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SportsField

MANAGEMENT

April 2021

Vol. 37 No. 4

The Official Publication of the Sports Turf Managers Association

Soil Water Tension **18** | The *SportsField Management* Interview **22**
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Schools and Parks Baseball Field of the Year

Ray Cipperly Memorial Baseball Field

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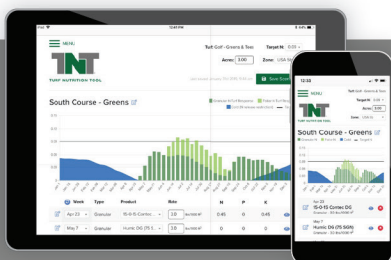
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Editor's Note



John Kmitta
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In the April 2020 issue, I wrote about how I had changed the topic of my Editor's Note at the last minute to discuss the pandemic and the new set of challenges facing the industry.

My original article at this time last year was going to be about how spring is one of the best times of the year for sports. That topic, of course, was a non-starter. Everyone was dealing with quarantine, shelter-in-place orders, lock downs, shut downs, cancellations and more.

One year later, we are hopefully seeing the light at the end of the end of the tunnel. Athletics at all levels have resumed (at least to some degree). In some cases, event loads are heavy as fall sports that had been postponed are now taking place this spring (in addition to the regularly scheduled spring sports). Fans are returning to games in varying capacities. And, overall, hope is high for a return to normalcy.

Some sports field managers have indicated to me that it is full speed ahead, and that their desire is to move away

from discussing COVID-related topics and focus on the tasks at hand. While I'm sure there will be lasting impacts from COVID-19, and we will still continue to discuss how the industry is adapting and moving forward, I can understand the sentiment of looking at the positives and focusing on field management topics and how to present the best-looking, safest playing surface possible.

Yes, in the spring of 2020, I wanted to write about the joy of spring sports. From the NCAA Men's Basketball Tournament, to baseball's Opening Day, to just being able to pull up a folding chair on a Saturday morning and watch my son play soccer, there is something special about this time of year.

Sports have always been a microcosm of life – the challenges, the ups and downs, the victories and defeats, the hopes and the dreams. After the year that was, and the anxiety and uncertainty that came with it, this spring sports season feels even more special than ever. **SFM**

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Howdy STMA members!
As I was writing this message,
I came across an interesting
acronym for APRIL that I
thought I'd share:

A new month to
Push yourself,
Rejuvenate,
Inspire others and
Laugh often

While nothing profound, this
acronym resonated with me
because of the sheer simplicity of
the message. Frankly, it's some-
thing we should remind ourselves
of each month, if not daily. The
first part is pretty self explanatory,
while the second and third are
somewhat contradictory. We are
meant to push ourselves on a daily
basis, whether that is with our
health, our ideas or our jobs. The
sports field industry has changed
drastically during the last 20 years
because of our ability to push our
limits and find new and creative
ways to be successful. While we
continually push the boundaries
of our capabilities, we also have
to take the time to rejuvenate our
minds and bodies and allow our-
selves the time to recover. This past
year reminded me that taking time
for ourselves is just as important as
time for our jobs.

Inspiring others can seem like
a daunting task, but sometimes
the simplest things can have
the biggest impact. I've had the
honor and privilege of being on
multiple podcasts during the last



Nick McKenna, CSFM

STMA President

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few months, including with the
Brentsville Turfgrass Program
(Tiger Turf Talk). The irony is that
they invited me on the program
to share my background and
experiences to help inspire their
students, but what actually hap-
pened is that they inspired me.
Engaging with students who have
a strong interest in the turfgrass
management industry was excit-
ing and invigorating. I hope that I,
in turn, was able to inspire some
of them. It really can be some-
thing that simple!

And finally, laugh often. Laugh-
ter truly is good for the soul.

In parting, I'd like to leave
you with a quote from author
Jose N. Harris:

"There comes a time in your life,
when you walk away from all the
drama and people who create it.
You surround yourself with people
who make you laugh. Forget the
bad and focus on the good. Love
the people who treat you right,
pray for the ones who do not. Life
is too short to be anything but
happy. Falling down is a part of life,
getting back up is living" **SFM**

Nick McKenna, CSFM

The Appelfeller Report, Part III

By Weston Appelfeller, CSFM

Editor's Note: This is the third part in a series of articles that follow the progress of building a new soccer pitch for the Austin FC franchise. In this series, Weston Appelfeller, CSFM, senior director of grounds at Austin FC, shares his experiences as the process plays out.

Hi y'all. It has been a little over a year since the last rendition of this series, and I would like to fill you in on what has been taking place. The last article focused on the research that was done in preparation for having grass. This article features the process of building on that research and constructing more than 10 acres of sand-based playing surfaces. We have now installed just shy of 500,000 square feet of turfgrass, and hired two new members to our staff. Things are getting exciting — and busy — here in Austin.

On April 15, 2020, our Platinum TE Seashore Paspalum was planted at West Coast Turf in Scottsdale, Ariz. We chose this grass for one specific reason: its ability to handle shade. We have a 200,000-square-foot roof that overhangs our north and south end field by 5 feet. We have grass growing under a roof. Because we wanted our players to practice on what they will play on, we also grew enough to sod two training facility pitches. We wanted to have a seamless sod layer to rootzone transition, so we had West Coast lay 1.25" of matching rootzone before planting our sod.

Nearly six months after it was planted, the first rolls began getting cut and rolled in Scottsdale. As the first of the refrigerated trucks arrived in Austin, we felt excited and nervous. The sod was being transported from more than 1,000 miles away. We sodded the



two pitches at the St. David's Performance Center (SDPC), our training facility, in early October, and the stadium three weeks later. It took 49 total trucks to get all our sod to Austin.

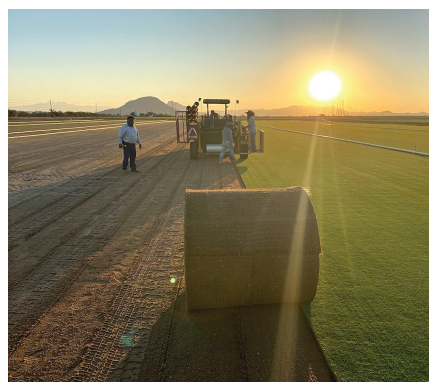
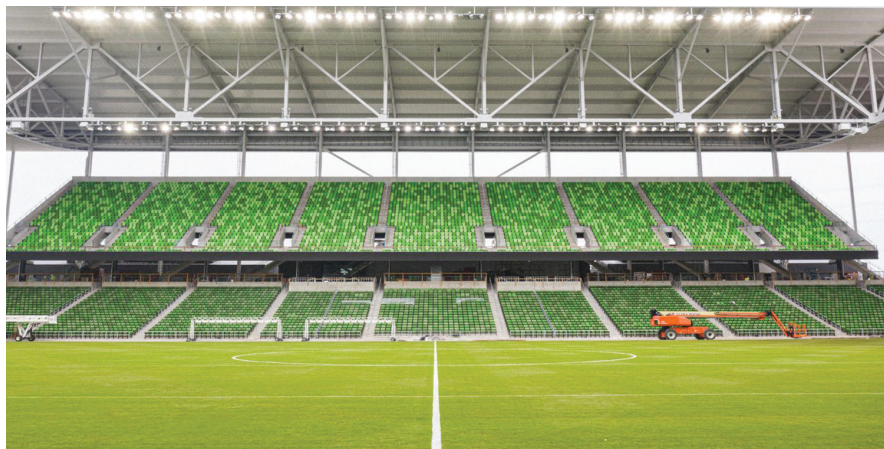
For the final 1.5 pitches at St. David's, we chose to use TifTuf bermuda from TriTex turf. These areas will be used as the primary training pitches for our Academy teams. We chose TifTuf due to its ability to handle heavy traffic, its drought tolerance, and its availability in the Austin market. The first Academy pitch was sodded with 0.5"-thick sod rolls of the TifTuf the first week of November, with the half pitch planted the first week of December. We have been pleasantly surprised at how well they have rooted given the dormant planting conditions.

The grass was laid on top of our custom rootzone. We worked with two different field builders, using Sports Construction Group (SCG) at the stadium and Landscapes Unlimited at the SDPC facility. Those groups worked together to source a sand that met the needs we wanted. We added 5% by volume of both Dakota Peat and Profile

to help give our sod a good base and offset the drought conditions we will face while still allowing us the ability to drain quickly when we have the seasonal rain that is common in central Texas. We used the same spec'd sand beneath all our surfaces. To aid in the grow-in and promote rooting, we added several products to the soil from Mirimichi Green, Earthworks and The Andersons.

Once the fields were built and the grass was installed, we needed to begin maintenance on these. Our equipment from Toro, Dennis mowers, Inmants, Yanmar Tractors, CoverMaster and a few others began to arrive. Anyone who has ever built fields on an active construction site understands the challenges. From construction items falling on the field to lifts setting one inch from the edge of your field to having no equipment access because of work taking place near the field, it can be frustrating.

The largest pieces of equipment come from Stadium Grow Lighting (SGL). We purchased seven light rigs from them — five large and two small — and we have had them deployed



nearly every day since early November. We also purchased two of their fans and look forward to using those once the Texas heat arrives in the spring. These units are a must have given our shade. Our south 18-yard box has seen very little natural light. We are supplementing this area with an average of 60 hours a week of artificial light.

Our biggest additions came in August and October. In August, we hired Tanner Coffman to oversee turfgrass management at our St. David's Performance Center. He joined us from Real Salt Lake's training center, and has been instrumental during the grow-in process. His skillset and knowledge are perfect for that role. Since his arrival, he has been working hard to see that the fields are ready for action in the spring, but he has

also been extremely helpful in the construction process. Having him present during the field construction of that facility gave us comfort in what was being constructed.

In October, Luke Bentley joined the club to oversee the grass at the stadium. He joined us from the Mercedes Benz Dome, and had previous experience at Sun Trust Park. His experience working in one of the busiest stadiums in the world and with Platinum TE has been invaluable. He's been on site at our stadium daily since his arrival, and has been key to making sure all our new investments are working as they are supposed to. The success we will have is due in large part to these two. We look forward to growing the team more during the next several months.

As the research, install and grow-in period is coming to an end, we look forward to the next challenge. Construction is winding down, and we are excited to move into our offices and officially have a place to call home. With practices and matches starting soon, we are working hard to ensure we have everything needed in place. None of the time, research and effort means anything until the fields perform the way they are supposed to, and we need to finish this phase strong.

Thanks for following along. If you have any questions regarding the field building process, please reach out (wappelfeller@austinfsc.com). This has been an unbelievable experience. While sometimes stressful and exhausting, this has been the best two years of my career. **SFM**



RAY CIPPERLY MEMORIAL BASEBALL FIELD MIDDLESEX COUNTY VOCATIONAL AND TECHNICAL SCHOOL DISTRICT, EAST BRUNSWICK, N.J.

