

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

JUNE 2018

SportsTurf

SPORTS FIELD AND FACILITIES MANAGEMENT / www.sportsturfonline.com



Making the (re)grade: South Carolina Upstate's "U Crew"

ALSO INSIDE

- » Fast (and even fun!) facts on drainage
- » The value of becoming a CSFM
- » Focus on outcomes and measure them
- » University turf researchers working for you
- » Mower trends 2018: propane power



See
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A close-up action shot of a baseball player in a red uniform sliding into a base. The player is wearing a red helmet and a red jersey. A catcher's black glove is visible on the left, holding a baseball. The scene is set on a dirt field with a blurred green background.

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ON THE COVER

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On the cover: According to Travis Dill, Field of the Year Award winner from the University of South Carolina Upstate, "Our Sports Turf Team, the U Crew, 100% in-house built our infield practice facility to take away some of the game field stress. Using those savings of building it ourselves we were able to use the funds to focus on Harley Park with its own upgrades."

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FROM THE SIDELINES

Consequences for legal sports gambling?



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

NOW THAT BETTING ON SPORTS is legal in all 50 states, what are the implications, if any, for sports turf managers? The amount of money wagered in Las Vegas at sports books last year was \$4.8 billion according to Nevada Gaming Control (interesting that the state's sports books won only \$248 million off all those bets; I would have wagered the business model was more profitable). Online gambling services raked in billions as well, according to legalsportsreport.com. One consequence of all this cash is a lot more games are televised than ever before. Are any FBS schools' football games NOT televised, for example? Not a stretch to imagine more collegiate contests in low/no revenue sports being televised, so maybe more of your fields will get exposure.

If leagues and state legislative taxing bodies win the coming battles, conceivably there could be more revenue available that could work its way into field maintenance budgets though no one is holding their breath on that, I'm sure. And some, perhaps many, states may choose to forgo the money, or propose deals like one state's 36% tax on revenue from sports betting that may have books saying "no thanks."

Watch for a Twitter (@SportsTurf_Mag) conversation I'm starting June 11 to hear what others foresee as possible consequences for the industry, good or bad, regarding legalized betting.

Everyone out of the pool

The annual "Healthy Pools" survey conducted by the Water Quality and Health Council found that nearly 4 out of 5 adults rarely or never check swimming pool health reports. These survey findings are concerning in light of a 2016 CDC report that found nearly 8 in 10 routine inspections of public pools turned up at least one violation of health and safety rules, and 1 in 8 found problems so serious the pool had to be closed immediately.

"Swimmers and parents of young swimmers can take a few simple but effective steps to help protect themselves and their families from germs and maximize fun at the pool," said Michele Hlavsa, RN, MPH, epidemiologist and chief of the CDC's Healthy Swimming Program. "Stay out or keep your kids out of the water if sick with diarrhea, check the pool's latest inspection score, and do your own mini-inspection before getting in the water."

Swimmers might be able to check pool inspections online or on-site at the pool facility. Public pools are typically inspected by the health department; backyard pools are not.

The Water Quality & Health Council has compiled a list of local and state health departments that provide online access to pool inspection reports. If you do not see your local community or state listed, contact your local or state health department, or ask the pool's manager directly for more information.

Looking for fields that went back to natural

For an upcoming article we are looking for facilities that have recently switched from having a synthetic field(s) back to natural grass. If that's you, please email or call me at your convenience. Thanks for considering it. /ST/

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PRESIDENT'S MESSAGE

Thank You!



Sarah K. Martin / CSFM / sarah.martin@phoenix.gov / @neongrapefruit

APRIL SHOWERS BROUGHT US May flowers, and now here we are in June. The passing of time has always fascinated me; it feels like time is not moving at all, and then BAM, it is a year (or 20) later!

I'd like to recognize a few folks who have hit some fantastic milestones with the organization:

30 Years:

- Gil Landry, Jr., Ph.D.
- Ted Thorn
- C. Tom Rudberg, CSFM
- Jim Frelich, Ph.D.
- Stephen Horne

35 Years:

- Mark Hodnick

36 Years:

- Harold Howard, Ph.D.
- Paul Zwaska

37 Years:

- Richard Ericson
- David Frey
- Mike Schiller, CSFM ret.
- George Toma
- Steve Wightman
- George Bannerman

Thank you, and ALL of the STMA members, for your loyal support of membership!

I challenge you to think back to the 'version of you' when you first became an STMA member. How have you changed? How has the organization helped you grow in your career?

For me, the changes are HUGE. I was the quiet, painfully shy girl standing to the side listening to everyone talk around me. I wanted to drink in EVERYTHING about this industry but was terrified to talk to people or get involved. As you can see, that has mostly changed, except for still having a tireless thirst for all things turfgrass! STMA had a huge impact on my life; helping me to get out of my comfort zone and have amazing conversations with people from all over the industry. It got me involved at both the local and national levels, helping me to grow past my terror at meeting new people and talking to groups.

Membership in this organization is a marvelous thing, from the education opportunities and resources to the incredible networking at the National Conference and local events. STMA also strives to reward its members for being members. New first-time members have the benefit of a complimentary Conference registration, with the referring member receiving a \$100 credit toward membership or Conference fees for each person referred.

Amy Poehler said it nicely: "Find a group of people who challenge and inspire you, spend a lot of time with them, and it will change your life forever."

Thank you all for being a big, crazy good, caring tribe. **/ST/**

IF YOU RE-BUILD IT, THEY WILL COME

This item originally appeared on The DuraEdge Blog, April 25 edition and was written by the company's Darin Kain, territory manager and agronomist:

What happens when an iconic baseball field, like the one used in the movie "Field of Dreams," is damaged due to vandalism? You help rebuild it of course.

In the sports turf industry, if your neighbor needs help, you help. That's exactly what happened April 16 when staff, owners, and representatives from several area teams and businesses spent a cold and windy Iowa day repairing the damage caused at the site cherished by baseball and movie fans alike.

Once the Minor League Baseball office in Florida got wind of the damage they decided to organize their local affiliates (Iowa Cubs, Cedar Rapids Kernels, Clinton Lumberkings and Quad City River Bandits) to donate their time and expertise to help with repairs. Also joining the voluntary work force were employees from Bush Turf, local volunteers and area high school and college players. In all more than 50 people diligently and carefully braved the inclement conditions to bring the field back to life [including your blogger].

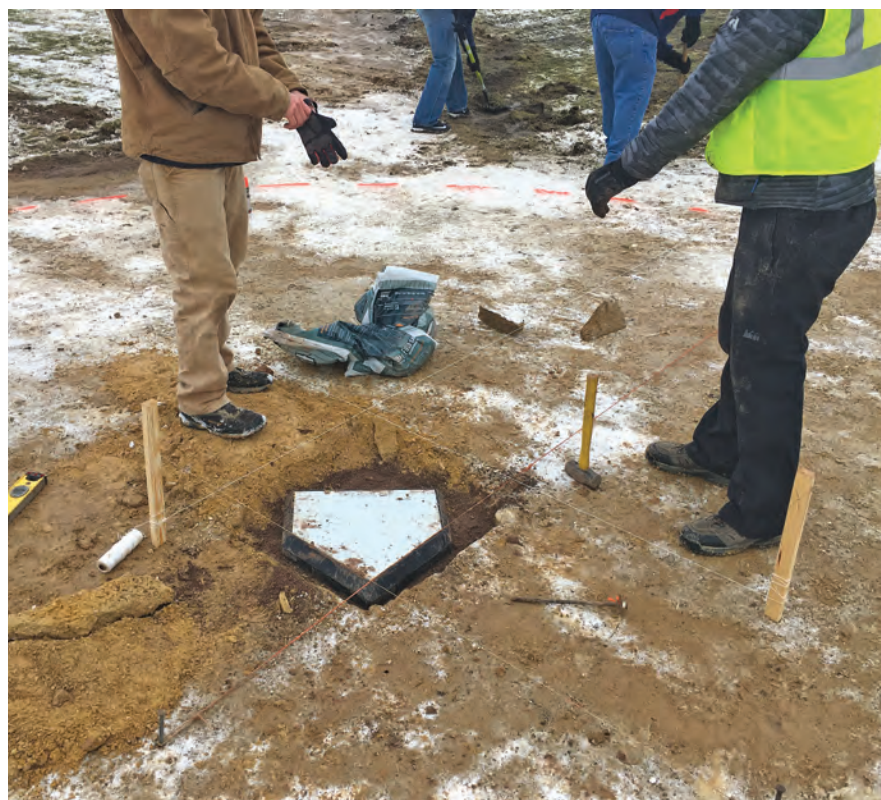
By nightfall, the infield grass had been cut out, replaced with backfill soil, and sodded. Bases were reset, the pitcher's mound and home plate had been rebuilt, and measurements were taken to make sure all improvements were done to field specifications. Next to be completed at a later date will be infield skin laser grading, irrigation inspection, and repair (if needed), as well as filling in of ruts in the outfield grass.

One volunteer said, "It's an honor and privilege to be able to participate in a project such as this, anybody who loves baseball and the game has some kind of feelings for 'Field of Dreams'. I remember watching it as a younger man and it feels very special to be here and rebuild it so more people can continue to come."

If you "re"build it, they will come. Eased its pain. Went the distance.



Many volunteers braved cold and snow to begin repairing the iconic "Field of Dreams" in Iowa (aka "heaven" to some folks).



The 1989 movie featured Kevin Costner hearing a voice in his Iowa farm cornfield and pursuing a dream. The field has since become a tourist destination.



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Fast (and Even Fun) Facts on the Dry Subject of Drainage

// By MARY HELEN SPRECHER



Ponzio Stadium, Northland College (WI). Photo courtesy of Rettler Corp., Stevens Point, WI.

There's a scene in the movie "Animal House" where Donald Sutherland's character stops teaching, sighs in defeat and admits to the class that he finds John Milton's *Paradise Lost* as boring as they do.

A similar situation comes to mind when trying to describe drainage. It's a core topic in the curriculum of sports fields but it's hard to present in an exciting or enticing

way. Additionally, it's a complex topic and it's impossible to share every piece of available information in one article. Therefore, what you're about to get are some key facts about drainage you can take with you to the next budget meeting where you will (successfully) defend your projected expenditure. (And since the information below has been condensed

from the book, *Sports Fields: A Construction and Maintenance Manual*, that's where to go for the full story.)

