickup, the spot sprayers are ideal for weed spraying, turf maintenance, tree and flower watering, and

pest control applications. Two TurfEx spot sprayers are available with a 50-gallon tank and a 100-gallon tank. Both units feature fully corrosion-resistant polyethylene tank construction, 50-foot hoses on 100-foot capacity manual-rewind hose reels, and long spray wands with trigger actuation. Featuring 12-volt diaphragm pumps, the sprayers conveniently connect to the carrying vehicle's electrical system for operation. The pumps move liquid at a rate of 5 gallons per minute at 40 psi. TurfEx spot sprayers are built on a skid-frame mount for easy transport. In cases where the service vehicle can't carry the unit, an optional trailer kit is available.

TURF FUEL FOR COLOR, RESILIENCY

Target Specialty Products has launched Turf Fuel MZ-23, a product designed for turf professionals to strengthen plants and turf's overall performance. The product was created using a combination of auxin-loaded sea kelp, potassium phosphite, manganese and zinc designed to improve turf's color, resiliency and overall performance. MZ-23 also contains a high dose of our proprietary root driving sea kelp and nutrient uptake aid which allows for better absorption of ALL nutrients in the spray tank.

FIELD OF THE Year

FIELD

NORBROCK STADIUM

CITY OF KAMLOOPS

LOCATION

British Columbia

Category of Submission: Schools/Parks Baseball
Sports Turf Managers: Mike DeCicco, crew chief leader, and Shawn Cook, parks supervisor
Education: Diploma in turfgrass management from Kwantlen University College and a trades qualification in horticulture [DeCicco]
Experience: I have 10 years of experience in Turf Management with the City of Kamloops and manage 30 seasonal staff, maintaining 80 sports fields throughout the city.
Full-time staff: Tiffany Cossentine and Lisa Androlick
Part-time staff: John Matonovich, Kelsey Martin, Alysha Hofstede, Olivia DeCicco, Kevin Exelby, Steven Reekie, Lane Jansen and Nick Smith
Volunteers: Thompson Rivers University Baseball and Kamloops Minor Baseball Association
Original construction: 1967
Turfgrass: Due to cold winter temperatures, the field is mainly Kentucky bluegrass with less than 5-10% of Poa annua coming in.
Rootzone: Clay loam
Overseed: We overseed mainly with Kentucky bluegrass and perennial ryegrass sports field mixes. We have also overseeded with bermudagrass during the summer months for quick germination, and have done trials with Poa annua and Annual ryegrass.
Drainage: No system

Why should STMA consider your field a winner?

Kamloops, British Columbia is branded as "Canada's Tournament Capital." We hold our sports fields to the highest standard to ensure we live up to the billing! We are a community of just under 100,000, and sport and outdoor life plays a large role.

Implementing a turf maintenance program on par with a major league ball field and high-end golf course, we provide a finished turf and ball field product unsurpassed by any other municipality in Canada and, quite possibly, North America.

We host international, national and provincial baseball events all while regular play continues on the weekdays. We are home to the Thompson Rivers University (TRU) baseball team and have received rave reviews about our facility and grounds from all user groups, including TRU, Minor League Baseball and BC Baseball.

The Field of the Year Awards program is made possible by the support of sponsors Carolina Green Corp., Hunter Industries, Precision Laboratories, and World Class Athletic Services.

Our knowledgeable staff has years of experience, university educations and the right equipment to do the work required. We mow at 1.25" height of cut twice a week with a Toro 4700D mower and edge with a Toro Sand Pro monthly to eliminate lips in the turf areas. The infield is groomed and leveled daily with a Bannerman Ballpark-6 attachment.

We proudly manage all of this on a municipal budget.

We feel we have the best-maintained field in Canada (and the USA) that is second to none but don't take our word for it, below are some of the comments from user groups and out of town teams:

"For my money this is the best amateur field in Western Canada. I enjoy watching American collegiate players enter the field for the first time. They take out their phones and immediately start snapping photos. They can't believe a field like this exists in Canada! It is a team recruiting tool for our tournament, as teams that come here once, love to return to play here again. A top notch playing surface and facility overall. Meticulously maintained by City staff." Dean Padar - President of the Kamloops International Baseball Tournament.