This field is held to a very high standard in the community and the district. After Ray Cipperly passed in 2015, the field was still maintained well and on the surface looked and played well. However, when I took over, we had to come to the reality that we needed to do some work to keep it up to the level it was. I refused to be the guy that let the field go downhill, at least in perception. The field is maintained to a high standard, and we keep that standard by being passionate about its success and playability. The turf is irrigated and maintained at a 1-1/2" HOC. The infield dirt is DuraEdge Collegiate mix, which needs to be maintained daily. The mound and home plate areas are maintained with Pro's Choice Pro Mound to reduce wear. We keep the edges clean to provide no lips and smooth transition from grass to dirt. The warning track is crushed red barn stone that is dragged daily to ensure a smooth transition from grass to track. I was told by Dan Cunningham, "There is no difference in how you maintain a sports field from Major League to Little League, it's just your attention to detail that sets you apart." I've also told my kids, "If you are going to put your name on it, do everything you can to make it the best you can." Detail and passion are what set this field apart from other fields.

— Keith Fisher, grounds foreman

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FIELD OF THE YEAR
SCHOOLS AND PARKS BASEBALL



Category of submission: Schools and Parks Baseball

Field manager: Keith Fisher

Title: Grounds Foreman

Education: High School

Experience: Assistant head groundskeeper, Atlantic City Surf Baseball Club (1999-2000); assistant head groundskeeper, Lakewood BlueClaws (2001-02); head groundskeeper, Atlantic City Surf Baseball Club

(2003-06); assistant groundskeeper, New York Yankees (2014); head groundskeeper, Toms River Regional School District (2015-19); grounds foreman, Middlesex County Vocational School District (2019-current)

Original construction: 1990

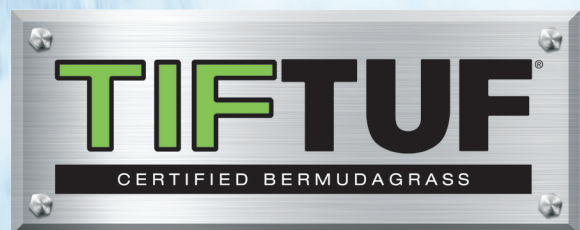
Previous FOY win: 1991

Turfgrass: Ryegrass

Rootzone: Silty clay

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SportsField Management (SFM): Congratulations on the winning field. What are you most proud of with this win?

KEITH FISHER: I've been working in the industry for more than 20 years, and have always strived to maintain the best fields possible. I've come in second a few times in the Atlantic League to Ray Cipperly, who this field is named after, while he was working for the Somerset Patriots. I've come in second a few times in the FOY for the New Jersey chapter of the STMA. So I'm extremely happy to win it for the people I've worked for in the past to show that their trust in me has paid off. I'm also proud I can share this with my family — my wife Shannon, and my kids, Faith and Tommy. The district has really invested its resources to have quality sports field managers to maintain this field before me. The Middlesex County Vocational School District Board of Education and the administrative staff should be commended as well for always supporting safe playing fields and giving us the means to achieve it — especially Facilities Manager Francis Cap, Athletic

Director Mike Pede and Superintendent Diane Veilleux. I think what stands out the most is the professional quality of the field. Its playing surface rivals Minor League fields and compares to Major League quality. The district has really invested in having the best sports fields by having great sports field managers and staff. From Ray Cipperly to Ryan Radcliffe, Mike Morvay and myself, all have had experience managing sports fields at a high level.

SFM: What attracted you to a career in sports field management and what has been your career path in the industry?

FISHER: My brother, Brian, worked for the Vero Beach Dodgers at Dodgertown in 1997. I found it amazing to be around all the players when I visited during Spring Training. He then became the head groundskeeper for the Atlantic City Surf in N.J., so he needed an assistant. I had just graduated from high school and was only working for landscape companies. In 2000, I stayed as head groundskeeper as my brother had moved back to Florida to work for the Port

St. Lucie Mets. From 2001 to 2002 I worked for the Jersey Shore BlueClaws as an assistant head groundskeeper, then back down to Atlantic City from 2003 to 2006 as head groundskeeper. As I began to start my family, I worked in commercial landscaping from 2006 to 2014. In 2014, I gained a position as an assistant groundskeeper for the New York Yankees. That was an experience of a lifetime, but my son missed me and I missed the start of his baseball career, so I decided to find something more practical for my life as a father. From 2015 to 2019 I enjoyed being the head groundskeeper for the Toms River Regional School District, and 2019 to current grounds foreman at Middlesex County Vocational School District.

SFM: Who are your mentors in the industry, and/or what is the best piece of advice you have received?

FISHER: Everywhere I have been in my career, I have learned something that has molded me into the groundskeeper that I have become. It started with my brother, Brian, in Atlantic City; Bill Butler with the BlueClaws; and Dan Cunningham in New York. Those men had a wealth of knowledge to share, and were great to work with. The expectations were high, so you had to perform. The guys in New York on the staff were great in helping me understand what was expected of me. There are two pieces of advice that I still use today. While I was with the Jersey Shore BlueClaws as the assistant, I was in charge of maintaining the mound and home plate areas. Bill Butler told me, "The mound and field need to be perfect. The Phillies made an investment in these players, and if one of them gets hurt, it's on us." That really put into perspective what my responsibility was every day. While I was with the Yankees, Dan Cunningham said, "What we do at the Major League level is no different than what they do at the Little League, high school or Minor League levels. It's our attention to detail that sets us apart." My perseverance to keep fields playable, safe, and aesthetically beautifully was changed forever after those wonderful words of wisdom. I also want to thank Brad Park from Rutgers University. He was an integral part of this field's success from the beginning.

SFM: 2020 was a year unlike any other. Please walk us through what the past year was like for you, how you

were impacted, and how you approached the challenges you faced?

FISHER: As sports field managers we are usually on our fields everyday, but when spring sports were about to start in New Jersey, it was all shut down. We had already prepared for practices to start. We were not sure if they were going to happen or not, so we had to maintain the fields daily to ensure they were playable if practices were going to start. Once everything was cancelled, we changed our staff to working every other day, so one week we were working three days and the next two days. So, not being on the fields consistently was challenging with regard to spotting disease or weeds. We used all of the valuable time we had to work. I kept my staff on a rigid schedule, and we were able to meet success among the chaos of the scheduling and quarantines. One of the few positives was that we were able to make applications to the field without conflict — it also allowed us to mow the field whenever we needed, depending on what other things were thrown at us. We used the positives of the situation and thrived.

SFM: What's the greatest pleasure you derive from your job?

Fisher: The excitement of the players and people who come and see the field for the first time or one hundredth time. I also enjoy when a game starts, knowing you worked and did all the things that people never see, and looking at the field as you close the last gate — it's a kind of relief that all went well. I also enjoy knowing that I give each player who plays on the field the confidence in knowing the field is going to play great, and they can field the ball cleanly — especially if a scout or someone here is looking at them.

SFM: How has your career benefited from being a member of STMA?

Fisher: It has benefited from all the education I have received from all the members nationally and through my local chapter — Sports Field Managers Association of New Jersey (SFMANJ). I don't have a degree in turf management, so I relied on all the guys who have done

it before me. The biggest help came when I started to work for the Toms River Schools and started to go to the SFMANJ meetings and speaking with those guys. It really opened up my eyes on how to approach working in the public sector.

SFM: Many sports field managers are dealing with challenges similar to what you have faced. What advice do you have for others?

Fisher: Every field is going to give you challenges on any given day, but with the circumstances this year I'd say the biggest thing is to be flexible. Look at the fields like triage — take care of what is going to harm the playability of the field and then work down to taking care of aesthetics and then any projects. Usually, on a daily basis they go hand in hand, but with either staffing or time issues, take care of the most important things first. Always stay positive, and find a way to pull through and meet success. **SFM**



Judge's Comments

Keith Fisher demonstrated professionalism, experience and wisdom in his approach to maintaining Ray Cipperly Memorial Baseball Field. Acting with a limited budget, crew, and with limited time, he was able to address one of the most common turf problems in the industry, *Poa annua*. Keith met the challenges of the field, and was able to significantly improve its aesthetics by drawing on his own experiences and by consulting with those in the area who were familiar with the field's history. Through sound cultural practices, adequate planning and a lot of hard work, Fisher and his crew earned Field of the Year honors for Ray Cipperly Memorial Baseball Field.

— Dustin Pixton, assistant director of fields and grounds, Real Salt Lake

Editor's Note: A panel of judges independently scored Field of the Year entries based on playability, appearance of surfaces, utilization of innovative solutions, effective use of budget and implementation of a comprehensive agronomic program.

JOHN MASCARO'S PHOTO QUIZ

CAN YOU IDENTIFY THIS TURFGRASS PROBLEM?

PROBLEM:

Brown area of turf

TURFGRASS AREA:

Front lawn of college football stadium

LOCATION:

College Station, Texas

TURFGRASS VARIETY:

Tifway 419 bermudagrass

Answer on page 33

John Mascaro is president of Turf-Tec International



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Soil Water Tension

Cutting-edge measurement for perfecting turfgrass performance

By Colin S. Campbell, Ph.D.

With Bryan G. Hopkins, Ph.D., and Neil C. Hansen, Ph.D.

Years ago, I received a call from Dr. Bryan Hopkins and Dr. Neil Hansen about the sports turfgrass they were growing in cooperation with the Certified Sports Field Managers at Brigham Young University (BYU), and their turfgrass research and education programs. They wanted to optimize performance through challenging situations, such as irrigation controller failure and more.

Together, we began intensively examining the water in the rootzone. As we gathered irrigation and performance data over time, we discovered new critical best practices for managing turfgrass irrigation, including measuring “soil water tension.” We used soil water tension to reduce the effort it took to keep the grass performance high, while saving water costs and reducing disease potential and poor aeration. We also reduced fertilization costs by minimizing leaching losses out of the rootzone due to overwatering.

WHAT IS SOIL WATER TENSION?

In simple terms, soil water tension is a measure of the energy state of water in the soil. It has a complicated scientific definition, but you don't have to understand what soil water tension is to use it effectively. Think of it as a type of plant thermometer that indicates “plant comfort” — just as a thermometer indicates human comfort. Here's an analogy that explains the concept of soil water tension in terms of optimizing irrigation.

As a boy, I joined my friends on a winter hike to a cabin near the top of a beautiful mountain. After an afternoon of sledding, our group trudged



back to an icy cabin. We hurried to build a fire to warm up and dry out. We kept adding more and more logs so we would be comfortable, but soon the cabin was sweltering. The fire was so hot that some of the boys' boots melted on the hearth. In an attempt to cool down, we let the fire die and were soon shivering with cold and struggling to stoke up the fire again. Clearly, we were missing a fundamental understanding of “the amount” of logs needed to add to the fire to be warm and comfortable in the cabin.

A similar problem existed for a Wisconsin professor named Warren S. Johnson in the late 1800s. Finding the janitor to add coal to a furnace downstairs to keep his students

comfortable was an imprecise and time-consuming effort. He could have tried to calculate how much heat each piece of coal contained, the size of the room, and how much heat existed already. But instead, he invented a simple device called a thermostat. This invention used temperature and a bell down in the basement to alert the janitor to add more coal when the room dropped below the optimum temperature range for their comfort. The thermostat became the primary product of Johnson Controls, a company that still exists today.