When it comes to field planning, drainage is the most important decision you'll make.

This is true whether you have a natural grass field or one made of synthetic turf. The success of your field, its playability, its overall look and feel – even how soon you'll

have to replace it – will all be tied into how well it drains.

Drainage is still a hard sell, however. While many people want to spend money on visible amenities like lighting and press boxes and Jumbotron, drainage is invisible and often, there's a strong temptation to cut back on it since 'nobody will see it.' But skimping on drainage doesn't actually save money since none of the fun improvements will do you any good if the field is flooded and you can't use it at homecoming, for instance, or that big championship.

You can't have too much drainage.

Ever heard of a field that drains too well? Neither has anyone else.

Every field needs drainage.

Often, those outside the field industry (parents, your booster club, alumni, etc.) will say that having an artificial field will cut maintenance costs, and one of those costs they'll often point to is water. But as every turf manager knows, many synthetic fields rely on constant irrigation to stay cool for comfortable play. Natural fields, conversely, may not need water to cool them, but they'll need it to keep the grass thriving. Both types of fields, therefore, will need good drainage.

When planning a grass field, your native soil may not provide adequate drainage.

On the other side of the equation is the person who declares a natural grass field is far more economical to build. In many cases, it can be, provided you have the right soil. But often, water doesn't move very well through the soil at a given site, necessitating changes to the soil itself, resulting in additional expenses.

Traditionally, moving rainwater off the field was done by crowning and/or sloping fields; unfortunately, this may conflict with the programming requirements of the sport you're trying to host and the level of competition the site will see. The composition of your soil can also affect its ability of soil to drain; one example is a high percentage of clay. In addition, in areas where the water table is very high, further problems may arise.

You don't need to be an engineer to test your soil's drainage.

If you are building a natural grass field, you can do a percolation test to find out how well the site drains and the degree to

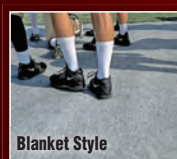


Sunset High School, Portland, OR. Photo courtesy of Cameron McCarthy Landscape Architecture & Planning, Eugene, OR.

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which field drainage as well as site drainage will be required. To conduct such a test, dig a hole the size of a 5-gallon bucket. Fill the hole with 5 gallons of water. Allow the soil to absorb the water for an hour or two. Next, fill the hole again. It should drain completely within 24 hours. If not, at a minimum, the soil will require modification. More likely, however, a site that does not “perc” will necessitate the construction of a sand-based field and/or a more complex drainage system. A field builder will be able to examine the site and tell you more.

While synthetic fields have subsurface drainage, you’ll still need to plan appropriately.

If you’re in an area that gets precipitation, you’ll need to make sure any areas adjacent to the field will shed water efficiently. The only water that lands on your field (no matter whether it’s a grass field or a synthetic field) should be coming down on it, either from precipitation or from irrigation. It should not be running onto the field from a nearby hillside or landscaping, dripping onto it from the dugout roof or running down the bleachers and onto the field. Your field should be designed so as to collect and/or redirect this water away from the field. Your field contractor will explain the various options.

The type of drainage you use will depend on your needs as well as local regulations.

It’s difficult, if not impossible and impractical, to go into every type of drainage available on the market; suffice it to say there are many choices, and that these choices will need to take into consideration multiple factors, including regulatory issues. In fact, in many jurisdictions, codes require construction of a suitable storm water management and water quality system whenever a construction project covers the ground with a non-permeable surface (including, in some locales, a synthetic turf field, but also parking lots, walkways or other paved areas.) It’s another reason to engage the services of a field builder – as well as a design professional who is well versed in these issues. **/ST/**

Free-lancer Mary Helen Sprecher wrote this article on behalf of the American Sports Builders



Fr. Monan Park, Boston College High School, Boston. Photo courtesy of Activitas Inc., Dedham, MA.



Memorial Field, Dartmouth College (NH). Photo courtesy of Activitas Inc., Dedham, MA.

Association (ASBA), a non-profit association helping designers, builders, owners, operators and users understand quality construction of many sports facilities, including sports fields. One of the Association’s resources is the book, Sports Fields: A Construction & Maintenance

Manual. The ASBA sponsors informative meetings and publishes newsletters, other books and technical construction guidelines for athletic facilities including running tracks and sports fields. Info: 866-501-ASBA (2722) or www.sportsbuilders.org.



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The value of becoming a CSFM

Attaining the Certified Sports Field Manager (CSFM) status means you will be looked upon as a leader in the industry. It will give you a sense of pride and accomplishment and it can even improve your current or future employment prospects.

Becoming a CSFM is meant to challenge your knowledge of managing sports fields and to draw upon all aspects of your background in education and experience to prove that you are one of the best in the industry. Meeting the challenge can contribute to your professional advancement in sports turf management.

Many CSFMs report that becoming certified was a great learning experience; other benefits include the official recognition of your skills as well as your demonstrated commitment to excellence. Anecdotally, earning the CSFM status can mean an increase in your earning potential.

Materials available at www.stma.org include: credentialing information, detailed CSFM competency list, study resources, educational requirements, fees, application and more.

Earlier this spring we posed some questions about the program to several members of the STMA's Certification Review Panel, including: Rick Perruzzi CSFM, CPRP, CPSI, recreation manager of outdoor athletic facilities, South Portland (ME) Department of Parks, Recreation & Waterfront; Josh Glover, CSFM, CPO, CPSI, parks superintendent, Town of Wake Forest (NC); Will Rogers, CSFM, sports turf manager, Clover (SC) School District; and Jason DeMink, CSFM, head groundskeeper, University of Michigan.

Why did you seek certification through the CSFM program?

"At the time and still to this day it can be difficult to be viewed as a professional at the park and recreation level as a front line employee," Perruzzi responded. "I felt that I needed to change that



Rick Perruzzi CSFM, CPRP, CPSI

stereotype not just with management but within the community that funds our operations with their tax dollars. I felt that being certified would allow me to have more influence in the decision-making process with management. Now, 13 years later, I am involved in every aspect of the decision process when it comes to outdoor athletic facilities."

Glover said, "Obtaining the CSFM designation was a requirement of my new position at the Town of Cary – USA Baseball National Training Complex. Upon being hired, I was given 1 year to obtain the CSFM certification."

"Two reasons: I wanted to prove to myself that I could become a CSFM and pass the test; second, for advancement at my current job," DeMink said.

"I think I wanted to prove to myself that I could pass the exam," Rogers said. "I am honored to be a CSFM and I think it shows people that I am serious about the sports turf industry."

How did you prepare for the exam?

Glover said, "Using the CSFM Detailed Competency List, I made countless notes that were used to study, and I also used



Jason DeMink, CSFM



Josh Glover, CSFM, CPO, CPSI

notes and textbooks from my college turfgrass classes to help prepare, as well the Practice Exam. I also studied with others who were taking the test at the same time, or had previously taken it."

I prepared by first looking over the comprehensive outline to try to determine what my strengths and weaknesses were so as to focus my attention on those weak areas," Perruzzi said. "After determining my weaknesses, I used two main resources to study with: the University of Georgia's "Certified Turfgrass Professional" course and *Sports Fields: A Manual for Design, Construction and Maintenance* by Jim Puhalla, Jeff Krans and Mike Goatley. I felt that those two resources were the best that I had at my disposal so as to not overwhelm myself with too much information."



NEWLY CERTIFIED

Christi Clay, CSFM, CLT, is sports stadium manager, North Area Athletic Complex, Golden, CO where she works with STMA Schools K-12 Board member Sun Roesslein, CSFM.

"I attained my CSFM certification in July 2017. My decision to become a CSFM was a personal challenge to take the extra step for professional development and commitment to the sports turf industry and I am very proud of this accomplishment," Clay emailed. "I prepared for the exam by taking the online practice exams and reading both editions of *Sports Fields – Design, Construction & Maintenance* as well as *Fundamentals of Turfgrass Management*."

Will Rogers responded, "The STMA website gives you a list of books and I chose three, one of which was a math book."

"I took practice exams and studied textbooks from when I was at Michigan State," DeMink said.

What benefits have you experienced from your certification?

"I have received a higher salary after passing the exam," said DeMink.

Perruzzi said, "Obtaining CSFM status has been probably the best thing to happen to me professionally. It



opened up more opportunities for me to be more creative in my job as a sports turf manager and allowed me the opportunity to climb the ladder professionally, as I am now the outdoor athletic facilities manager. My employer was able understand the fact that when I ask for resources or try new products that I have done the research to support such requests. The increase in credibility has made this process easier, but with credibility comes accountability, which is part of being a professional in any line of work."

"I think other sports turf people respect you more," Rogers replied.

Along similar lines, Glover said one benefit is being recognized as being among the best sports turf managers in the field. "I have obtained other certifications in other areas that relate to my current job, all of which do the same thing as CSFM certification – labeling me as having a definitive level of expertise in sports turf management. And it does open up new employment opportunities as well."

How might the program be improved?

"I feel that improvement in the program can be established by getting more people certified. Even though the number of certified members has grown over the years, there are a lot of folks out there at all levels that are doing tremendous work in the industry but I feel that some feel overwhelmed when looking at the process of being certified," Perruzzi said. "We as a committee have worked hard over the years to try to remove that label and to make folks understand that, yes it may be hard, but it is also fair in how the process has been developed and maintained through the years. One thing I can say: As a self-called

GRIZZLED VETERAN

Mike McDonald, CSFM, building and field supervisor at the University of Minnesota, has been certified for nearly as long as the CSFM program has existed. He emailed that he sought certification to increase his professionalism and participation in his local STMA chapter and community. "I have always been proud of this accomplishment."

"It hasn't been too difficult at all [to keep his certification updated over the years]. Being involved in your local STMA chapter makes it pretty easy, actually. Between serving on a couple committees, doing our community service project, attending meetings, and helping with the certification process for other CSFMs and stadiums, not to mention going to the national Conference, it all worked out well," McDonald wrote.

"From my employer I really haven't seen any benefit from being a CSFM, though it might have helped out on my getting to go to the national STMA Conference, but certainly I have had more recognition and respect from my peers, locally and nationally."