"I have been to baseball stadiums in every province in Canada except Nunavut and NWT and no natural grass stadium that I have played or coached on compares to Norbrock. The playing surface and stadium setting are unmatched." Ray Chadwick - TRU baseball coach

"Diamonds represent nicest facility ever seen – Major League Perfect" – Tweet

"Best facility in Canada and community spirit like no where else" – Tweet

"Outstanding job, very successful Westerns, field was amazing" - Tweet

SportsTurf: What's your background? How did you get into sports turf management?

COOK: grew up in Brandon, Manitoba and started working on a golf course when I was 13 and been working around turf ever since.

DECICCO: I grew up in Kamloops and have a long family history in the sports turf industry.

ST: What are your biggest challenges in providing excellent playing surfaces? And how do you approach those challenges?

DECICCO: User groups and weather. Communication with the user groups.

COOK: I would say same. I think our approach with the user groups has taken about 10 years but they are all on the same page in terms of what our goals and standards are.

ST: What changes if any are you considering or implementing for the winning field in 2019?

DECICCO AND COOK: We are looking at the wetting agents applied to our shale infield and warning track areas. We also are getting a few new attachments; one is called the Stone burrier and the other is the laser level groomer attachment

sort of like the one we saw at the Conference in Phoenix.

ST: What's the greatest pleasure you derive from your job?
DECICCO: Seeing the finished product and happy users of the fields, getting that feedback from them is so rewarding.
COOK: Seeing how awesome our staff are and the pride and commitment from them and how they can produce with the challenges we have with weather and use.

ST: What's the best piece of turf management advice you have ever received?
COOK: Always take care of your staff.
DECICCO: You can never aerate enough.

ST: How has your career benefited from being a member of STMA?
COOK AND DECICCO: For sure just going to the Conference in Phoenix was huge help [with all of the] networking.

ST: How are using social media at work?
DeCicco and: We don't use as much as maybe we should be, [but] we do have a communication section for the City of Kamloops that does post things for us.

ST: What are your passions and interests outside of work?
DECICCO: Family, soccer, and Italian food.
COOK: Family, golf, and politics. ***/ST/***

Maintenance plan

JANUARY
- Snow covered fields
- Goose dropping removal maintenance
- Ordering field equipment fertilizer materials Staff planning for season
-Research on new products
- Safe work practices for staff
- Snow removal in parking lots

FEBRUARY
- Snow covered fields
- Goose dropping removal maintenance
- Ordering field equipment, fertilizer materials
- Snow removal in parking lots

MARCH
- Rake-o-vac turf areas
- Goose dropping removal maintenance program
- Leaf and debris clean up
- Cleaning building stands
- Tarps go onto the field on home plate and pitchers mound Field and facility inspections done
- Mowing starting end of March
- Irrigation startup end of March

APRIL
- Mowing 2x per week at 1 1/4 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with rahn groomer daily
- Before opening ceremonies Green Pig is applied to turf areas that haven't greened
- During tournaments staff will drag the field in between games, do maintenance to home plate, pitchers mound and chalk foul lines
- Grooming infields with ballpark 6 attachment monthly
- Edging and sweeping lips with sandpro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay
- Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose removal maintenance program
- Field and facility inspections bi weekly
- Cleaning building and stands after events and games

MAY
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Grooming infields with Ballpark-6 attachment monthly
- Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay
- Re-turf winter-kill areas
- Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games
- Seeding sports fields mix Kentucky Blue Grass and Perennial Rye mix Topdressing with sand compost %60/%40 mix

JUNE
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Re-turfing worn areas with thick turf from our own turf farm
- Grooming infields with Ballpark-6 attachment monthly
- Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay
- Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games

JULY
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Re-turfing worn areas with thick turf from our own turf farm
- Grooming infields with Ballpark-6 attachment monthly
- Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games
- Seeding with Bermuda Grass for summer germination
- Core deep tine aeration as field is closed for a week after International baseball event