Managing soil water for plant growth has many parallels to these stories. Often, when people manage irrigation water, they recognize that

a plant is struggling as the soil dries, and they add water to make it comfortable again. The problem is, just like the boys in the cabin, they add too much water because they don't know where the upper limit is or "how much" water is enough. Then they let the soil dry out again to a point where it's parched. This cycle is repeated over and over. In other cases, they are so afraid of brown spots that they keep the soil near saturation, which is wasteful of water and harmful to plants. Many irrigators think installing a soil water content sensor will fix this problem, but they are mistaken. This approach has similar problems to adding logs to the fire.

A water content sensor can only tell you the amount of water in the soil. It can't tell you if that amount is optimal for plants. A soil water tension sensor (also called a water potential sensor) will give you that information. With soil tension, you measure a parameter that — like temperature — will tell you about the energy of water in the soil, or how much soil water is available to your plants.

UNDERSTANDING SOIL WATER TENSION IS EASIER THAN IT SEEMS

Everyone is familiar with temperature. We're constantly checking the temperature to make decisions, but, in doing so, we rarely, if ever, think about its complicated definition as the energy state of a system. We simply know what it means to our comfort. We understand the units (degrees) without knowing how they're tied to the third law of thermodynamics.

Soil water tension is a far less familiar term that defines the energy state of water in soil and is analogous to temperature. It defines the water comfort range of plants in a similar way that temperature defines the comfort range for humans. Simply put, it's the thermometer for plant water. Some resist using water ten-

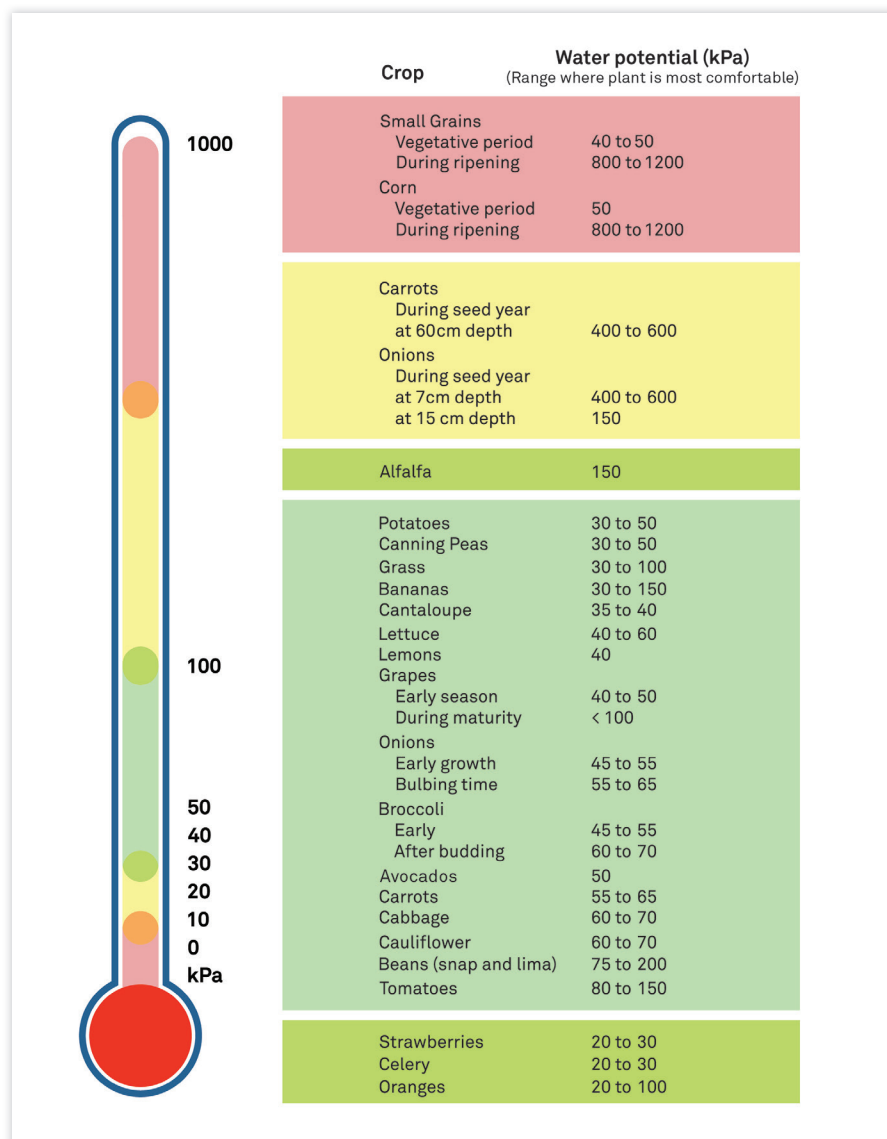


Figure 1: Measuring soil water tension is like taking a plant's temperature: it indicates whether available water is in a comfortable range. This table gives optimal ranges for various crops including grass. (Taylor, Sterling A., and Gaylen L. Ashcroft. *Physical Edaphology. The physics of irrigated and non-irrigated soils*. 1972)

sion because it's hard to understand. But while its definition is complex, the plant "comfort ranges" are well established. So there's no need to deeply understand the measurement to get the benefits.

The table above is taken from *Physical Edaphology*, a book by Dr. Sterling Taylor that outlines some established crop comfort ranges in units of kPa. There are also many other

research papers in the literature that list comfort ranges of various plants.

For example, the comfort range of a potato plant is about 30 to 50 kPa. You may not know what a kPa is, in the same way that you may not know exactly what a Fahrenheit degree is. But, you can still use that scale to measure the "comfort" of your plant. In our experience, an optimal comfort range for closely mowed turfgrass is between 20

to 100 kPa. (L.J. Aronson, A.J. Gold, and R.J. Hull. 1987. Cool-Season Turfgrass Response to Drought Stress. Crop Science. 27:1261 - 1266)

SOIL WATER TENSION IS A PLANT STRESS INDICATOR

Because we often work with potato growers, we'll illustrate this point with potato irrigation data, but the same principles apply to turfgrass. Figure 2 shows potato yield at six different locations in a 40-acre field. Clearly, the longer the potato plants stay in the stress range (above 100 kPa), the larger the yield loss.

This same concept applies for all plants, including turfgrass. Obviously, the goal for turfgrass is a consistent, robust, stable playing field that looks great, as opposed to producing yield, but the principles are the same. Managing turfgrass within its water comfort zone will result in healthier plants by providing the proper balance of root zone water and air. And it will minimize disease and preserve nutrients while conserving water and enhancing the quality of the playing surface. With today's challenging freshwater situation, these are powerful tools to help with conservation.



Figure 3: Soil water tension sensor, sometimes called a water potential or matric potential sensor

IS SOIL WATER TENSION HARD TO MEASURE?

Some people resist using soil water tension, because, historically, it's hard to measure. But this is no longer true. Over the years, many devices were created to measure soil water tension, but generally suffered from debilitating problems such as inaccuracy, poor repeatability and disappointing longevity. But, like most technologies, advancements have overcome many of these prob-

lems. We've been installing these next-generation sensors in turfgrass, and we've learned much.

CAN YOU CONTROL IRRIGATION USING ONLY SOIL WATER TENSION?

All plants, including turfgrass, have a strong relationship between soil water tension and their performance or behavior. Why not just measure soil water tension to control irrigation? You do the same thing when setting the thermostat temperature. It does not tell you how much energy it will take to heat or cool; but by setting the temperature threshold, you know you'll be comfortable. Can you do the same thing in the soil? Yes, you could simply turn the water on long enough to bring the tension back to the top of the comfort range (this is commonly done).

However, there are a few potential problems. First, you may not want to irrigate at the exact time the sensor determines you need it (such as during the day in the middle of play). In an HVAC system, the thermostat simply turns the system on, and you have heating or cooling immediately. Also, some soils may experience a lag time between when you apply water and when

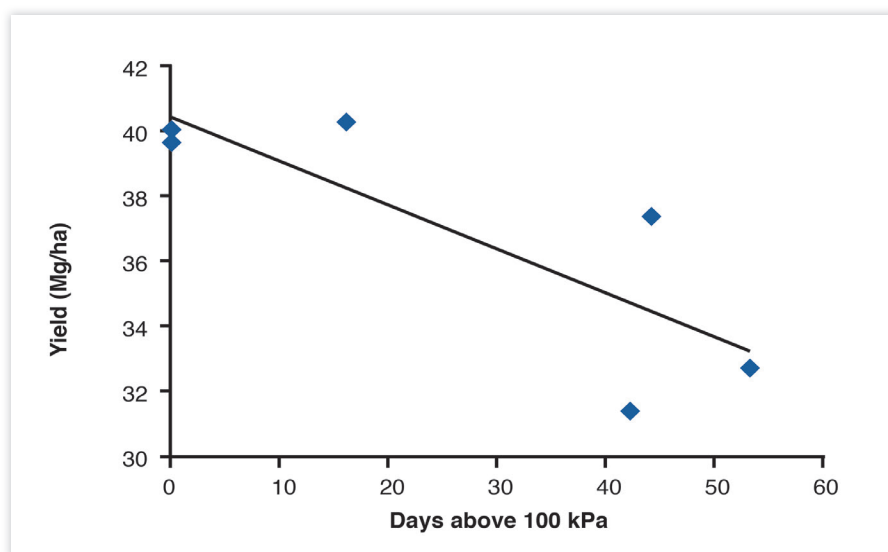


Figure 2: The impact of stress duration on potato yield

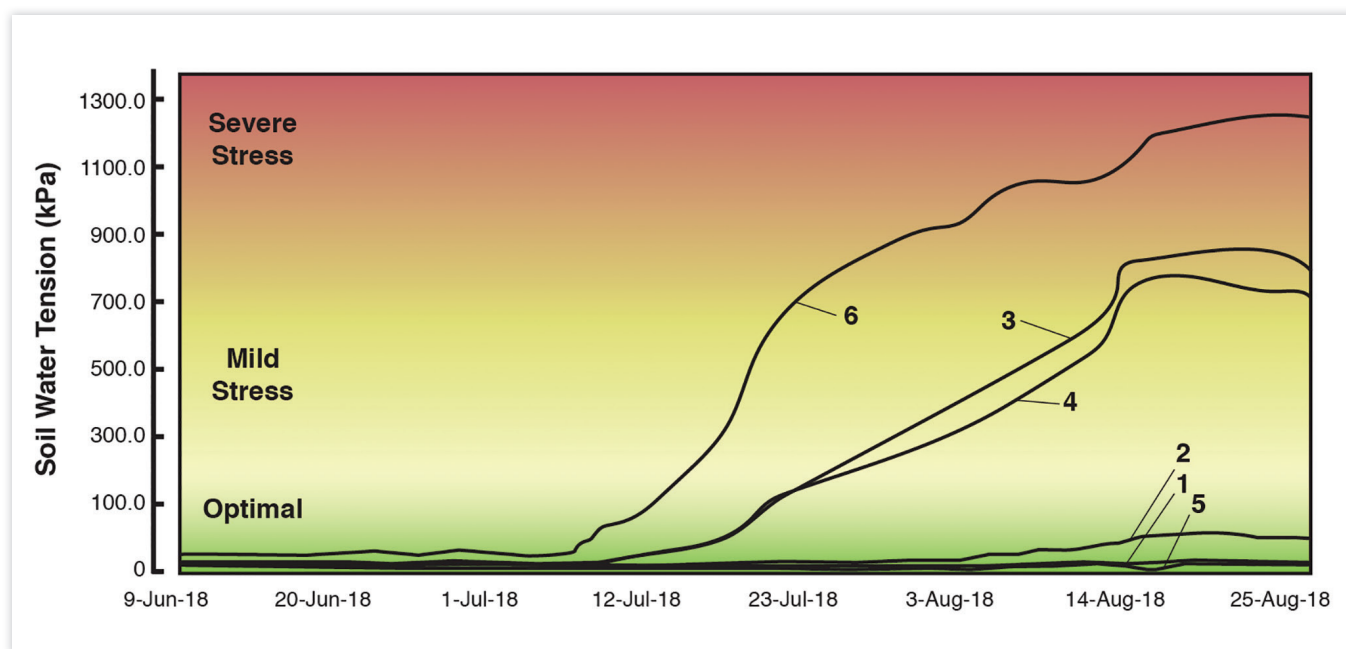


Figure 4: Soil water tension at six locations shows clear times of stress (yellow and red zone)

the tension returns to a minimum, so it would help to know how much water is necessary to apply.