"self-taught idiot" like me can pass the exam, then so can anyone else if they put the effort into it. The more certified members we have then the more voices we have to promote the certification process and grow its numbers."

DeMink said, "It could be improved with better wording on some questions."

"Marketing and making organizations outside the STMA aware of what the CSFM designation means, and promoting individuals who have earned it, said Glover.

Rogers said, "I don't want it to become a numbers game. Continue with HIGH STANDARDS!" /ST/

CHAD FOLLIS

This month in “The SportsTurf Interview,” we meet Chad Follis, EdD, an associate professor of agriculture at Mineral Area College, Park Hills, MO. Follis supervises the college’s greenhouses and serves as the turf manager for the baseball field among other duties. He is Missouri born and bred, and has earned a bachelor’s in ag, master’s in horticulture and turfgrass management, and doctor of education degrees, all from the University of Missouri. The doctoral degree was in education leadership and policy analysis.

SportsTurf: *What are you responsible for in the turf program at Mineral Area College?*

FOLLIS: I am responsible for Introduction to Turf and Advanced Turfgrass. I maintain our variety plots, campus baseball field, three campus greenhouses, three pollinator beds, five campus bee hives and our 20-tree nursery and assist facilities when they have needs related to pest management. You learn to be a generalist at a community college. Since we don’t have extension or research appointments I teach 21+ credit hours a semester. It could be turf to pest management, ag leadership to plant propagation to interior plants.

ST: *How do you attract students to your program?*

FOLLIS: That is the million-dollar question. It is getting harder and harder. We are heavily involved with our area FFA programs; we host an FFA Day on campus, with classroom visits, and we maintain relationships with local golf courses and park departments. I try to have a presence with our baseball players, this seems like a natural fit. It is definitely an approach of casting a wide net.

ST: *What challenges are facing 2-year turf programs around the country?*

FOLLIS: We are a traditional community college with state-mandated open enrollment, which is both good as well as challenging. We often see students that require one to three remediation courses, which often translates into the degree taking longer than 2 years to complete and that frustrates students. The plus to open enrollment is things like ACT or SAT scores are less important and a person’s future is not solely determined by those predictive model exams.

As state budgets become smaller colleges are becoming more focused on courses that crank out an administrator-determined number of students each semester. For budgetary reasons this is understandable but not realistic in degree plans that focus on career-centered learning in more niche careers like sports turf. As the economy improves and jobs are plentiful getting students to understand the long-term benefits of college is a challenge. Public perception is that career focused, 2-year degrees won’t transfer to universities, which is not true. I really want to work to dispel this myth. The level of these concerns might be different in urban environments as compared to our rural campus location.

ST: *How has your career benefitted from being a member of STMA?*

FOLLIS: Networking and developing relationships has been the greatest benefit. In smaller community colleges I also teach plant science, plant propagation, greenhouse, landscape design, ag leadership and a few more. STMA allows me to gain factual, science-based information that I can bring into the classroom and keep current with the industry. It is a great repository of data, information and resources.

ST: *How has social media impacted your work?*

FOLLIS: It has assisted with keeping up with the industry and networking. The problem is keeping students off it during class! Our departmental Facebook page is “MAC Horticulture.”

ST: *How do you think the industry will change in the next 10 years?*

FOLLIS: I already see apprenticeship programs being started at community



Chad Follis, EdD, Mineral Area College

colleges in medical and law enforcement and think this would be a great way to promote and recruit students into sports turf. We have a curriculum and employers need trained employees; why not have employers sponsor future employees at a local 2-year program for 15-30 hours of college credit, and then the remainder of the degree would be obtained via paid apprenticeship from the employer. The forest products and arborists industries already have similar programs in place. In many of these situations workforce development dollars can be used to help offset cost for customized training programs. I would LOVE to see STMA work with national FFA to start a FFA Career Development Event (CDE). If this would happen FFA programs around the country would immediately start teaching turf because CDEs drive FFA programs.

ST: *What are your passions and interests outside of work?*

FOLLIS: My passion is a great wife, Stacey, and daughters Colvin and Sela. I go to and we coach a lot of volleyball, basketball and softball games. It is really hard to be a parent coaching or on the sidelines.

The ladies in my life would say my yard is a passion. I feel terrible when the yard doesn’t look perfect. I feel like I’m letting the industry down. Everybody knows where the turf guy lives in town.

Finally, the place I met my wife, learned to not only love turf but also understand the science, the University of Missouri; heaven on earth is MIZZOU sports! **/ST/**



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:

Straight line of
brown spots

TURFGRASS AREA:

Area between
athletic fields

LOCATION:

Sioux Falls,
South Dakota

GRASS VARIETY:

Bluegrass/ryegrass
blend



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University of Massachusetts Amherst

The University of Massachusetts Turf Program conducts a wide range of research at both the UMass Joseph Troll Turf Research Center as well as at various field sites throughout the Northeast. Our goal is to enhance the functional use of turfgrasses while reducing the environmental impact of turf management practices. Numerous projects are at various stages of completion. Presented below is one project that may be of interest to some turf managers who are responsible for managing natural grass surfaces under intense traffic, especially lawn tennis courts. Little research specific to grass tennis has been conducted. In addition, wear and associated research is often simulated using wear machines whereas in the study summarized below the wear injury is the result of actual tennis match play.

Carrying Capacity, Surface and Plant Characteristics of Natural Grass Tennis Courts, by J. Scott Ebdon, PhD, Michelle DaCosta, PhD, and William Dest, PhD. Three official size single courts (78 by 27 ft.) were established in 2016. Each court was planted to evaluate pure stands of the same eight species and cultivars: 'Keeneland' Kentucky bluegrass (KB), 'Rubix' KB, 'Karma' perennial ryegrass (PR), 'Wicked' PR, 'Puritan' colonial bentgrass (CLB), '007' creeping bentgrass (CB), 'Villa' velvet bentgrass (VB) and the Chambers Bay Dunes mix (creeping red fescue and Chewings fescue, FF). The study is maintained at 0.375-inch height of cut. Net posts and base lines were installed and natural wear from actual match play was initiated in June 2017.



UMass Amherst grass tennis courts before match play in June 2017. Wear tolerance along with plant and surface properties are being evaluated. Mike Buras (left), Director of grounds at Longwood Cricket Club, Chestnut Hill, MA, is shown setting the court base lines.

Maintenance personnel from Longwood Cricket Club (Director of Grounds Mike Buras and crew) assisted in the design and installation of the courts.

The following surface characteristics important to tennis are being measured on the different species-cultivars, including ball bounce (i.e., coefficient of restitution, COR), surface friction (i.e., coefficient of friction, COF), surface hardness (Gmax, firmness), traction (Nm), soil moisture, as well as turfgrass physiological and morphological measurements. Court pace (speed of play) is being derived from COF and COR measurements. Lower

COF of the surface increases horizontal velocity of the ball after bounce while lower COR decreases the time to react to ball bounce. Both lower COF and COR increase court pace. Hours of play on each court are recorded daily to compute carrying capacity of the different grass species and cultivars. Carrying capacity is derived from wear injury measured as the loss in grass cover at the base lines on all courts (replicates) and main plots. This study is a 3-year test with only one year (2017) completed. The New England Regional Turfgrass Foundation is sponsoring this study.

EDITOR'S NOTE: Once again we asked university turf program researchers to update us on their current projects. Thanks to Sam Bauer, University of Minnesota; Scott Ebdon, PhD, University of Massachusetts Amherst; Bryan Hopkins, PhD, Brigham Young University; Adam Thoms, PhD, Iowa State; and Ben Wherley, PhD, Texas A&M, for their time putting together these reports.



Three single courts as replicates were planted to eight different species-cultivars. Eight main plots were used per court, each main plot measured 6.75 by 44 ft. Species-cultivar main plots extended 5 feet beyond the base line to capture base line traffic during match play.



Traction apparatus used to measure the force (Nm) to initiate slip on grass courts. Apparatus disc was fitted with the soles from grass tennis shoes and weighted with 75 pounds. Peak force required to tear (break) the grass surface was then measured.

Seventy-two players participated in 2017 with an average of 22 players per week on each court. By the end of the playing season 76 hours of match play

were recorded on all three courts. Carrying capacities (hrs) were calculated in terms of hours of play required to diminish grass cover from 100 to 70% cover at the

base line. Species carrying capacities in 2017 to cause 70% grass cover were as followed: PR (69.2 hrs) = KB (61.8 hrs) > VB (52.9 hrs) > CB (30.7 hrs) = CLB (26.9 hrs) > FF (13.3 hrs). Cultivars of KB and PR exhibited a 2-fold greater carrying capacity (and wear tolerance) than most other species (bentgrass and fine fescue). After 76 hours of match play the courts were closed to begin overseeding of the base lines. Grass cover at the base line after 76 hours of match play corresponded to PR (77%) = KB (72%) = VB (65%) > CLB (39%) = CB (35%) = FF (11%). Grass cover and carrying capacity at termination of match play was highly correlated with shoot total cell wall content (cell wall

BALL TO SURFACE INTERACTION IS RELATED TO COR WHICH IS DERIVED FROM THE SQUARE ROOT OF THE BALL BOUNCE-TO-DROP HEIGHT RATIO.

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thickening). Species-cultivars with greater carrying capacities, grass cover, and wear tolerance at the base line were associated with greater total cell wall content measured in their shoots.

The soles from grass tennis shoes were fitted to a traction apparatus for measuring the ability of the grass surface to resist slippage when a rotational force (measured as Nm, Newton meter) is applied. Traction measurements indicated that grass surfaces with greater carrying capacities (and wear tolerance) are not necessarily the best for traction. Species traction measurements in 2017 were as followed: Bentgrasses (34 Nm) = KB (33.7 Nm) > FF (31.1 Nm) > PR (29.4 Nm). Preliminary results suggest that KB is the only species to combine both superior traction and wear tolerance under grass court conditions. Perennial ryegrass plots were among the most tolerant to wear but players may be more prone to slip when compared to the other species even when wearing grass court shoes.



Player wear injury at the base line after 42 hours of match play: 'Wicked' perennial ryegrass (left, 90% grass cover) and 'Puritan' colonial bentgrass (right, 58% grass cover).