AUGUST
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Re-turfing worn areas with thick turf from our own turf farm
- Grooming infields with Ballpark-6 attachment monthly Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games

SEPTEMBER
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Re-turfing worn areas with thick turf from our own turf farm
- Grooming infields with Ballpark-6 attachment monthly
- Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games

OCTOBER
- Mowing 2x per week at 1.25 inches
- Deep tine aeration once per month
- Painting foul lines 2x per week
- Regular irrigation maintenance
- Dragging infields with Rahn groomer daily
- During tournaments staff drag the field between games, and do maintenance to home plate, the pitchers mound and the chalk foul lines
- Grooming infields with Ballpark-6 attachment monthly
- Edging and sweeping lips with Sand Pro daily
- Wetting infield if necessary
- Pitchers mound and practice mound maintenance using beam clay Home plate and base maintenance
- Spraying for weeds in warning track and infield areas
- Goose dropping removal maintenance program
- Field and facility inspections bi-weekly
- Cleaning building and stands after events and games

NOVEMBER
- Irrigation blowouts first week in November
- Winterize the building
- Clean up building stands and dugouts
- Remove tarps for winter
- Final field and facility inspection
- Goose dropping removal maintenance program until it snows

DECEMBER
- Snow covered fields
- Goose dropping removal maintenance Ordering field equipment fertilizer materials
- Staff planning for season
- Research on new products
- Safe work practices for staff
Snow removal in parking lots

PARTNERSHIPS: A MEANS TO ADVANCE PROFESSIONALISM

STMA's mission is all about advancing members' professionalism: using education, public relations/ outreach, and industry to do so. In its strategic plan, two of its four goals specifically focus on advancing professionalism:

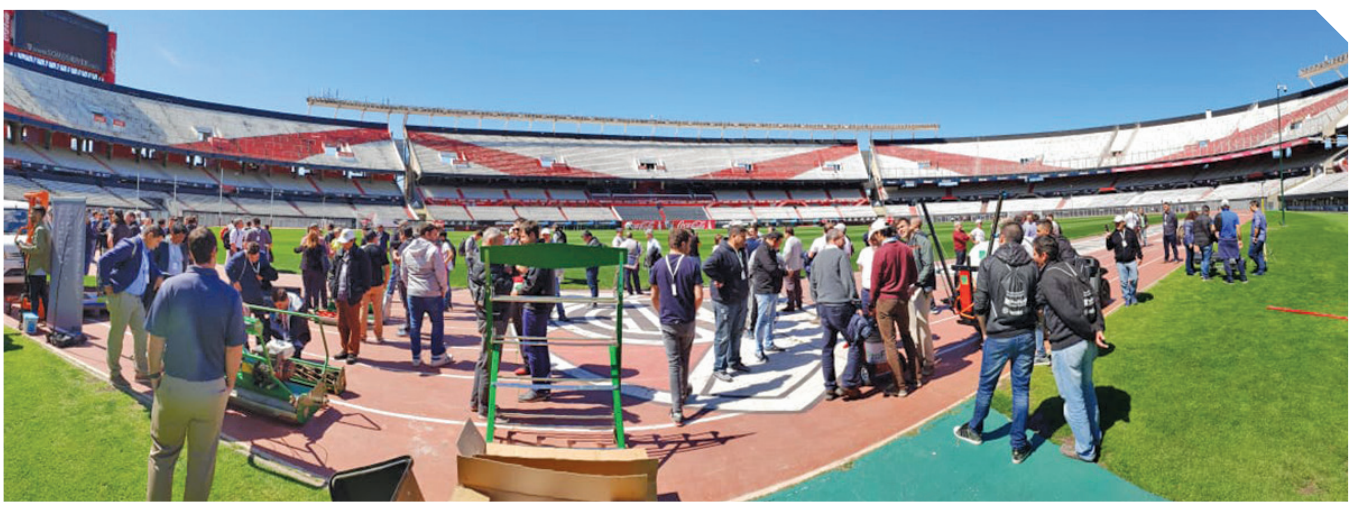
- Strengthen STMA by growing membership, creating strategic global partnerships, and collaborating with local chapters.
- Increase the value of STMA to its members by promoting professionalism within our industry and advancing STMA Brand Awareness.