WHY WON'T WATER CONTENT ALONE TELL YOU WHEN TO IRRIGATE?

Historically, almost everyone who thought about soil water thought of water content. The simple reason is that water content is easier to measure, and there are a plethora of available sensors. It's no surprise that many have used it to schedule irrigation, but it can sometimes leave them in the dark. We worked with one manager who was simply looking at water content in the rootzone to control irrigation. As the summer progressed, the water content only changed a few percent, and he felt confident that his plants were getting enough water. He didn't realize he was missing critical stress information.

In the meantime, we were watching the soil water tension sensors at the same locations, spread across the field (Figure 4). According to the tension, several areas were moving into mild or severe stress. While ini-

tially distrusting the data, the manager eventually grew to see that the sensors were correct. He now has a number of soil water tension sensors installed, and trusts them before any other measurement.

MEASURING SOIL WATER TENSION SAVES YOU TIME AND MONEY

Accurate, inexpensive soil water content sensors have made water content a justifiably popular measurement. But, as many people have discovered, a good hammer doesn't make every soil water problem a nail. Water content can only show you how much water there is. Soil water tension shows whether that water is available to plants. This information ultimately saves you time and money by eliminating problems associated with over irrigation. To return to the cabin analogy, we didn't know if we would be comfortable in our cabin just by knowing "how many" logs we added to the fire. In the same way, we won't know if a soil is at optimal moisture for plant growth just by knowing "how much" water is there,

or the water content. Soil water tension gives the precise full and empty points for optimal performance. As the water tension drops outside the turfgrass optimal range, we know we need to add water.

This is just a brief introduction of the power of measuring soil water tension. There are a number of resources available to learn more about things such as how to determine the amount of water to add, how to use it in conjunction with evapotranspiration, irrigating with saline water, and more. **SFM**

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The SportsField Management Interview:

Ben Polimer

In this edition of the *SportsField Management* Interview, we meet Ben Polimer. Ben has been the Fields and Grounds Coordinator in Weston, Mass., since January 2016, and was the town's first in this new position. Previously, he worked at a private school in central Massachusetts and at a private tennis club outside Boston. He is past president of the New England Sports Turf Managers Association, and been involved with STMA since 2005. He was awarded George Toma Golden Rake award in 2015 and the President's Award for Leadership in 2014 and 2020.

SportsField Management

(SFM): Please tell us about your role as Fields and Grounds Coordinator for the Town of Weston, Mass., the fields/facilities that you manage, and your crews/staff.

Polimer: My role here in Weston was created in 2015, and I was their first turf manager in early 2016. My responsibilities include managing all green space for the town. That includes school and recreation fields, lawns, landscapes, grounds and trees around town buildings including all schools. That includes about 50 acres of maintained turfgrass. Our schools are separated into two campuses, with the high school and middle school together with two synthetic fields and 11 natural grass fields. The other campus has three elementary schools with playgrounds and recess fields, school administration building (with historic, mature trees), community center, public library and a soccer complex. I have a school grounds staff of three and a recreation staff of one. With small staffing, we manage all the daily operations, but we contract out most ag-



Ben Polimer with his wife, Jen, and son, Max.

ronomic work like aeration, bulk fertilization, etc.

SFM: What attracted you to the turfgrass industry, and what was your career path in the industry?

Polimer: I was an athlete growing up, and I knew this industry was a way to stay in sports. My dad was a volunteer head groundskeeper for the local Little League Baseball complex for many years, and I worked summers for him. I went to Delaware Valley University for my turfgrass degree. I had internships in Minor League Baseball and for a sports turf construction/renovation company. I was hired for my first job out of college by Mike Buras at the Longwood Cricket Club, helping to man-

age 19 clay tennis courts and 25 poa annua courts, and the associated beautiful grounds. After Longwood, I was the sports turf manager at Worcester Academy, a private school in central Massachusetts. I managed three athletic campuses for multiple sports, and I was the project manager for a synthetic field construction project. After six years there, I landed the job currently in Weston.

SFM: Who would you consider your mentors, and/or what is the best advice you have received?

Polimer: Certainly, my mentors are my dad and Mike Buras. My dad got me into the industry reading books and watching old VHS videos from Floyd Perry! Mike was my first boss out of college, and really pushed me to think critically and use my knowledge. Mike has produced great turf managers over the years with his intern and mentoring program. The best advice I received was from Mike: He always said to ask questions — question everything and everyone.



SFM: What would you say are the biggest accomplishments of your career and/or what are you most proud to have achieved?

Polimer: That's tough to say. My George Toma Golden Rake Award in 2015 was certainly a highlight, and my two STMA President's Awards for Leadership in 2014 and 2020. I am proud of how I left the athletic fields in Worcester. They were really in fantastic shape. I tried to make those fields the best conditions I could. I have really enjoyed my time with NESTMA — now being the past president. It is a fantastic organization and I made lifelong friends and relationships.

SFM: What has the past year has been like for you and your staff? What types of challenges have you faced? What have you learned? And what is your outlook for 2021 and beyond?

Polimer: 2020 was certainly tough for many. Overall, we did well here. No sports took place in the spring and most of the summer, and we had limited school and youth sports in the fall. We did not change our agronomic plans at all during the year, and we certainly had good turfgrass going into the winter. I do wish I was more aggressive with some projects. We could have renovated some fields if I knew they were going to be used so little.



None of our grounds staff have been sick, and we do a very thorough disinfecting each day — from hand tools to tractors and vehicles. A lot of our focus is managing the grounds around the schools. In the fall, a lot of classes were outside using our spacious grounds, which was great but posed a little more difficulty maintaining them. Snow removal is always challenging, and with COVID, they expanded out the areas for school drop off and pick-ups, so that, in turn, has expanded our needs for snow removal and ice control. I'm honestly not sure how 2021 is going to look. I think we will have organized sports in the spring, but I'm not sure if that means full fields.

SFM: You recently received recognition from the New England Sports Turf Managers Association, as outgoing president, for your service to the association; and you also recently received a 2020 STMA President's Award for your service to national STMA. Congratulations on those achievements. How did you first get involved at the chapter and national STMA levels? And what is your advice to other industry professionals regarding the value of belonging to industry associations, as well as the importance of giving back to the industry through service?

Polimer: I first got involved in both NESTMA and STMA through Mike Buras. He pushed his managers to be involved in both organizations. My first work with NESTMA was helping rebuild fields for a field makeover project that

the organization did, that, in turn, led to board service for many years, president for two years and now past president. My first STMA conference was in 2005, and I was excited then to learn as much as I could from the industry's best. I still feel that way when I get the opportunity to go the conference every few years. My advice is get involved with local chapters as much as possible — they need help running their associations. For STMA, sign up for committee service. I have served on so many different committees over the years, and met so many great people.

SFM: How do you think the profession and industry will change in the next 10 years, and/or what would you most like to see in terms of industry advancement in the future?

Polimer: First, I see the profession getting younger. Many of my colleagues are starting to retire. I do see that our value as turfgrass managers is being more appreciated, and, in turn, our salaries are rising. Unfortunately, I think some are getting used and abused both in hours worked and salary, and many will be looking at different opportunities in the business or leaving altogether. This seems more prevalent in professional and college sports. I think the use of technology with sensors, drones and robots is coming fast. Labor is still our biggest expense, and if a robot mower or line painter can do just as good a job, it will become industry norm very soon. **SFM**



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The Mathematics of Tank Mixing

By Nick Christians, Ph.D., Ben Pease, and Adam Thoms, Ph.D.

Tank mixing of fertilizers and pesticides can be a very efficient method of applying these materials to your turfgrass, but it must be done carefully. Small mistakes, such as putting a decimal point in the wrong place, can be costly, and can even kill the turfgrass. The order in which the various chemicals are added to the tank is also important, and minor mistakes can result in major problems in the tank with chemical and physical incompatibility.

When it comes to tank mixing, mathematics is critical. For a more detailed description of the math involved in tank mixing, see "The Mathematics of Turfgrass Maintenance" (Christians and Agnew, 2008). The following are some of the basics from that book.

The first consideration has to do with the type of sprayer that is being calibrated. If you are blessed with one of the new GPS (Global Positioning System) sprayers, you can simply set the number of gallons per acre in the computer system. However, you should never completely trust a computer. It is always critical that you back this up by performing the procedures outlined here, at least initially, and periodically check the application rate of the system on a known area of turfgrass.

Most of us are not going to be able to spend \$50,000 or more on the latest equipment. That means that we likely have a standard sprayer with a tank, boom and multiple nozzles that rely on us to calibrate the system. At first, this is going to appear to be very complex, but actually the process is not difficult once you understand the basic

logic involved. There are basically two steps involved:

1. Determine how long that it takes your sprayer to cover an acre of turfgrass.
2. Determine how much liquid is released in that amount of time.

Before we start, we have to establish some facts. There are many things that affect application rate, including pounds per square inch (psi) of pressure generated by the pump, the number of revolutions per minute (rpm) of the engine, gear and gear range of operation, and the speed of the unit. Speed is critical. If the flow rate remains constant and speed drops in half, you will be applying twice the desired rate of application. These things can vary, so, from the beginning, establish these criteria and stick with them throughout the calibration and application process.

Other key pieces of information include the size of the tank on your unit, the width of the boom, and the number of nozzles on the boom. Write all of this information down as you gather it, and then you are ready to begin.

Next we have to determine the operating speed at which the applications will be made. Don't even look at the speedometer, as it can be highly inaccurate and will be of little use in this process. We are going to do a little experiment to determine the operating speed. First, determine your gear and gear range for application. Next, set the operating speed at a constant number of engine rpm. Then get a stopwatch and set up a known distance on which to operate the unit. In this example, we are going to place flags at a 100-foot distance and we are going to be working with a unit that has a 15-foot-wide

boom. Now, have the person who is going to be doing the actual applications drive the unit at a uniform speed over the 100-foot distance. Have a second person use the stopwatch to accurately time this process. It is a good idea to do this three or four times and determine a mean time to travel 100 feet.