Player wear injury at the base line after 42 hours of match play: Fine fescue mixture (center left, 22% grass cover) and '007' creeping bentgrass (center right, 55% grass cover).

Ball to surface interaction is related to COR which is derived from the square root of the ball bounce-to-drop height ratio. Fresh tennis balls are dropped from 100-inch height and higher COR increases with higher ball

bounce. Higher ball bounce in turn increases the time between successive bounces, which slows the pace of play. Coefficient of restitution indicates the fraction of the inbound ball velocity retained immediately after interacting

with the surface. Measurements of COR were made on concrete as well as on nearby hard court and clay court surfaces, which corresponded to COR of 0.74, 0.73, and 0.71, respectively. Species COR measured in 2017 were as followed: FF (0.63) > PR (0.61) = KB (0.60) > bentgrasses (0.54). All species retained at least 60% of the inbound ball velocity after bounce (i.e., $COR > 0.60$) except for the bentgrasses. All grass surfaces were associated with lower ball bounce (and COR) compared to artificial surfaces such as concrete, clay court, and hard court surfaces. This is largely due to surface hardness measured as Gmax. In 2017 greater

HIGHER BALL BOUNCE IN TURN INCREASES THE TIME BETWEEN SUCCESSIVE BOUNCES, WHICH SLOWS THE PACE OF PLAY.

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surface hardness promoted higher ball bounce and COR. Fine fescue surfaces exhibited the highest surface hardness (119 Gmax) and bentgrasses the lowest hardness (100 Gmax) with KB (115 Gmax) and PR (111 Gmax) intermediate in their surface hardness.

All species and cultivars selected for the grass court study summarized above were based on previous wear trails conducted as part of the National Turfgrass Evaluation Program (NTEP). In addition, the UMass faculty and staff are conducting a number of other research projects within the field of turf management. These include: (1) studies conducted by Geunhwa Jung, PhD, including rolling studies in the management of dollar spot, fungicide management of snow mold, and fungicide resistance management; (2) studies conducted by Michelle DaCosta, PhD, including the screening for drought resistant cultivars, quantifying ET and irrigation frequencies of turfgrass species; and (3) studies conducted by Robert Wick, PhD, on nematode management

and biological alternatives to nematicides in reducing pesticide exposure to turf users. For more information on these and other projects, please visit the UMass Turf Program website at www.ag.umass.edu/turf and click on "Research."

Iowa State University

Shockwave Evaluation. Finding time to relieve compaction on athletic fields is always hard to do with the constant use of the fields. Traditionally the field has to be closed for a period of time after aerification to allow the field to recover. A new device by Campey Imants (Campey Turf Care Systems, United Kingdom) called the Shockwave could potentially be a tool for this type of a situation. The device has knives that are offset and rotate to decompact the soil in a linear direction up to 10 inches deep, with minimal surface disruption. The offset knives give the soil a kick as they work the ground. A 2-year study is being conducted by graduate student Tim Dalsgaard comparing the Shockwave with one pass and two passes per month, monthly solid tine, monthly hollow tine aeration, and no aerification treatments all under simulated athletic field traffic. Data on surface hardness and turfgrass performance are being collected. Early results indicate that this device can be used during periods of field use with no negative effects to the playing surface. Full results will be presented in the coming years.



The Shockwave offers the potential of linear decompaction of athletic fields with offset rotating blades up to 10 inches deep.



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Tim Dalsgaard, a graduate research assistant, simulating athletic field traffic at the Iowa State Athletic Field Research Center with a modified Baldree Traffic Simulator.

Wetting Agents for Athletic Fields.

Managing moisture in the rootzone can be tricky for athletic field managers. Too much soil moisture can lead poor playing conditions, while too little can lead to a very hard surface. Wetting agents have been used for a while on golf courses to help combat localized dry spot, lower the frequency of irrigation, and increase infiltration rates. Data is lacking for wetting agent performance under simulated athletic field traffic. Various wetting agents (Alypso Plus, Dispatch, Revolution, Sixteen90, Triplo, Vivax, and an untreated control) and application timings (monthly and biweekly) are being tested under simulated traffic on a native soil athletic field to see how the playing surface will perform. Fall simulated traffic is being applied by graduate student Ben Pease, and he also is collecting data on turfgrass performance and safety. First-year results indicate that Sixteen90 and Vivax had lower surface hardness values than the control. All treatments performed similarly for percent green cover. A second-year of data will be collected this coming fall.

Evaluating Corn Gluten Meal under Traffic.

Many municipalities and schools have undergone a synthetic pesticide ban, and traditional weed control methods are no longer acceptable. Corn gluten meal, a natural-based preemergent herbicide, has demonstrated use as a preemergent herbicide but has never been tested under simulated athletic field traffic. Twenty pounds of corn gluten meal per 1,000 square feet was applied to plots as a preemergence and compared to a traditional preemergence herbicide (Barricade), and a non-treated control. Simulated athletic field traffic was applied in the fall, and turfgrass performance and safety data were taken. First-year results indicate that corn gluten meal offers a

natural weed control in situations where synthetic herbicides are banned, and demonstrated improved turf cover compared to untreated controls.

Natural Products Herbicide Trials.

Continuing research on alternative products for sports turf managers under pesticide bans, a multi-state study is being conducted as part of the NCERA-221 to look at various natural products for post emergence broadleaf control. Products being tested include active ingredients including iron, clove oil, boric acid, rosemary oil, and cinnamon. Additional trials are being conducted with a Lawn Life to determine timings of various natural products for weed control. First-year results from previous work indicate that many natural herbicides will burn the tissue, but will not kill the plant. Often sprays must be made on 7 to 10-day intervals to limit the visual presence of weeds with these products.

Hybrid Turf Evaluation. A multi-university trial is underway with Iowa State, Michigan State, and the University of Tennessee to evaluate the performance of new hybrid turf systems containing Kentucky bluegrass

compared to a non-hybrid Kentucky bluegrass turf. The hybrid systems include the Hero and Eclipse hybrid turf systems available from The Motz Group. Simulated athletic field traffic will start at all locations this summer.

Paint Effects on Sand-Based Rootzone Characteristics. It is well known that areas that receive regular paint often have lower infiltration rates than other locations on the field. A greenhouse trial

A MULTI-UNIVERSITY TRIAL IS UNDERWAY WITH IOWA STATE, MICHIGAN STATE, AND THE UNIVERSITY OF TENNESSEE TO EVALUATE THE PERFORMANCE OF NEW HYBRID TURF SYSTEMS CONTAINING KENTUCKY BLUEGRASS COMPARED TO A NON-HYBRID KENTUCKY BLUEGRASS TURF.

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is being conducted by graduate student Ryan May to investigate painting sand-based Kentucky bluegrass pots at regular intervals compared to non-painted Kentucky bluegrass pots. The objective of this work is to investigate the changes in rootzone characteristics with known regular applications of athletic field paint.

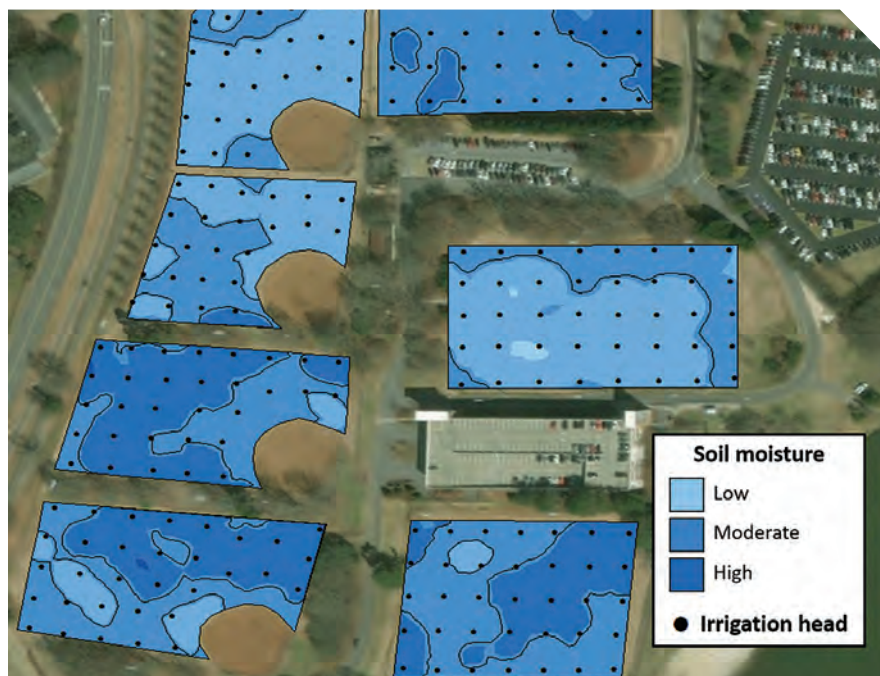
2018 National Turfgrass Evaluation Program (NTEP) tall fescue test. The 2018 NTEP tall fescue test will be seeded this fall to assess the tolerance of entries to wear applied with a traffic simulator. Traffic simulation will begin after the establishment of these entries. In addition to this cultivar test, Iowa State is also home to a 2018 Tall Fescue NTEP shade location and a 2017 Kentucky bluegrass NTEP shade and sun trial location. These studies will help guide turfgrass breeders and end-users in making selections for better performing turfgrasses.

- By Adam Thoms, PhD, Assistant Professor and Turfgrass Extension Specialist.

University of Minnesota

Site-specific Irrigation. Precision turfgrass management involves site-specific applications of management inputs only where, when, and in the amount needed. GPS-equipped sampling devices to measure plant and soil properties can aid in creating maps to identify variations within a field. These maps are used to classify units for site-specific management, which can be employed by managing each unit independently. A 3-year study is in progress in Minnesota to encourage the adoption of precision irrigation technology through on-site application and demonstration of water savings. Using golf as an example, we will use a GPS-equipped mobile multi-sensor sampling device and unmanned aerial vehicle, as well as in-ground soil moisture sensors, to demonstrate a practical approach for creating irrigation management units, defining thresholds to trigger irrigation within each unit (based on plant available water and turfgrass quality), and programming an irrigation system to irrigate site-specifically by unit. Water consumption from this site-specific irrigation technique will be compared to traditional (irrigating when the turfgrass managers believes it is necessary) and evapotranspiration-based (using weather data) irrigation practices. Most sports fields are currently limited to predetermined irrigation zones (as opposed to golf where individual irrigation heads and zones can be manipulated). We hope our research findings will entice future development of irrigation system design and technology for site-specific irrigation application in all types of turfgrass areas.