Collaborative partnerships help to advance professionalism. STMA has worked diligently to create strong and transparent partnerships throughout the green and sports industries. For the seventh year in a row, STMA has been named a Community Partner with the Global Sports Alliance, and its annual Global Sports Summit. STMA joins forces with many other organizations and corporations at Lincoln Financial Field in Philadelphia later this month to bring the message of sustainability in sports to the forefront. As a partner, our members receive a discount on summit registration fees; STMA receives signage, logo placements and the opportunity to distribute literature on its environmental programs at the summit.

Many of STMA's partnerships revolve around sharing of information. We have been sharing our turfgrass science curriculum with the Golf Course Superintendents Association of America (GCSAA) and the National FFA Organization, aka Future Farmers of America, for greater distribution of it to high schools to help grow the number of students who pursue turfgrass science in college.

For the seventh year in a row, STMA has been named a Community Partner with the Global Sports Alliance and its annual Global Sports Summit. Held at Lincoln Financial Field in Philadelphia June 19-20, the Summit will bring together many other organizations and corporations to bring the message of sustainability in sports to the forefront. As a partner, our members receive a $75 discount on registration fees by using the code "STMA."

At our annual Conference, the STMA Executive Committee meets with a myriad of peer organizations to discuss what we have been working on and if there are areas in our current and future programs for collaboration. This year they met with The Irrigation Association (IA), Turfgrass Producers International (TPI), the FFA, American Sports Builders Association (ASBA) and the Synthetic Council (STC). A major field renovation was accomplished through our partnership with Project Evergreen



Included in this group in Buenos Aires, Argentina, is Kyley Dickson, PhD, who represented STMA.

Shaun Ilten represented STMA in Kunming, China.

Weston Appelfeller, CSFM, represented STMA at the Santiago, Chile event.

(PE). Approximately 100 members came to Phoenix a day early to help rebuild the Phoenix Parks Department's Lindo Field. STMA has partnered with PE on several other events including a mower giveaway and renovation project, which is in its third year.

Our partnership efforts have extended internationally. Last year STMA partnered with three different companies to bring education to sports field managers in countries outside of the US. Approximately 80 people attended Turfmasters' 2-day event in Santiago, Chile. More than 175 people attended the ProFields training in Buenos Aires, Argentina, and nearly 200 attended the Forward Group's education in Kunming, China. STMA provided a speaker and materials for each of these education and training events.

Through these and other relationships, STMA members receive benefits beyond being part of a global association focused on the safety of sports fields. For example, STMA has partnered with two universities to offer certificates through online or distance learning programs. The University of Georgia and The Ohio State University offer discounts to our members for their certificate courses.

Many associations offer CEUs to their members for attending our conference. This year, ASBA, GCSAA, the National Association of Landscape Professionals (NALP), the National Recreation and Park Association (NRPA) and the Professional Ground Management Society (PGMS) awarded CEUs for attending our event in Phoenix.

But the definitive partnership for STMA involves our chapter network. Although each chapter is independently incorporated, STMA continues to forge relationships with our chapters for a stronger profession. The more that we can assist our chapters and provide resources and expertise to them, the stronger each chapter becomes. We believe that all agronomy is local, and for STMA to succeed, every chapter must also achieve success. **/ST/**

CHAPTERS IN ACTION: Mark Holder, president of the Georgia STMA chapter, said more than 75 people attended their Spring Field Day on the Griffin campus of UGA. Education topics included field safety and field testing; weather safety; and controlling insects in turfgrass.

STMA Affiliated Chapters Contact Information

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.ILSTMA.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

Iowa 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

Mid-Atlantic STMA: www.mastma.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 Associationof 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

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Ozarks STMA: www.ozarksstma.org

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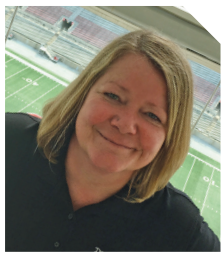

Q&A with
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Microclover mixes for recreational turf?