In our example, we find that it takes an average of 14 seconds to travel the 100 feet (this will vary from sprayer to sprayer). We have now established a very important fact. The sprayer boom is 15 feet wide and the time required to cover the distance is 14 seconds. Therefore, $15 \text{ ft.} \times 100 \text{ ft.} = 1,500$ square feet. It takes 14 seconds for the sprayer to cover an area of 1,500 square feet.

Next, we need to know how long it will take this sprayer to treat an acre of turfgrass. We do this by setting up a simple proportion, followed by cross-multiplying and dividing to get our answer.

$$\frac{14 \text{ sec}}{1,500 \text{ sq ft}} = \frac{X}{43,560 \text{ sq ft}}$$

$$1,500 X = (14)(43,560)$$

$$X = \frac{609,840}{1,500}$$

$$X = 407 \text{ sec.}$$

We have now determined that it will take 407 seconds to cover an acre (43,560 square feet). Write this down, as it is the critical first step.

The next step means going back to the facts that we have established. In this example, we have a 100-gallon tank; we are operating at 30 psi, with an engine speed of 1,500 rpm. The 15-foot boom has 10 nozzles.



Photo by Ben Pease

Next, we need to collect a little data. To do this, we will need some measuring cups large enough to catch the spray volume from a few seconds of operation. You will need to set up the proper operating conditions. Start the sprayer, set it to the right number of engine rpm, and catch the spray from each nozzle. The amount of time that you do this can vary. In this example, we are going to use the same time that it took to travel 100 feet, which is 14 seconds. It is a good idea to check the flow rate of every nozzle to determine if any nozzles need to be replaced due to wear. A nozzle with a difference as small as 10% should be replaced. This can greatly affect flow rate from the individual nozzles.

In our current example, we have determined that an average of 17.5 ounces (oz.) is released from each nozzle in 14 seconds. There are 10 nozzles, therefore:

17.5 oz. x 10 nozzles = 175 oz.
A total of 175 oz. of liquid is released from the sprayer in 14 seconds. We can now easily determine the application rate of the unit.

$$\frac{175 \text{ oz}}{14 \text{ sec}} = \frac{X \text{ oz}}{407 \text{ sec}}$$

$$14 X = (175)(407)$$

$$X = \frac{71,225}{14}$$

$$X = 5,087.5 \text{ oz}$$

There are 128 oz./gal; therefore:

$$\frac{5,087.5 \text{ oz}}{128 \text{ oz per gal}} = 39.7 \text{ gal per acre}$$

We now know that this sprayer, at these operating criteria and speed, will apply approximately 40 gallons of spray per acre to the turfgrass. We also know that we have 100 gallons in the tank, therefore we can cover

100 gallons/40 gallons per acre = 2.5 acres per tank

43,560 square ft./acre x 2.5 acres = 108,900 sq. ft.

The fact that we will treat 2.5 acres or 108,900 sq. ft. with a tank is important information for the next step.

Next, we will calculate how much fertilizer and how much pesticide will be placed in the tank for the spray application. In this example, we will tank mix a liquid fertilizer (14-0-3) with 1.4 pounds (lbs.) nitrogen (N) per gallon of product at a rate of 0.5 lbs. N/1,000 sq. ft., a 4 emulsifiable concentrate (EC) herbicide at 2 quarts (qts.) per acre, and a 50 wettable powder (WP) insecticide at 1.5 lbs. a.i. (active ingredient)/acre.

Let's begin with the fertilizer. When dealing with liquid fertilizer, it is not the analysis that is important; it is the number of lbs. N/gallon. In this case, it is 1.4 lbs. N/gallon. We know that the material contains 1.4 lbs. in one gallon and we only want 0.5 lbs. N for each 1,000 sq. ft., therefore the answer will be less than a gallon per 1,000 sq. ft.

$$\frac{1 \text{ gal}}{1.4 \text{ lb N}} = \frac{X \text{ gal}}{0.5 \text{ lb N}}$$

$$X = \frac{0.5}{1.4}$$

$$X = 0.38 \text{ gal}$$

We now know that we need 0.38 gallons of 14-0-3 fertilizer for every 1,000 sq. ft. of area treated. The tank will treat 108,900 sq. ft., therefore:

$$\frac{0.38 \text{ gal}}{1,000 \text{ sq ft}} = \frac{X \text{ gal}}{108,900 \text{ sq ft}}$$

$$X = \frac{41,382}{1,000}$$

$$X = 41.4 \text{ gal of fertilizer}$$

Therefore, when we prepare a tank of material, there needs to be 41.4 gallons of fertilizer added to each tank load.

Next, determine how much 4 EC herbicide goes in the tank. We know the application rate is 2 qts./acre, therefore:

$$\frac{2 \text{ qt}}{1 \text{ acre}} = \frac{X \text{ qt}}{2.5 \text{ acres}}$$

$$X = (2) (2.5)$$

$$X = 5 \text{ qts.}$$

We will need 5 qts. of the herbicide in each 100-gallon tank.

Finally, the insecticide is a 50 WP to be applied at 1.5 lbs. a.i./acre. We can calculate the amount of product per acre in this way:

$$(X)(.50) = 1.5 \text{ lb ai}$$

$$X = \frac{1.5}{0.5}$$

$$X = 3 \text{ lbs./acre}$$

$$(3)(2.5) = 7.5 \text{ lbs. of 50 WP/tank}$$

We now know that we will need 7.5 lbs. of 50 WP insecticide per tank.

In summary, we know that we need 41.4 gal. of 14-0-3 fertilizer, 5 qts. of 4 EC herbicide, and 7.5 lbs. 50 WP insecticide in each tank of material. We will then bring it to 100 gallons volume with water and mix it thoroughly. We are then ready for the spray application. Each acre will be treated with 40 gallons of total spray volume. Each 1,000 sq. ft. will receive 0.5 lbs. N. The herbicide will be applied at 2 qts./acre (2 lbs. a.i./acre), and the insecticide will be applied at 1.5 lbs. a.i./acre.

There is one more consideration that we will need to deal with before we start mixing. That

is the order of adding the materials to the tank. This can be very important, particularly with a variety of formulation like we have in this example. In the next article, entitled "Tank Mixing Procedures," Ben Pease will consider the order in which various formulations are to be added to the tank, and some of the other practical aspects of tank mixing. **SFM**

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Ben Pease is a Ph.D. candidate and turfgrass research scientist at Iowa State University. He received his undergraduate and graduate degrees from the University of Wisconsin-Madison. Prior to returning to school, Pease spent six years as an assistant golf course superintendent. His research has focused on bentgrass shade tolerance, Kentucky bluegrass traffic tolerance, and compost use during establishment.

Adam Thoms, Ph.D., is assistant professor specializing in commercial turfgrass management, Iowa State University, Department of Horticulture, Ames, Iowa.

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Aerification

For insight into turf aerification, *SportsField Management* recently spoke with Steve Harris, CGCS, golf national account and sports turf manager at SiteOne Landscape Supply. Harris is a former golf course superintendent.

SportsField Management (SFM): What recommendations do you have regarding aerification frequency for athletic fields?

Harris: As many times as you can, but realistically twice a year in northern climates and three times in transition to southern climates should be enough as long as you are disrupting as much surface area as possible

SFM: What are your thoughts regarding solid tine versus hollow tine?

Harris: Both solid and hollow tines are useful and have their place in the agronomic program. If thatch and compaction reduction is the goal, hollow tines should be used. Solid tines would not help alleviate those issues. However, hollow tines require much more cleanup and are a more involved process usually followed by sand topdressing. Solid tines are great for opening up the surface in order to allow water to penetrate into the rootzone more efficiently. These are a great option “in between” core/hollow tine aerification. Solid tines are great for alleviating localized

dry spots and hydrophobic soils if coupled with sufficient irrigation and a wetting agent program.

SFM: What recommendations do you have regarding aerification depths?

Harris: My goal was to always go as deep as possible to create deeper channels into the rootzone. The downsides to deeper aerification are faster wearing of the tines, more cleanup, and larger volume of topdressing sand needed as you are removing more material. Older surfaces are more in need of deeper aerification than a newer field just due to compaction over time, thatch buildup and past agronomic practices.



SFM: What are your thoughts on aerifying using other methods?

Harris: As with solid vs. hollow tine, these methods have their own applications and uses, and are another tool for field managers to utilize to keep the rootzone as healthy as possible. Air injection type aerification is great as there is nearly zero disruption to the surface and most casual observers wouldn't be able to tell it has been done. It is great for keeping the surface open, allowing water in and gas and oxygen exchange to the roots. Air injection is similar to solid tine, but will reach deeper depths in the rootzone, and create nice, deep channels without any visual signs on the surface once complete.

SFM: How do soil texture and frequency of field use impact aerification practices/frequency?

Harris: Heavy clay soils will require more frequent aerification than a sandy soil. Clay soils will get very hard if left alone. These soils will seal off faster and not allow water to the roots. Likewise, once they are wet, clay soils will hold water and stay wet longer without proper aerification. Frequency of field use plays a huge role as well. More foot traffic equals more compaction and tighter soils. Maintenance

equipment will also cause more compaction, especially if the maintenance team uses the same route with carts and mowers. Fields in warmer climates will have more compaction typically due to longer growing season, which also translates to more play and field use.

SFM: What are some common challenges with regard to aerification, and how can sports field managers avoid those problems?

Harris: Time is always a limiting factor. Aerification can be a very lengthy, time-consuming practice. There is also nearly always a recovery period that will make the field conditions less desirable for a short period of time. Crew size, weather and soil type all have an impact on how long the process will take. Working with management to schedule field use around these practices, and setting expectations for post aerification conditions, will help set expectations.

SFM: Is there anything we might not have touched on here, or any other areas of advice with regard to aerification?

Harris: Staying on top of aerification practices and staying consistent will help provide consistent playing

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conditions and a stronger stand of turf. Newly renovated or constructed fields should be aerified as well to stay on top of rootzone management before thatch builds up or

other problems present themselves.

In my opinion, there is no substitute for core aerification with hollow tines, followed by sand top-dressing (ideally). Pulling the old soil

out and replacing with clean new sand helps give roots better channels to grow and be healthier.

Verticutting the field will be a nice “add-on” to a good aerification practice and will help reduce thatch and keep the playing surface smooth and free of grain that could affect ball bounce and roll.

A good wetting agent program in conjunction with aerification will lead to a healthy rootzone and stronger turf.

Hollow tine aerification presents a great opportunity to amend the soils with nutrients as well. Field managers should have soil test done prior to aerification so that essential nutrients can be worked into the holes and down to the rootzone.

These materials are often difficult to get in the soil in high enough volume without aerification holes to take advantage of. **SFM**

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Pictured above : Nathan Berquist and Al Hentges

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JOHN MASCARO'S PHOTO QUIZ

ANSWER

From page 17

This photo dates back to the pre-COVID collegiate football season of September 2018. As you know, grass never dies in a straight line, so this brown area was obviously caused by something manmade. Here, plywood flooring for the vendors' area was laid on the 419 bermudagrass front lawn of the stadium, in a portion known as "The Zone." This particular college game day weekend, the Texas sun brought dry heat and 93-degree temperatures, and the turf was covered for about four days. The turf under the plywood got a little toasty, and when the plywood was removed, the area looked like this photo. The sports field manager applied a 21-0-0 fertilizer and ample irrigation. The area recovered on its own in approximately two weeks. Although this damage is unsightly, after this past season, I think we would all be happy to see damage like this again and a return to normalcy.