Influence of soil temperature on wetting agents' abilities to reduce soil water repellency. Using wetting agents throughout the growing season for localized dry spot prevention is a common practice. A calendar-based application schedule can be convenient, but may be inefficient since soil water repellency is impacted by environmental and management factors. These products, since they are biodegradable, may also be influenced in the same



An example of low, moderate, and high soil moisture site-specific management units at a sports complex. The unit classifications are based on soil moisture values obtained from a sampling device and indicate areas of low, moderate, and high soil moisture relative to this sports complex.



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way. With a focus on soil temperature, we will determine how long different wetting agent chemistries reduce soil water repellency from single applications. Results from this research are currently being analyzed.

Biological nitrification inhibition in perennial turfgrass systems. Nitrogen loss by nitrate leaching and gaseous nitrogen compounds is a problem in many landscapes using perennial grasses and fertilization management. These nitrogen compounds are detrimental to the environment when lost from a turfgrass system, causing water contamination and greenhouse gas emissions. At the University of Minnesota, we are committed to look for innovative solution to overcome this important challenge. Biological nitrification inhibition (BNI) is the ability by plant-secreted root exudates to decrease soil nitrification rates and the loss of nitrogen; this has been previously described in pasture grasses and various cereal crops but never in perennial grass species. Preliminary results in our lab with a known perennial grass root exudate led to nitrification inhibition in soil slurry experiment. Further experiments are needed to validate these results and to determine which step of the nitrification pathway was inhibited. We are particularly interested in continuing to study lower input species such as the fine fescues, which require lower levels of nitrogen inputs and are used for parks, roadsides, lawns, and other sustainable turfgrass systems. Results from our research can be used to improve the efficient use of nitrogen in perennial grass systems and to develop new cultivars.

Fine fescue breeding program. Over the past 5 years, we have greatly expanded our efforts in improving fine fescues for low-input environments. This effort is part of a multi-institutional grant from the USDA Specialty Crop Research Initiative (<http://lowinputturf.umn.edu/>). Other partners in this project include Rutgers, Wisconsin-Madison, Purdue, Oregon St., and the USDA-ARS in Logan, UT. The overall breeding efforts of the multi-state team are focused primarily on a few traits that we know to be deficient in the fine

SHADED ENVIRONMENTS PRESENT SIGNIFICANT CHALLENGES FOR TURFGRASS MANAGERS; INCREASING OUR UNDERSTANDING OF HOW COOL-SEASON TURFGRASSES RESPOND TO DIFFERENT TYPES OF SHADE CAN IMPROVE TURFGRASS MANAGEMENT RECOMMENDATIONS AND ALSO RESULT IN BETTER METHODS FOR SELECTING SHADE- TOLERANT PLANTS IN TURFGRASS BREEDING PROGRAMS.

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fescues: heat stress tolerance, wear/traffic tolerance, and disease tolerance (focused primarily on summer patch and snow molds). This project also includes efforts to better understand how public land managers and other consumers make choices about purchasing grass seed. We are also working on the development of a turfgrass performance database that will allow for greater accessibility to turf data by consumers who would like to make informed seed purchasing decisions. In Minnesota, we aim to improve other traits that make these grasses very useful as low-input turfgrasses: weed suppression and shade tolerance.

Breeding for natural weed suppression. Allelopathy, a phenomenon when one plant negatively affects the growth of a nearby plant, has been shown to be present in the fine fescues; however, there has been little effort to develop cultivars possessing this trait. Breeding for natural weed suppression via allelopathy in turfgrasses has potential for reducing pesticide use in sports fields and other turfgrass systems. Field and greenhouse trials are

currently in progress evaluating multiple genotypes of three fine fescue species, hard fescue, Chewings fescue, and strong creeping red fescue, for their ability to suppress crabgrass growth. A field trial planted in April 2017 in Saint Paul, MN and West Lafayette, IN demonstrated genetic differences within and across fine fescue species for their ability to suppress crabgrass growth. Genotypes that expressed the highest and lowest rates of weed suppression were planted in controlled environment experiments to better understand mechanisms of weed suppression. Field evaluations and growth chamber experiments will continue in 2018-2019. Further directions of this research include evaluating for allelopathy across multiple weed species and incorporating these findings into breeding efforts.

Breeding for shade tolerance. Shaded environments present significant challenges for turfgrass managers; increasing our understanding of how cool-season turfgrasses respond to different types of shade can improve turfgrass management recommendations and also result in better methods for selecting shade-tolerant plants in turfgrass breeding programs. We have been screening a number of fine fescue cultivars and selections in a greenhouse under a photosensitive plastic filter that alters the distribution of individual wavelengths of light similar to the effects from vegetative shade. We are monitoring tillering and plant height (etiolation), and are quantifying chlorophyll (a, b, and a:b) and specific leaf area (SLA). At the same time, we are also monitoring light intensity and wavelength distribution under various levels of natural shade at the Turfgrass Research and Outreach Center (TROE), and around the UMN St. Paul campus. This information will then be used to treat entries from each fine fescue species that exhibit strong or lack of shade avoidance responses in our greenhouse experiment with more extreme, as well as realistic, qualitative shade conditions within a growth chamber using far-red LEDs. Ultimately, we hope to improve methods for selecting shade-tolerant turfgrasses in our plant-breeding program.



Soil profile image of a sand-capped bermudagrass turf sports field.



Image of turfgrass shade research facility at Texas A&M University. The research is determining Daily Light Integral requirements for 9 cultivars of zoysiagrass and bermudagrass.

Perennial ryegrass breeding program.

Perennial ryegrass is an important species for cool-season sports turf

managers due to its rapid rate of establishment and excellent wear tolerance. In Minnesota and other areas

that experience harsh winters, this species can often suffer severe winter damage. Over the past several years, our breeding program has focused on improving the winter hardiness of this species. Many cultivars of perennial ryegrass are infected with the fungal endophyte *Epichloe festucae* var. *lolii*, which gives these grasses tolerance to some stresses, especially those related to insect feeding. We have recently completed a project that found no direct effect of endophyte on perennial ryegrass freezing tolerance and are now studying how endophytes might be affecting stem and crown rust resistance in perennial ryegrass. To this point, plant breeders have struggled to develop cultivars with consistently high levels of crown rust resistance. Our current project should shed more light on this important problem. In addition, we are studying how we might modify the design of our breeding nurseries to better select for important turfgrass and seed production traits in this species.

Fine Fescue Seed Size. With five different species in the 2014 Fine Fescue NTEP fairway traffic trial, differences in seed size could influence how well they perform when seeded on a weight per area basis. Replicated thousand seed weights (TSW) were taken from remnant seed for the trial to assess the variation between species and within a species and used to calculate the number of seeds per pound. The entry with the greatest TSW was 2.75 times heavier than the entry with the lowest TSW, which equated to 282,000 seeds versus 776,000 seeds per pound respectively. Significant differences were seen among cultivars within a species with a difference ranging from 162,000 to 255,00 seeds per pound when comparing the cultivars with the highest and lowest TSW within a species. Further analysis will be done to determine if these differences correlate to ratings taken on the trial.

Contributors: Sam Bauer; Chase Straw; Ryan Schwab; Dominic Petrella; Jon Trappe; Florence Sessoms; Garrett Heineck; Eric Watkins; Brian Horgan; and Andrew Hollman.

Texas A&M University

Management dynamics of sand-capped turf systems. Sand-capping of athletic fields is a trend being driven by the need for improved growing and playing conditions, especially in high rainfall areas, or in areas where low-quality irrigation water and fine-textured soils exist. However, due to the significant cost sand-capping can add to a construction/renovation budget, less than optimal depths of sand are often placed atop the existing soil. The ideal placement depth ultimately depends on physical properties of the sand, environmental conditions, and providing a balance of water to air-filled porosity for optimal growing conditions. However, no specifications currently exist for sand-based construction atop an existing soil. This project seeks to develop science-based information that can contribute to development of such recommendations while offering insights on best management of irrigation, organic matter, and subsoil sodicity in these systems.

Daily light integral requirements for bermudagrass and zoysiagrass cultivars. Maintaining acceptable levels of turf quality in stadium shade is a management challenge for many sports field managers. Time of year, location, shade source, traffic intensity, and duration of direct sunlight all contribute to difficulty of specifying a minimum light requirement in terms of hours per day or percent of full sunlight a field may require. Rather than responding to a number of hours of direct sunlight or percent shade, plants respond to cumulative daily total number of photons (measured in moles/sq. meter/day) received within the photosynthetically active wavelengths (400-700 nm), termed daily light integral (DLI). To date, the limited turfgrass DLI research that has been conducted involves primarily short-term greenhouse experiments or has been focused on ultradwarf bermudagrass. This long-term field study has been conducted over



Image of fertilizer N source x irrigation chemistry study at Texas A&M University.



Image of dumpster full of spent coffee grounds, a byproduct of cold-brew coffee production. Substantial quantities are being generated and evaluated for use as a root zone amendment or topdressing material for sports fields at Texas A&M.

3 growing seasons in College Station, TX under replicated treatments offering 0 to 90% reductions in photosynthetic photon flux (PPF). Objectives of the study are to 1) Determine minimal DLI requirements for nine bermudagrass and zoysiagrass

cultivars; 2) determine impacts of mowing height and trinexapac-ethyl (TE) on DLI requirements; and 3) determine whether DLI requirements change seasonally (spring, summer, and fall months).

MAINTAINING ACCEPTABLE LEVELS OF TURF QUALITY IN STADIUM SHADE IS A MANAGEMENT CHALLENGE FOR MANY SPORTS FIELD MANAGERS. TIME OF YEAR, LOCATION, SHADE SOURCE, TRAFFIC INTENSITY, AND DURATION OF DIRECT SUNLIGHT ALL CONTRIBUTE TO DIFFICULTY OF SPECIFYING A MINIMUM LIGHT REQUIREMENT IN TERMS OF HOURS PER DAY OR PERCENT OF FULL SUNLIGHT A FIELD MAY REQUIRE.