Q: ***Is it a good idea to add clover to an existing turf sward?***

A: White clover (Trifolium repens L.) is a stoloniferous plant that is commonly found in low-medium maintenance turf. In a turf situation, it is typically classified as a weed species and controlled with a selective broadleaf weed herbicide; however, there may be situations where a clover-turf mix is beneficial. Clover is a legume, which means that it can take nitrogen gas from the atmosphere and convert (fix) it into a nitrogen source that can be used by clover plants. Research has also shown us that clover can symbiotically transfer nitrogen to adjacent plants, like turfgrasses. The nitrogen fixation process in clover is done by rhizobium bacteria, located inside the root nodules of the clover plant. The symbiotic relationship between clover and rhizobia is particularly common in nitrogen-limited conditions, such as low maintenance lawns or athletic fields.

While white clover may be too obtrusive on a sports field, "microclover" is a clover species touted to be more diminutive in growth habit and produce less flowering, resulting in a better compatibility/quality component than traditional white clover. As its name suggests, it is a smaller version of white clover, with smaller leaves and a low-growing growth habit that does not produce clumps, but blends in nicely with the grass plants. Microclover seed can be purchased from many seed suppliers, and it typically comes coated with the rhizobium bacteria, since the bacteria may not already be present in urban soils.

So while we have historically treated clover in turf as a weed, clover is actually a very cool plant that can add nitrogen to the soil, feeding itself and adjacent plants. Clover can also grow in poor soils, which is a big benefit to turf managers managing native soil sports fields. And let's not forget that clover flowers attract pollinators like bees and therefore improve upon the biodiversity of the turfgrass system. For these reasons, researchers and practitioners alike have been looking at microclover/turf mixes to see if it could result in a more sustainable turf system.

Results to date have suggested that microclover/turf mixes are viable systems that produce a good quality, uniform, dark green sward. The inclusion of microclover also reduces the amount of fertilizer, pesticide and mowing inputs. One study at Ohio State reported up to 50% cost reductions for fertilizer, 20% reductions in pesticide (namely herbicides) and 2.5% for fuel and labor costs. The reduction in herbicide was attributed to the fact that the clover shaded out germinating weed seeds. The study also observed that Kentucky bluegrass turf was significantly less drought stressed during dry-down periods when microclover was added to it.

A microclover/turf sward can be established much the same way as any new sward, so timing and soil preparation would be the same. The seed mix should contain no more than 5-10% microclover seed by weight, to make sure that turfgrass is the predominant species. This is important because even though it is hardy to USDA Hardiness Zone 3, clover will go dormant during the winter and lack of ground cover during that period can cause soil erosion problems and encourage winter weeds. Introducing microclover seed to an established turf sward can be done in a variety of ways: by slit-seeding it in, core aerating, vertical mowing or scalping. The most effective way to establish microclover weed is scalping, but that also causes injury to the turf and delays growth. Keep in mind that the more competitive the turf species is, the more it will crowd out the clover. Quick species like tall fescue and perennial ryegrass will dominate the sward, while slow-establishing/growing species like Kentucky bluegrass and fine fescues may contain more clover.

There are a few challenges associated with maintaining a microclover/turf sward. Firstly, it is difficult to control other broadleaf weeds like dandelion and plantain with herbicides without also removing the clover. There are several herbicides that microclover has shown some tolerance to, such as 2,4-D, quinclorac and MCPA, but the tolerance depends upon rate and type of clover (micro or white). There is still research needed in this area.

Like most turfgrasses, microclover grows best in full sun and does not do well in shade. Mowing heights need to be no lower than about 3-3.5 inches for the microclover to persist, which means it is suitable for lawns and recreational fields but may not be useful for high quality turf and sports that require ball roll and ball bounce. Be mindful that introducing pollinator plants to the sward will attract bees, which may cause issues for children and people with bee allergies. Lastly, the longevity and amount of the microclover in turf can be adversely affected by several factors; it does not persist well under heavy traffic, it is a short-lived perennial so needs to reseed itself adequately to maintain density (don't keep mowing the flowers off), and if supplemental fertilizer is added, the turf may crowd out the microclover over time. ***/ST/***

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