Photo submitted by Brian K. Carey, CSFM, recreational sports field team manager at Texas A&M University, College Station, Texas.

John Mascaro is president of Turf-Tec International



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 e-mail to john@turf-tec.com. If your photograph is selected, you will receive full credit. All photos submitted will become property of SportsField Management and the Sports Turf Managers Association.

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Is Testing Your Synthetic Field Important?

By John Sorochan, Ph.D. and Kiley Dickson, Ph.D.

Athletic fields require regular maintenance whether the surfaces are natural or synthetic. One under-appreciated and challenging aspect for managing athletic fields is that both systems change as a season progresses. One of the best ways to reduce player injuries and increase player performance is to have a consistent playing surface that is kept within acceptable ranges for athlete safety. Without regularly testing fields, it is hard to determine variances in playing surface consistency as use/wear increases. Knowing how a field is changing throughout the year can help field managers make data-driven decisions to optimize the performance of the playing surface and help keep athletes safe. Keeping records of different field conditions across years and within seasons can help a field manager visualize what is going on across the surface. Although testing takes time and can be expensive, the knowledge gained by field managers can help extend the quality and longevity of a field, can improve player performance while protecting player health, and can mitigate risk.

One of the main benefits of testing a field is that it indicates consistency and characteristics of a field's impact on athletes. Tests that are conducted provide clues to the safety and performance of a field, and help identify which maintenance practices are needed. Although there are different testing criteria for natural and synthetic surfaces, knowing what is needed for a synthetic field is critical. When determining what tests to conduct, knowing what sport

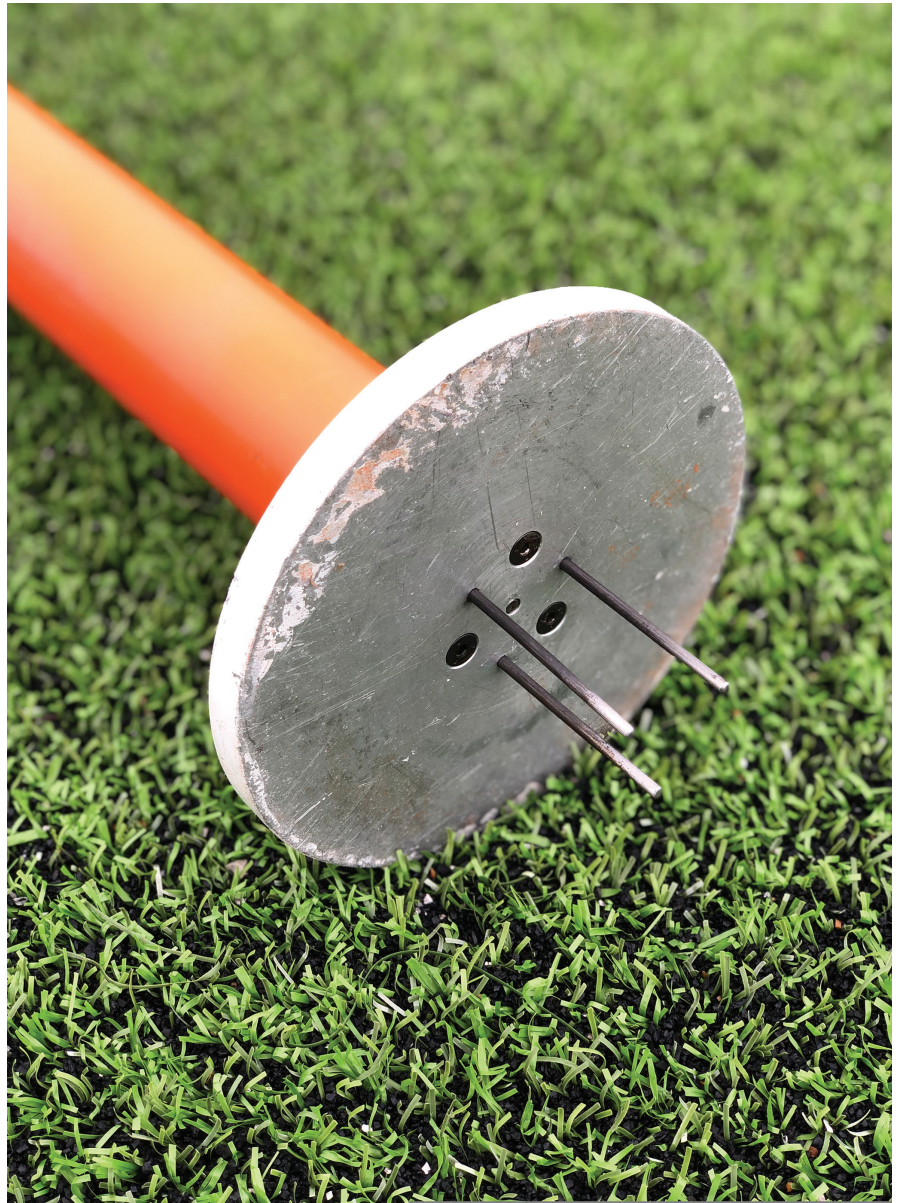


Figure 1

or sports are played on the field is essential. Another critical question is what is the budget and time available for testing. This information will help determine what tests

would provide the most beneficial information for a surface. To start, some basic tests need to be established for field managers as a base. Just like a doctor checks for blood

pressure, weight and pulse at most visits, having a baseline tests for synthetic turf athletic fields provides that quick look into the field's health.

The University of Tennessee Center for Athletic Field Safety (UTCAFS) has a suggested basic

the testing device being the same each time, if possible.

All testing done is a snapshot of that field at that particular time — the same test could be conducted the following week with different results. That is why taking multiple readings in a year will give

many synthetic fields. As seasons progress across the lifespan of a synthetic turf field, infill will be moved around and areas of concern will be formed on the field that are lower or higher than adjacent areas. Variances in infill depth have been found to impact surface hardness, surface temperature, and also rotational traction (Center for Athletic Field Safety Reports). Measuring infill depth uses a metal rod/rods that are inserted until the backing is contacted by the rod/rods, the top of the infill is determined, and the distance the rod/rods are inserted into the surface is the infill depth (Figure 1). The results will let the field manager know if additional infill is needed, or if the infill simply needs to be redistributed from areas that are too high to areas that are too low. The goal is keeping the infill depth as close to manufacturer's recommendation as possible.

Surface temperature is another important variable to turf health, as well as field and player performance. Synthetic turfs have temperatures that can be much higher than natural grass fields during full sun hot conditions (Lim and Walker, 2009; Thoms et al., 2016). As heat increases to temperatures as high as 175 degrees Fahrenheit (Knoxville, TN, August 12, 2019, at 3 p.m.) on synthetic turf, it has a detrimental impact on athletes, decreasing performance and increasing the need for breaks and rehydration (Charalambous et al., 2016). Surface temperatures can be taken with a variety of tools, but a handheld temperature gun (available at most automotive and do-it-yourself supply stores) is an inexpensive, fast and easy device for gauging the surface temperatures of a field. Although little can be done to reduce synthetic turf temperature after a system is installed, educating field stake-



Figure 2

kit for synthetic fields. The basic kit for a synthetic surface recommends an infill depth gauge, surface temperature measuring device, and some type of rotational traction device. The costs for synthetic turf kits range from \$850 to \$1,000. All kit estimates are from price researching different suppliers' websites and then totaling the cost. The purpose of this article is not to promote one specific brand of testing equipment, as there are a variety of products available. The key thing is to be consistent with

a more detailed picture of what is happening. As a human doctor might want to track blood pressure or some bloodwork several times throughout the year to determine what could be impacting the health of a patient, tracking field results is just as important. The other key in getting a good snapshot is testing for the variables that have the greatest impact. For synthetic turf, infill depth can be just as important as soil moisture is to a natural grass system. The infill depth is often taken for granted on

holders of potential heat concerns is one potential plan of action.

Rotational traction is an additional tool that is very useful for synthetic surfaces. These testing devices give more of a performance and safety standpoint for the athletes on the field (Figure 2). Trying to keep a field consistent for rotational traction is helpful in providing consistent footing and potentially safer playing surfaces. Rotational traction has been associated with both lower extremity injuries and grass health (Orchard et al., 1999; Stier et al., 1999). The smaller portable devices are relatively easy to use and quick.

The tests described above are just the basics. There are many more tests available if budget and time permits. When considering what sport/sports are played on the field, additional tests can be beneficial. In football, knowing surface hardness and rotational traction are of greater importance than ball-to-surface interaction questions. In soccer, FIFA has requirements about ball roll and ball rebound that take place on a field. Field testing locations of a field are also be important for choosing where to test (Figure 3). Minimal recommendations are to test the same 8 to 12 spots on a field each time while testing additional areas that may also be of concern. The more locations that can be tested on a field provides greater detail of the surface. Testing the same spot across time and recording the results in a spreadsheet or other mapping platform will help the field manager interpret the findings in a meaningful way. These records will tell you how it is changing each time testing is completed. Testing after traffic events could indicate the need for infill maintenance or decompaction. Or, if a coach complains that the field is too soft/hard, numbers can be provided to show a quantitative measurement. Comparing multiple fields

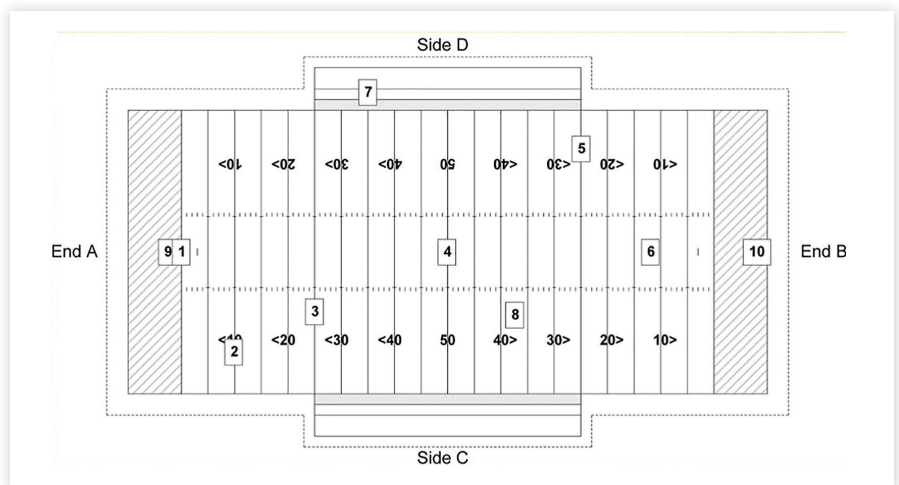


Figure 3

in a sports complex can show how different fields may vary from each other (and where) due to use, construction, infill selection and depth, shockpads and other factors.

Although there are more tests available, these basic tests suggested can potentially increase the performance and safety of an athletic field, and can be completed quickly with minimal expense. These quick data snapshots throughout a season would take less than an hour to complete per field, and would provide extremely useful information for the field manager. When you put the snapshots together for the entire year, you get a pretty clear picture of the changes that occur throughout the season. Ultimately, this data will also aid in maintenance decisions needed to provide a consistent playing surface. When it comes to field testing, start with the basics and work out from there. **SFM**

John Soroachan, Ph.D., is a professor of turfgrass science at the University of Tennessee and director of the University of Tennessee Center for Athletic Field Safety in Knoxville.