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Irrigation Chemistry and N Source Impacts on Fertilization Efficiency. As availability of potable water for irrigation of turfgrass systems declines, sports turf managers must increasingly manage turfgrass using lower quality water sources often characterized by elevated salinity, pH, sodium, and/or bicarbonates. Irrigation chemistry has been shown to directly impact plant growth, evapotranspiration rates, and soil physical properties, but there has been little research aimed at determining impacts of irrigation and/or tank mix water chemistry and nitrogen (N) source interactions on uptake efficiency in bermudagrass. Knowledge of potential interactions of water chemistry on foliar or root uptake efficiency of various inorganic N sources would be important for optimizing plant health as well as for minimizing environmental losses of N. Objectives of this research are to 1) Utilize various combinations of N-labeled fertilizer N (urea, ammonium sulfate, and potassium nitrate) and water sources (reverse osmosis, saline (2.5, 5, and 10 dS/m), and sodic potable containing 200 ppm Na, elevated

bicarbonates ~500 ppm, and pH 8.2) to determine the influence of irrigation/tank mix water chemistry on foliar and root N uptake efficiency in bermudagrass. We also seek to determine define thresholds at which increasing root zone salinity begins to impair bermudagrass N uptake efficiency. **Spent Coffee Grounds as an alternative Root Zone Amendment for Sand-Based Turf Systems.** Given the current and anticipated growth of the cold-brew coffee production industry nationally and worldwide, there is growing importance in evaluating the agronomic merits/demerits of spent coffee grounds for use in golf course turf applications. This is especially true in light of the growing environmental and ecological concerns relating to peat production. Considering that peat continues to be the predominant amendment used for golf course sands in many parts of the world, spent coffee grounds could offer an opportunity for use of a more sustainable, renewable resource in many regions. Lab testing, greenhouse and field studies are currently underway at Texas A&M to begin to explore the agronomic merits of spent coffee grounds in turf systems. This project will evaluate the potential benefits of both fresh and composted spent coffee grounds

as a turf fertilizer and/or amendment (field tests) and/or sand-based rootzone amendment (greenhouse tests).

Summary compiled by Dr. Ben Wherley, Associate Professor of Turfgrass Science & Ecology, Texas A&M University, with assistance from graduate research assistants Reagan Hejl, Manuel Chavarria, Baoxin Chang, Garrett Flores, and Will Bowling. Aforementioned projects have been made possible through support from United States Golf Association, Golf Course Superintendents Association of America Environmental Institute for Golf, Aqua-Aid Inc., and GeoJava, LLC.

Brigham Young University

Reducing maintenance costs with nitrogen management. Nitrogen is the key nutrient for plant health and water conservation. Apply too little and plants die; but too much stimulates shoot growth over roots, causing excessive mowing, water demand, and increased risk of pathogen pressure.

Nitrogen management can be done by small, frequent (2-4 weeks) applications, typically by foliar sprays or injecting it



Duration, a polymer-coated urea, is on the left; uncoated urea is on the right at BYU. These amounts show that we can use less PCU than uncoated urea. Photo by Bryan Hopkins.

into irrigation water. This can be difficult and detrimental to plants if adjustments inaccurately account for total nitrogen applied to the system and mineralization of nitrogen from soil organic matter during the warmest months.

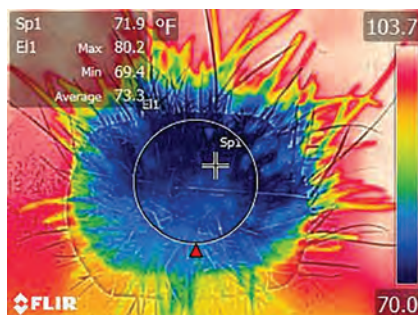
Alternatively, many slow and control release nitrogen fertilizers claim only a single application is required, thus potentially reducing mowing and fertilization labor costs. We conducted several research trials on Kentucky bluegrass grown on sand based and "regular" soil over several years to evaluate these various fertilizers. To date, we have found:

- None of the several products, sold as "one application" annually, that we evaluated performed as well as the practice of "spoon feeding" nitrogen every few weeks. Growth was uneven, with an initial spike, ultimately degrading to poor verdure and health (as measured by visual assessment, crown density, clipping volume, and Normalized Difference Vegetative Index or NDVI) within ~4-6 months.

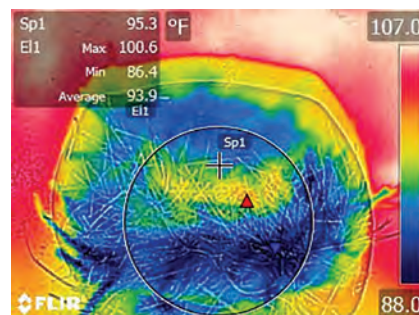
- In contrast, two applications of control release nitrogen fertilizer gave statistically similar results as spoon feeding. Growth and, thus, mowing, was even and plant health was uniformly good over the growing season.

- High quality polymer coated urea (PCU) products gave the longest and most even release timing compared to other slow release products (such as sulfur coated urea and urea formaldehyde) and urease and nitrification inhibitors.

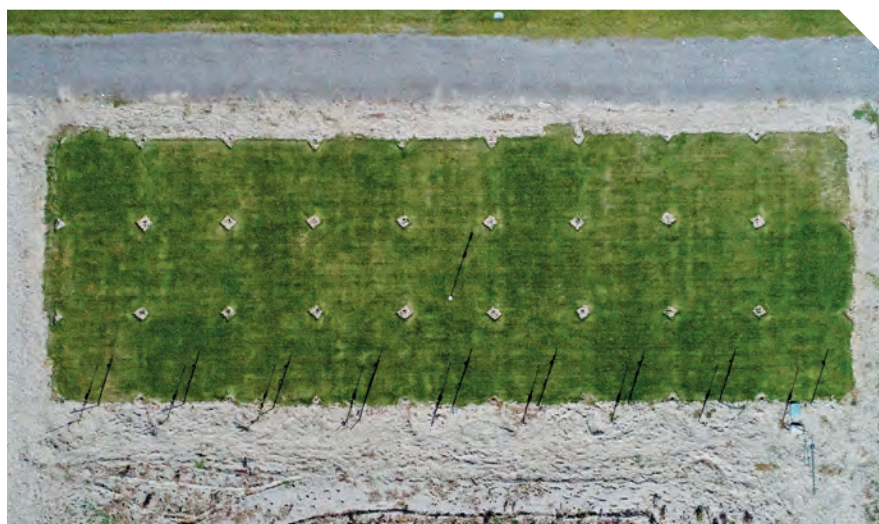
- Although slow and control release fertilizers are effective, we have shown repeatedly that the timing of release for most of these products is quicker than what is typically listed by the manufacturer. Most of the reactions of these enhanced efficiency nitrogen fertilizer are temperature controlled or influenced. The estimates from the manufacturers of these nitrogen products for their release rates are often based on agricultural tests with fertilizer buried in the soil (where temperatures are moderated) and/or in lab tests (at room temperature). Fertilizer applied to turfgrass is not typically incorporated into the soil and surface temperatures can



Fleir image showing temperature differences as a function of moisture and nitrogen; this example is Optimum N and 60% ET Avg. Canopy temp = 22.9 C.



Another Fleir image example that shows temperature differences as a function of moisture and nitrogen: Excessive N and 60% ET Avg. Canopy temp = 34.4 C.



Aerial image of nitrogen-irrigation interaction research plots.

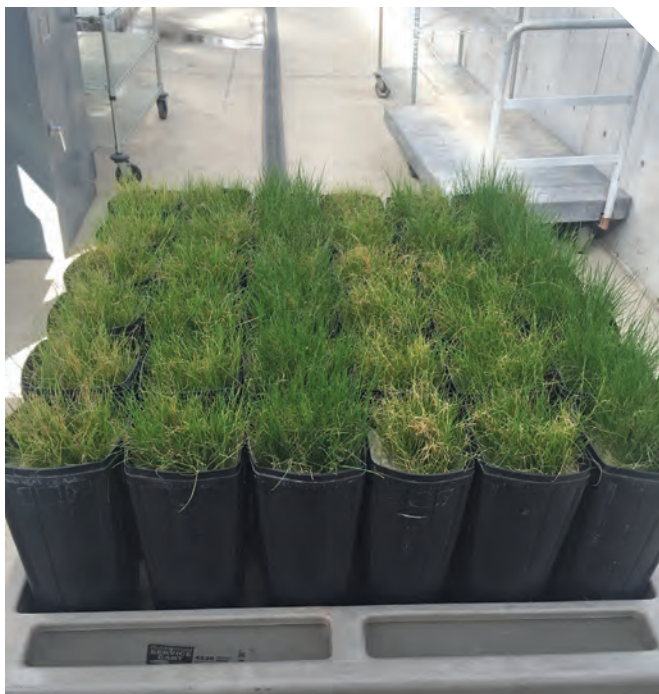
easily reach 120F on a sunny day. As a result, we found that all PCU products tested had greater than 90% of their nitrogen released/converted with ~35-40 days after application even though their suggested ranges in timing were 45-360 days (we did find that their estimates were accurate when the fertilizer was buried in the soil). We suggest this is why a single application of nitrogen fertilizer will not work as well as two or more applications, even when using a product with a claim of a 180 day or longer release pattern.

- Regardless, slow and control release nitrogen fertilizers (especially PCU) are effective nitrogen sources, partially due to having significantly less environmental loss due to leaching, volatilization, and denitrification. As a result, we have found that nitrogen fertilizer rates can be reduced by 25-50% when using PCU.

- The best current program for Kentucky bluegrass (and presumably other cool season species) for quality turfgrass with minimal maintenance and fertilizer costs is: 0.5 to 1 lbs. of nitrogen applied per 1000 ft² at spring green-up and 1 to 2 lbs. at late summer/early fall, with 2/3 of this applied as PCU and 1/3 as ammonium sulfate (or urea if sulfur is not needed).

Although initially successful in the short-term (2-3 years) with this low rate program, we are evaluating long-term impacts and how heavy traffic may impact the recommendation. For now, we recommend the higher rate for heavy traffic areas, especially sand based fields that may need up to 150% more total application.