Kyley Dickson, Ph.D., is a turf researcher at the University of Tennessee.

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GroundWOW was developed with a mission to make printing on ground as easy as printing on paper. GroundWOW Special FX can print any logo, any color, any size, on any surface. Deployable in less than 10 minutes, autonomous vehicle technology, artificial intelligence, and an end-to-end Cloud SAAS (Software As A Service) platform combine to create ground-printed images as accurate as a blade of grass. GroundWOW customers have the power of full-color autonomous AI printing at their disposal for sports sponsorship and advertising applications.

HUSQVARNA BATTERY CHAIN SAWS

The new Husqvarna T540i XP and 540i XP battery-powered chain saws

feature a new, ground-up design and are developed specifically with professional users in mind. Used with the newly released Husqvarna BLi200X (T540i XP) or Husqvarna



BLi300 (540i XP) batteries, the new chain saws have capabilities equivalent to professional 40cc gas chain saws, making them ideal for tree removals and smaller felling tasks. With the completely redesigned, optimized system, power has been increased by more than 30 percent compared to previous Husqvarna battery chain saws.



MEAN GREEN MOWERS VANQUISH

Mean Green Mowers' new Vanquish lithium-powered electric mower brings stand-on mowing to the Evolution Series of commercial mowers. Available with a 52- or 60-inch cut (side/rear discharge),

the Vanquish runs for up to seven hours continuously at speeds of up to 11.5 mph. It features Mean Green's patented ZTR technologies that make it competitive with any gas mower in its class. The Vanquish is virtually maintenance free and boasts ultra quiet operation.



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Milwaukee Tool's M18 brushless string trimmer provides up to 6,200 rpm and features a brushless motor built specifically for trimming applications. For versatility, the trimmer has two speeds – a high speed to take on demanding applications and a low speed to maximize runtime. A 16-inch cutting swath trims more grass in a single pass and an easy-load trimmer head delivers an easy line loading experience with the ability to load up to 25 feet of trimmer line in under 30 seconds. This M18 brushless string trimmer is part of the M18 System, now offering more than 200 power tool solutions.

STIHL BATTERY-POWERED PROFESSIONAL TRIMMERS

Part of the new Stihl 135 professional battery platform, the FSA 135 and FSA 135 R battery-powered trimmers are assembled in America.

The trimmers feature an on-board battery slot that can support an on-board battery or a backpack battery for even longer runtimes. Paired with a brushless motor and the same drive and cutting components used in Stihl professional gas trimmers, these units deliver professional cutting performance comparable to Stihl gas units with zero exhaust emissions and low noise.



SWOZI ROBOTIC SPORTS FIELD LINE MARKERS

SWOZI offers two robotic sports field line marking solutions; the SWOZI Cart Pro, a precision-guided walk-behind or ride-on line marker with GPS robotic arm, and the SWOZI Cart Auto, a fully self-guided autonomous line marking robot. Both units utilize SWOZI's patent-pending technology to achieve centimeter sports field line marking

accuracy. SWOZI sports field line markers allow the user to autonomously lay out and paint athletic fields in 20 minutes. SWOZI offers more than 100 pre-loaded and customizable sports field templates.



TURF TANK ONE

The Turf Tank One field painting robot features autonomous design that enables turf managers to be more efficient in completing other tasks, all while the robot marks the fields. It is controlled with a smart tablet, which requires just two minutes for setup. After a route plan is launched, the robot will drive straight to the starting point and begin painting. The robot uses GPS technology to draw precise lines every time. It memorizes all locations from the initial marking, making overmarking 100% accurate. The robot can perform precise line marking on both natural grass and artificial surfaces, for all types of athletic fields, with the option to customize the size according to the user's needs. Equipped with a low-pressure paint pump and nozzle system, Turf Tank One can reduce paint consumption up to 50%, while completing a field seven times faster than traditional line marking methods. **SFM**

The Ins and Outs of Sports Field Lighting

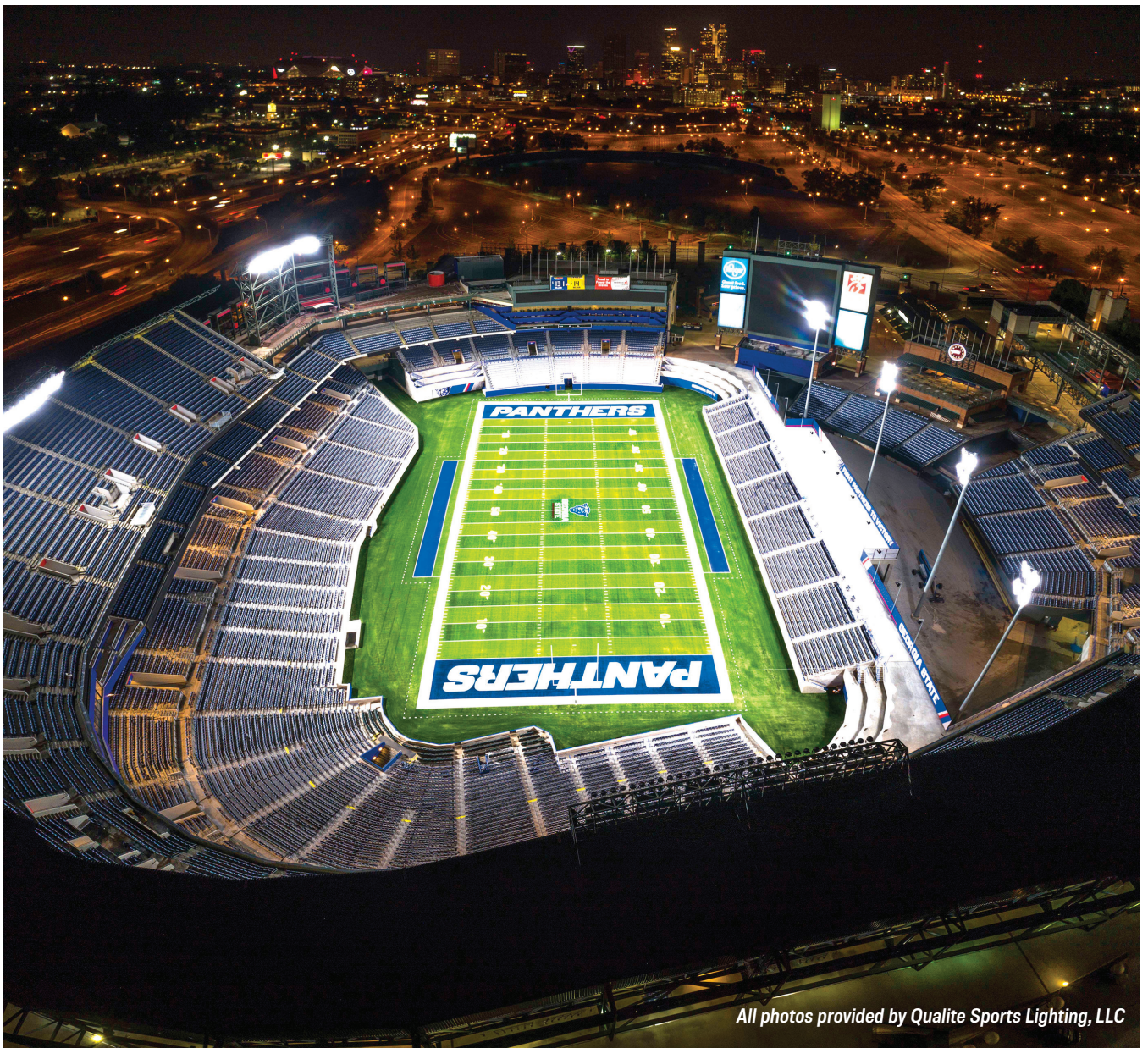
By John Kmitta

According to Nick Page, VP design and technical support, Qualite Sports Lighting, LLC, when it comes to sports field lighting, LED has opened the door to create more efficient luminaries with light

output, light control (beam shapes) and controllability.

Modular systems also allow for lighting to be upgraded as new technology becomes available, Page added.

“We have upgraded to more efficient LEDs, drivers with better efficiency, controllability and life span, better heat dissipation materials, etc.,” he said. According to Page, controls are rapidly evol-



All photos provided by Qualite Sports Lighting, LLC



ing as well, and end users now have much more control of their systems, including system feedback, built-in diagnostics and other features that were not possible with previous technologies.

When it comes to finding the right lighting solution for your facility, Page said the key is finding the right lighting system and service partner.

"Look for a company that has been around, offers long-term warranties, and can provide the installation/warranty service," he said. "Do not get caught up in the marketing stuff that is created to make it seem much more difficult than it is. You are buying light and a service contract, it's that simple."

According to Page, field lighting installation has gotten easier as well.

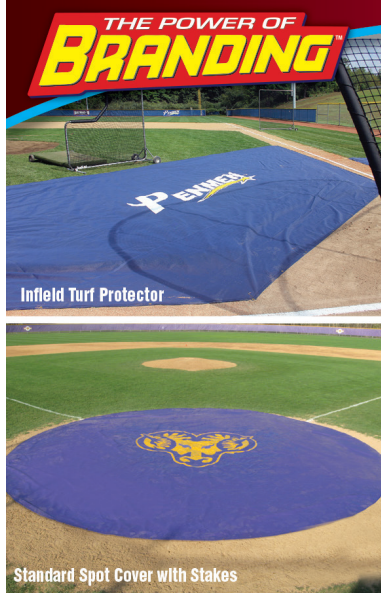
"We sub-assemble, pre-wire and pre-aim everything," said Page. "It is minor assembly onsite and single-point electrical hookup. It is still important to have trained professionals doing the installation to make sure that critical details are done correctly. It may be easy to install the system, but making sure the



poles are in the right location, level and oriented are all critical to the performance of the system." **SFM**

John Kmitta is associate publisher and editorial brand director of SportsField Management.

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Roadmap to Committing to Responsible Irrigation Practices

[Editor's Note: These materials have been provided by Toro.]

Global environmental concerns have become a trending topic of conversation in the turf and landscaping industry – and rightfully so. The effects of overusing natural resources are more evident than ever before, proving discussions around conservation are vital. Environmental changes are affecting landscapers and sports field managers alike, and in a variety of ways. Landscaping resources are scarce and climate change is here, forcing the industry to adapt by altering landscape designs, vegetation choices, and irrigation systems.

When choosing modern irrigation systems, efficiency is a high priority. Most newer systems excel at conserving water and are designed only to use water when necessary — a large upgrade from past irrigation systems. The efficiency of irrigation systems is a growing concern as government regulations increase worldwide, and the cost of water continues to rise in many regions. To be efficient with water, protect our natural resources and ensure healthier turf, mandates and system audits are a necessary part of the solution.

Modern and sustainable practices are very attainable, but first it's crucial to understand what makes a system sustainable. Newer systems can help conserve water, save money, and benefit the environment. There are many ways to ensure your irrigation systems are meeting the standards of a sustainable irrigation practice.