We note that at rates higher than those listed above we observe good color



Nitrogen-irrigation interaction greenhouse pot study.

initially, but the long-term impact is poor root growth and increased problems in several related areas, including water-oxygen relations, nutrition, pathogens, and insects.

Nitrogen and water interactions. Water is increasingly scarce. Turfgrass watering is often restricted during intense drought cycles, such as the recent severe drought in California.

Excess nitrogen stimulates shoot growth at the expense of roots, leading to higher water demand with less access to deep water. Instead, turf needs a consistent nitrogen supply, minimizing any availability spikes. Additionally, cool season grasses need adequate nitrogen in the fall when plants are preparing for winter.

So, how do we manage nitrogen during severe water stress? We have shown that deficient nitrogen negatively impacts water stressed turfgrass, due partly to higher canopy temperatures. It also reduces turfgrass potential to recover after dormancy induced by drought. Excess nitrogen increases water demand and potentially induces moisture stress faster.

We are running additional trials to quantify these results and provide

specific recommendations for nitrogen rate, source, and timing, as well as water needs. In addition, we are also evaluating a variety of soil and canopy sensors for managing both nitrogen and water.

Carbon based fertilizers. Carbon as a nutrient or additive is often misunderstood. Many fertilizer products claim to be “carbon fertilizers.” We conducted a variety of tests on carbon based fertilizers over several years and found the following:

- We measured positive results with several phosphorus fertilizers mixed or bonded with various carbon based organic acids. Often, the carbon gets the credit, but our results show the enhanced phosphorus nutrition makes the difference; the carbon is incidental as part of the overall molecule in the same way as urea fertilizer, which has both carbon and nitrogen, but the effect we get from urea is from the nitrogen. Note: we also measured similar benefits with some micronutrients in agricultural row crops, but we haven’t seen consistent results in turfgrass with micronutrients bonded to organic acids.

- Adding these carbon fertilizers often results in improved verdure and plant health. However, there is no difference between these and neighboring plots treated with identical rates of the other nutrients (such

as nitrogen, phosphorus, and potassium) found in these carbon fertilizers. The carbon concentration of the grasses is not increased with these carbon fertilizers. Thus, the effect on improved turfgrass is a function of other nutrients, not carbon. Note: about half of the dry weight of plants are made from carbon because they are very adept at pulling it from the air.

- Incorporating high rates of compost and similar materials high in carbon (organic matter) enhances soil quality initially. This increases water and nutrient holding capacity, infuses nutrients, and can help with soil aggregation. But adding these materials at high rates to the surface of established turfgrass often increases disease incidence. We advise caution in doing so, especially on short mowed sports turf. It is noteworthy that turfgrass is particularly adept at increasing the organic matter content of the soil naturally over time, with soil organic matter levels often double in comparison to similar soil that is not vegetated as fully or is in a tillage cropping system. Thus, adding large quantities of materials high in organic matter is not generally beneficial to turfgrass.

Bryan G. Hopkins and Neil C. Hansen are professors at BYU. /ST/



ALL PHOTOS PROVIDED BY THE PROPANE EDUCATION & RESEARCH COUNCIL

Mower trends 2018: propane power

// By JOHN KMITTA

When it comes to mower trends, one area of the mower market that has grown considerably during the past five or six years is that of propane-powered mowers. But what is the current state of propane mower options, and where is the market headed?

"More than 150 propane mower models are produced by 14 manufacturers today," said Jeremy Wishart, director of off-road business development, Propane Education & Research Council (PERC). "But what's more newsworthy is that those 150 models include a variety of zero-turn, wide-area walk behind, and stand-on units, when just a few years ago it was tough to find many propane models that weren't ZTRs."

According to Wishart, that data indicates that more contractors are looking to operate their mower model of choice

with propane, and OEMs are responding by making those models available.

"In addition to those 14 OEMs offering propane are four different EPA- and CARB-certified aftermarket conversion kit manufacturers," Wishart added. "Contractors can now transition to propane however they're most comfortable doing so, whether that's converting their existing equipment or purchasing a propane-dedicated unit manufactured by their preferred brand."

A PERC survey in 2016 found that 34 percent of commercial landscapers (at the time) were considering propane to power their equipment fleets. Also in 2016, PERC conducted a survey of outdoor power equipment dealers, and found that more than half of outdoor power equipment dealers expected to be offering commercial propane mowers to their landscape contractor customers within

three years. In addition, the overall opinion of commercial propane mowers was overwhelmingly positive among dealers.

"Of the respondents who had prior experience with propane machines, 80 percent rated their performance on par with gasoline mowers; and 90 percent responded they had a favorable or very favorable opinion of commercial propane mowers," said Wishart.

According to Wishart, PERC will be conducting another survey this spring to continue tracking contractor and dealer preferences and perceptions.

Wishart added that PERC has also heard from end users that implementing sustainable practices is increasingly becoming an important part of their business model.

"Commercial clients, for example, are increasingly seeking environmentally friendly methods to support their own

EDITOR'S NOTE: John Kmitta is editor of OPE magazine, our sister publication, as well as Landscape Business. This article originally appeared in the APRIL 2018 issue of OPE.

corporate sustainability efforts,” said Wishart. “Homeowners are also becoming increasingly attuned to the potential impact of engine emissions.”

Wishart added that a growing understanding and acceptance among contractors that propane is cleaner, costs less, and lowers operating costs is the most important factor to increasing commercial propane mower use in the industry.

Incentive programs available to contractors also boost propane mower use. For example, PERC’s Propane Mower Incentive Program offers contractors \$1,000 for every new commercial propane mower purchase and \$500 for every certified propane conversion kit.

But Wishart adds that incentives like this are more of a perk than a necessity. “There are plenty of examples of contractors making the switch to propane, without utilizing the incentive program, who still experience a positive ROI – thanks to the fuel’s lower cost of operation,” he said.

“Propane is consistently less expensive than gasoline. Propane mowers also cost about 30 percent less per hour to operate than gasoline and require less engine maintenance. Propane equipment’s secure, closed-loop fuel system saves money by virtually eliminating the opportunity for spills, fuel theft, and the need to sacrifice work time for trips to the gas station.”

According to Wishart, PERC estimates that there are 20,000 commercial propane mowers in operation throughout the country. “That is significant growth from 2012, when there were a few hundred propane mowers in operation and only a handful of models available by a few OEMs,” he said.

PERC expects steady growth to continue in 2018 and beyond for a variety of factors:

- Propane equipment models by more OEMs means contractors can stick with their preferred mower brand and still convert to propane.

- Propane engine and aftermarket conversion technology has made significant advancements to maximize performance and efficiency.

- More commercial and residential customers are going to ask their contractors if they operate with propane, as more customers want to incorporate “green” practices into their businesses and homes.

- High gas prices will play a role in propane taking market share from gasoline and diesel in the future.

“Another, purely anecdotal, sign that suggests propane will continue to grow in the landscape market can be found in the type of contractors applying for the Propane Mower Incentive Program,” said Wishart. “While we’ve always had healthy participation since the program first launched in 2012, we’re now seeing more second- and third-time applicants, reinforcing the belief that once a contractor converts to propane there is no going back to gasoline.” **/ST/**

STMA SOURCEBOOK

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Focus on outcomes and measure them

SportsTurf: What are your responsibilities as John Deere's manager of global university relations?

SCHMIDT: My role at John Deere covers two primary functions: managing global university relations and serving as a primary technical resource on science and technology issues that often have a policy component. Both roles are unique and rewarding. Each has a wide range of application and interaction with different functions inside of Deere, but also with several institutions, organizations, companies, and other entities outside of John Deere. Both roles cover all of Deere's primary business areas including agriculture, construction, forestry, turf, power systems, and others.

ST: What are three things all turf managers can do to help the turfgrass industry's sustainability efforts?

SCHMIDT: One of the most important initial factors is to define the intended outcome and/or target. Sustainability is a term that is used broadly and in a variety of ways. Its definition and/or meaning also have evolved and continue to evolve. Thus, it is important to know the intended outcome before one can set appropriate goals and develop related action plans.

With a focus on the intended outcome, one can then work in reverse to understand what practices are needed to achieve this goal. This approach will also let innovation and individual choices drive the best outcomes versus prescribing a one-size-fits-all approach that may or may not apply to a particular location, management operation, condition, or another factor.

Lastly, once an outcome is achieved, it is important to measure it. Measuring the outcome not only helps to understand the end state, but it can also help define the balance of inputs (or costs) (e.g., practices, material use, and/or other factors) that were used to achieve the outcome. Ultimately, the creation of net value (benefits exceed the costs) will define a sustainable solution.

So, paring this down to three primary things that all turf managers can do to help the turfgrass industry sustainability efforts.

- Definition – define the goal and intended outcome.
- Implementation – understand the program and practices needed to achieve the goal.
- Measurement – measure the outcome.

ST: How do you measure the benefits of turfgrass?

SCHMIDT: There are several ways to measure the value of turfgrass and managed landscapes. We are probably most familiar with both qualitative and quantitative measures, or measures that state the quality or quantity of something, respectively. Quality and quantity measures can be used to describe the economic, social, and environmental attributes of turfgrass and landscapes, as well as the inputs and practices used to achieve the resulting state. As select examples, the economic value of the turfgrass industry and different segments are often reported, as are statistics around important environmental and social measures like the ability of a 2,500 square foot lawn to produce enough oxygen to support a family of four. These measures and others are broadly available through a variety of sources.



Mark Schmidt, John Deere

A new and somewhat emerging way to measure the benefits of turfgrasses and landscapes is through the concept of ecosystem services. Ecosystem services is based on the foundational principle of measuring benefits and value with respect to the impact on society. As a result, it incorporates social, economic, and environmental value into these expressions.

Ecosystem services is an important concept in that it can present the benefits and value of turfgrass in a manner that is relatable and understandable to a broad range of people. Achieving a broader understanding of the value of turfgrass and landscapes will be paramount to the future of the turfgrass and landscape industry. As we account for the value of turfgrass systems, also, we will need to start to differentiate benefits from value and understand the role of costs in contributing to each. Further, we must broaden our understanding of costs, benefits, and value broadly as social, economic, and environmental.