According to John McPhee, general manager for Toro's Irrigation



and Lighting Businesses, adopting a sustainable irrigation system will result in landscapes requiring less maintenance and the turf lasting longer. Additionally, the landscape will require less water, with reduced runoff and puddling. A sustainable landscape also requires cutting down on fertilizer and pesticide usage.

SUSTAINABLE PRODUCTS TO HELP SAVE WATER

There are several products available that help conserve water, better protect the environment, and, over time, save turfgrass managers money.

Smart controllers

Irrigation smart controllers use the weather to automatically set watering schedules and runtimes, taking the guesswork out of watering. They make sure only the necessary amount of water is used on any given day.

Soil moisture sensors

Similar to smart controllers, irrigation system sensors control the amount of water used by detecting

how much water is in the soil. Sensors can work in tandem with smart controllers by sending a signal to the controller that limits irrigation based on the moisture levels.

Sprinkler spray bodies

Sprinkler spray bodies with pressure regulation control the water pressure output and eliminate the fine water droplets that normally get blown away in the wind. Therefore, more water reaches the desired location, making the system itself more efficient.

High-efficiency spray nozzles

Smart irrigation nozzles help you save up to 35 percent of water as compared to regular spray nozzles. They eliminate water runoff, reduce water waste, and save money over time.

WATER CONSERVATION FOUNDATIONS AND PROGRAMS

Many organizations understand the need to grow sustainability efforts within the turfgrass industry to enrich the beauty and productivity

of the land for years to come, and are creating sustainable solutions for the irrigation industry.

Wyland Foundation

The Wyland Foundation brings people together through educational programs, community events, and public arts projects to support clean water sources and healthy oceans.

Irrigation Association

The Irrigation Association holds an annual trade show that offers students learning opportunities pertaining to irrigation, product innovations, sustainability, and water conservation in the irrigation industry.

EPA WaterSense Program

The U.S. Environmental Protection Agency (EPA) WaterSense Program works to ensure certified irrigation products meet the program's water

use efficiency standards. The program also promotes sustainability through community water conservation and efficiency.

"The Water Zone"

Sponsored and produced by Toro, "The Water Zone" radio program aims to help educate the public on best practices for outdoor water use, and the latest updates in smart irrigation technologies and government and municipal policy. What started out as a local broadcast to approximately 5 million people in Southern California, has turned into a broadcast that can now be listened to on mobile devices via "iHeart Radio." To expand the show's reach even further, the show is available on podcast. The award-winning show continues to be a strong force in building water conservation awareness.

FUTURE OF SUSTAINABILITY IN IRRIGATION

The future is promising for sustainable landscaping and water conservation, especially within the irrigation industry.

"The future of landscape architecture will demand that we use our knowledge of living systems and nature-driven designs to reduce the use of natural resources while creating spaces of value and beauty for all of mankind," said McPhee.

Field and grounds managers will continue to drive water conservation efforts forward and may see the need to implement new technologies to help meet their bottom lines and sustainability goals. Additionally, more stringent government regulations of natural resources are necessary to preserve spaces of value and beauty. When we work together, we can positively impact sustainability and water conservation efforts. **SFM**

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STMA Committees Are Set

STMA President Nick McKenna, CSFM, has placed volunteers on committees for the 2021 year. All who indicated interest in serving were placed. STMA thanks all volunteers!

Each committee has been provided its annual charges of work that needs to be accomplished. Committees help STMA advance its strategic plan and members' involvement provides insight into how to make services and programs useful. The committee year is March through January.

For 2021, STMA has a one-year "bridge" strategic plan in place; its most recent plan ended Dec. 31, 2020. The board will create the next full strategic plan at its in-person summer board meeting engaging a facilitator to help to guide the process.

As new items come before the board this year, micro-volunteer opportunities may become available. If you missed the 2021 committee sign up, contact STMAinfo@STMA.org to indicate your interest.

The volunteers by committee this year are as follows:

ADVOCACY

- Chair: Jeremy Driscoll, St. Mark's High School
- Members: Cliff Driver, CSFM, Montgomery Parks; Jesse Driver, CSFM, Mid-Atlantic Turf, Inc.; Alan Dungey, CSFM, Great Lakes Athletic Fields; Mike Goatley, Ph.D., Virginia Tech; Rick Perruzzi, CSFM, CPRP, City of South Portland; Ben Polimer, Town of Weston; Joseph Sawyer, Barge Design Solutions; Sheree Scarbrough, Silico Turf, LLC

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- Members: to be engaged if any Bylaws issues need to come before the membership

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Athletes Now Have a Way to Stay Involved in Sports, Post-High School

STMA introduced its online Sports Field Management Certificate course for high school students. This FREE self-paced training provides continuing education opportunities for anyone who has not been formally educated in turfgrass science and is interested in entering the industry.

Completing the course will build a solid foundation in the science and practices of turfgrass management so that students can successfully care for a turfgrass surface and be prepared to enter a position in sports field management. Those who complete the course can be hired for seasonal and crew assistance at sports facilities. Athletes now have a way to stay very involved in the sports they love. This is also an excellent way to “test drive” a potential career. Besides athletes, students who have participated in their high school ag education programs will be able to validate their understanding of turfgrass science through this course.

Learn basic knowledge in the core areas of turfgrass science through comprehensive training in 5 Units:

UNIT 1 – INTRODUCTION TO TURFGRASS SCIENCE

Students will learn about the economic, environmental, and community benefits turfgrass surfaces provide. Students will also learn about the various careers available in the green industry.

UNIT 2 – TURFGRASS GROWTH & DEVELOPMENT, ANATOMY, AND IDENTIFICATION

Students will learn about turfgrass germination and growth. They will also learn about different anatomical features and how to use those features to identify turfgrass plants. Adaptations and use of turfgrass species is also covered.

UNIT 3 – TURFGRASS SOILS

Students will learn about the importance of soil properties in a turfgrass system. Soil texture, compaction, and drainage and how they influence turfgrass health is the focus.

UNIT 4 – TURFGRASS CULTURAL PRACTICES

Students will learn about the cultural practices essential for maintaining healthy turfgrass. Mowing, fertility, irrigation, aeration and topdressing, and integrated pest management are discussed in detail.

UNIT 5 – TURFGRASS ESTABLISHMENT

The final unit utilizes all of the information presented in the course to give students a broader picture of the requirements to manage turfgrass from start to finish. Successful establishment cannot take place without a firm understanding of turfgrass species and adaptations, soil requirements, and essential cultural practices.



(Photo provided by David M. Presnell)

The course must be completed within one year after starting it; many have completed it in one week. Upon successfully completing this course, participants will receive a Certificate of Completion that can be printed out and included with a resume to present to a potential employer.

This course is not restricted to students and may also be used as a training tool for current sports field crewmembers. Although the course is free, those pursuing it must be an STMA member or join as an STMA student member (\$30) to participate.

If you are interested or know of someone, visit STMA.org and click on the Sports Field Management Certificate course. For more information, contact Kristen Althouse at kalthouse@stma.org. **SFM**



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:
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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

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 Association of New Jersey: www.sfmanj.org

North Carolina Chapter of STMA:
www.ncsportsturf.org

Northern California STMA:
www.norcalstma.org

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

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

Oregon STMA Chapter:
www.oregonsportsturfmanagers.org
oregonstma@gmail.com

Ozarks STMA: www.ozarksstma.org

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

Southern California Chapter:
www.socalstma.com

South Carolina Chapter of STMA:
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Tennessee Valley Sports Turf Managers Association (TVSTMA): www.tvstma.com

Texas Sports Turf Managers Association:
www.txstma.org

Virginia Sports Turf Managers Association: www.vstma.org

Wisconsin Sports Turf Managers Association: www.wstma.org

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JOHN DEERE

Tetraploid Ryegrass

I have received some questions about tetraploid perennial ryegrasses recently, so I thought it might be helpful to share some information about them.

Perennial ryegrass, in its natural state, is a diploid plant, meaning it has two paired sets of chromosomes in each plant cell. Through plant breeding advancements, there are now tetraploid perennial ryegrasses that have four paired sets of chromosomes in each cell. Tetraploids tend to have larger tillers, larger seed heads and wider leaves, but are comparable in many ways with their diploid perennial ryegrass relatives. The tetraploid perennial ryegrasses are becoming popular for use in the sports field industry for many reasons. One of their major advantages is their ability to germinate at lower temperatures, with studies showing germination success at 40 degrees F (4C).

This is great news for those of you managing sports fields that host games early in the spring or into the fall and winter periods. Keep in mind that the seed is slightly larger than the finer-textured perennial ryegrasses, so apply higher rates accordingly. Once germinated, they can also establish quickly, which offers another advantage since grasses that establish quickly are far better at suppressing weeds such as crabgrass and prostrate knotweed.

Rapidly germinating and establishing turfgrass species are an important tool in an organic turfgrass management program where herbicides might not be permitted. Other reported advantages of tetraploid ryegrasses include excellent root growth, good color, winter hardiness and some tolerance to salinity and drought. It is slightly coarser in leaf texture and less dense than diploid perennial ryegrass, but it mixes well with other cool-season grass species. In a mixed sward it does not tend to dominate. If your goal is to maintain a predominantly Kentucky bluegrass sward but you rely upon a perennial ryegrass overseeding program, the tetraploids might be a good fit.

Sports field managers in the transition zone have also reported a quicker transition in the spring if bermudagrass fields have been overseeded with tetraploid ryegrass, since it is less dense than diploid ryegrass. In

addition to the aforementioned benefits, research at the University of Arkansas has shown that the quality and percent ground cover of tetraploid ryegrasses under traffic stress is comparable to the diploid perennial ryegrasses (as in pretty good).

Since perennial ryegrass is susceptible to several turfgrass diseases — some of them quite devastating — it's important to look at cultivar disease data from NTEP or the annual Rutgers Turfgrass Proceedings report when choosing cultivars. In relation to gray leaf spot resistance, the tetraploid ryegrasses don't rank at the top, though there's research being done to improve this. The consensus right now is that tetraploid ryegrasses are susceptible to gray leaf spot, and will probably get it if there's an outbreak. However, observations have been made at research stations that suggest that tetraploid ryegrasses may have the ability to recover from a gray leaf spot infection. At one research study in Kentucky, Dr. Leah Brillman was able to report that tetraploid ryegrasses damaged by gray leaf spot were able to recover. That is promising news. It's also important to note that perennial ryegrasses should not be established as a single cultivar monostand, but should be established or overseeded as a blend of several cultivars that exhibit as much resistance as possible to a range of abiotic and biotic stresses. Disease resistance in particular can be enhanced by genetic diversity, mixing multiple cultivars of grass within a species.

In summary, there are a lot of reasons to try a tetraploid cultivar in your seeding program. Work with your local seed supplier or local turfgrass extension specialist to choose the best cultivars for your location and your field's needs. **SFM**



Pamela Sherratt

Sports turf extension specialist
The Ohio State University

Questions?

Send them to Pamela Sherratt at 202D Kottman Hall, 2001 Coffey Road, Columbus, OH 43210 or sherratt.1@osu.edu

Or, send your question to Dr. Grady Miller, North Carolina State University, Box 7620, Raleigh, NC 27695-7620, or grady_miller@ncsu.edu

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