ST: What pressures might the turfgrass industry face in the near future?

SCHMIDT: Turf and landscape managers have the potential to face many challenges whether those challenges are social, economic, or environmental. Without

Continued on page 49

EDITOR'S NOTE: Thanks to Amy Jones, imre, Baltimore, for setting us up with Mark Schmidt, formerly a principal scientist for John Deere, and currently the manager of global university relations.



JOHN MASCARO'S PHOTO QUIZ

JOHN MASCARO
IS PRESIDENT OF
TURF-TEC
INTERNATIONAL

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ANSWERS
FROM
PAGE 17

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The reason why these brown spots in a straight line are on this area between some multipurpose athletic fields located on this 21-field complex in South Dakota has something to do with the newly planted trees. The photo was taken in early June after the area had experienced unusually hot days the prior week. A sanitary sewer project had gone through this area so some of the poplar trees were removed and replaced by hybrid elm trees that are resistant to Dutch Elm Disease.

On the newly planted trees, the Park Caretaker had installed these tree-watering bags shown in the photos. When the bags needed to be refilled, a parks seasonal employee was using pickup truck with a watering tank mounted in the back to water the tree first with a very slow trickle of water running out of a hose to allow for better infiltration of water around the tree and then to refill the bags, spending about 10 minutes per refill. As the utility vehicle was idling, the hot air from the muffler blew down on the bluegrass/ryegrass blended turf, producing these brown

spots near each newly planted tree. After this picture was taken, the park received some timely rains that helped to recover the grass and extend the time between tree waterings and since the damaged areas were not on a sports turf surface, they were allowed to grow back on their own. The Parks Caretaker also informed the seasonal staff that they couldn't remain parked in one area for an extended period of time, especially on hot summer days.

Photo submitted by Brad Thedens, CSFM, Park Caretaker for City of Sioux Falls, South Dakota.



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

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Turfgrass Water Conservation Alliance committed to cause

// By JACK KARLIN

The Turfgrass Water Conservation Alliance (TWCA) is a 501(c)(3) non-profit organization based in Albany, OR the heart of grass seed country. Founded in 2010 by direct competitors in the live goods industry, TWCA is committed to water conservation and dedicated to preserving the ecological benefit of turfgrass in the managed environment.

Membership

As a membership based organization no conversation about program identity is complete without an overview of the program membership. Currently, TWCA has 142 members in four countries, thirty-one US states and five Canadian provinces. In addition to ten seed producing companies representing an estimated 85% of the grass seed sold in the US; TWCA members include turfgrass breeders; government officials ranging from local to regional, state, and federal levels; university programs, sod farms, and landscaping companies. TWCA even has individual members who recognize TWCA as a vehicle for positive change.

Three types of trialing

TWCA utilizes three similar approaches to qualify drought tolerant turfgrasses: chronic drought, acute drought, and low maintenance. While each evaluation looks at turf response to drought stimulus, each one gives a unique look at turf quality and cultivar response to specific conditions.

The TWCA qualifies drought tolerant turf using independent peer review of objective data collected during multi-year, multi-site trialing. Each trial evaluates a single species of unblended cultivars meaning each trial plot is 100% of a single cultivar. The TWCA Research Review Committee consists of at least three university researchers who aggregate the

TWCA trial results from individual locations over the duration of the trial being evaluated and, based on the statistical analysis of the data, qualify cultivars based on the results. The geographic range of TWCA's trialing includes fourteen locations across North America including Olds College and the University of Guelph in Canada and ranges from New Jersey to Oregon and south to Riverside California.

All TWCA trialing is conducted using the copyrighted Turfgrass Water Conservation Protocol (Protocol) as a guiding document. This rigorous protocol guides TWCA Research cooperators' efforts in establishing and maintaining the plots, as well as laying out the turf evaluation methodologies. The Protocol specifically addresses both chronic and acute drought evaluation.

During chronic drought trialing, the trial plots are allowed to establish, watered to field capacity and then, once trialing is initiated, watered at a predetermined percent of reference ET (ET₀). During chronic stress, digital image analysis (DIA) is collected at least once a week. Chronic stress trialing is especially useful in determining turf performance during a water-restricted period or in areas where the maximum applied water allowance is determined in a regulation.

By far the most common method of evaluation for TWCA is acute drought stress. During acute drought stress trialing, plots are allowed to establish and are irrigated to field capacity after which the water is entirely shut off. The trials remain in a no water state with digital image analysis (DIA) being collected at least once a week until the top performing grass (the greenest) falls below twenty five percent green cover. Once the top performer falls below 25% green, water is reapplied to the trial at

a rate of 1 inch per week. Acute drought stress is excellent for giving a sense of cultivar performance in very dry conditions.

In addition to the Protocol, TWCA also has the TWCA Protocol for Low Maintenance Turfgrass (Low Maintenance Protocol). Copyrighted in 2014, the Low Maintenance Protocol is the first of its kind to detail the maintenance methodologies for evaluating turf performance and persistence under challenging maintenance regimes. During TWCA trialing, the Low Maintenance Protocol is considered supplemental to the Protocol.

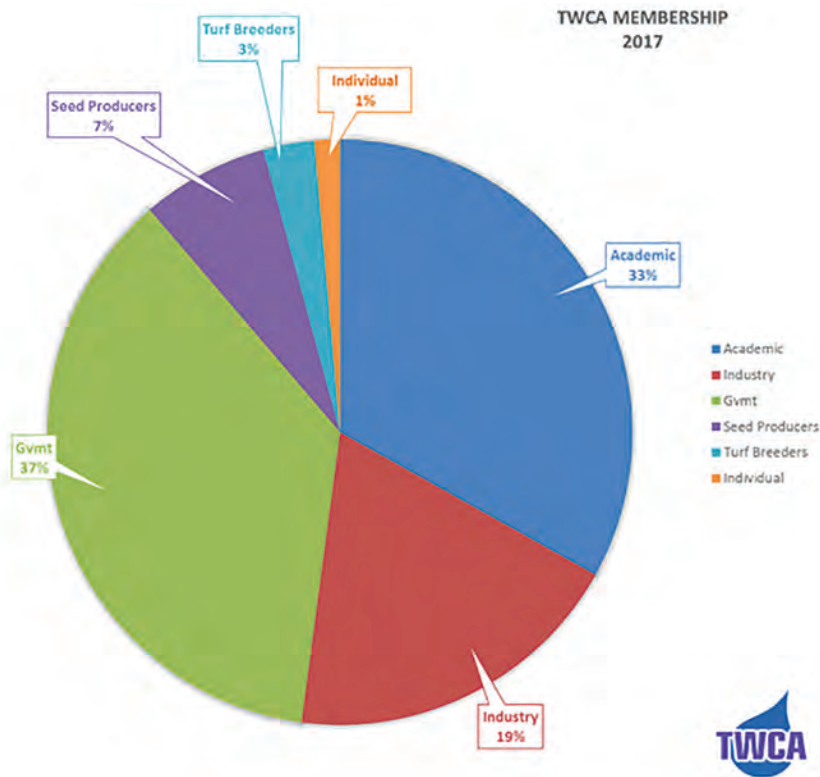
TWCA uses its Low Maintenance Protocol to conduct what we call Lawn Maintenance Trialing. Lawn Maintenance trials are the most punishing of all TWCA trials. They include a cap on fertility, a limit on herbicides and pesticides, and mandated use of a rotary mower.

Regardless of the trial type, TWCA relies on digital image analysis (DIA) to collect objective data across multiple locations. The use of standardized lighting and cameras allows the TWCA Research Review Committee to make meaningful comparisons between cultivars across locations. TWCA's move away from subjective rating to an objective trialing program allows for direct conversations about how TWCA qualified cultivars fit within a water budget. This methodology also allows the program to quantify the differences in cultivar drought tolerance.

Qualified varieties

Recognizing that most turf sold today is retailed as part of a blend, TWCA has adopted the policy that blended products must be at least 70% TWCA qualified material to bear the TWCA seal.

TWCA qualification is a time-limited affair; once qualified, varieties retain their



TWCA's diverse 2017 membership: credit TWCA

qualification for eight years (16 years for Kentucky bluegrasses). Cultivars either lose qualification at the end of their qualification period or they can be re-entered into the TWCA trialing process in hope of requalifying. Because TWCA continues to raise the standards for drought tolerant qualification, any cultivar trying to requalify must meet a new, higher standard for qualification; thus, it is not uncommon for previously qualified cultivars to drop off the qualified cultivars list. The list of current TWCA qualified varieties can be found at <http://www.tgwca.org/qualified-products/>.

Expanding program; expanding scope

TWCA's commitment to member service is evident not only in the growth of the program's membership but also in the growth of TWCA's scope. While the program retains strong focus on trialing and qualification, significant effort goes into advocating for drought tolerant turf and gaining recognition of the considerable differences between cultivars.

In the past 2 years, TWCA has been instrumental in getting regulatory agen-

cies to recognize the significant water use differences between TWCA qualified cultivars and conventional cultivars of the same species. A significant part of this focus went into California where TWCA Qualified cultivars are the only cool-season grasses recognized as medium water using turfs and where TWCA Plant Factors (PFs) are recognized by the State of California Department of Water Resources for compliance with the Model Water Efficiency Landscape Ordinance (MWELo). MWELo is California's mandatory minimum requirement for landscape water budgeting and applies to new construction with landscape designs over 500 square feet or rehabilitated landscapes over 2500 square feet.

To capitalize on this major achievement, TWCA created a water budget calculator that calculates and outputs compliance for landscape designs. This tool specifically uses TWCA plant factors and is part of the MWELo compliance requirements for the State of California.

TWCA also was instrumental in the removal of "Voluntary Turf Removal" from the 2016 Independent Technical

Panel on Demand Management Measures (ITP) report to California State Legislature and in re-focusing the attention of the report away from drought tolerant turf and toward high water using plants in general.

In addition, TWCA is recognized as a source for drought tolerant turf in the Chesapeake Conservation Landscaping Council's Chesapeake Bay Landscape Professionals (CBLP) Maintenance Manual. The manual, used in the CBLP certification program, is available for free at <https://cblpro.org/study-materials/>.

Not all the expanded scope is focused on influencing regulation. TWCA is also deeply invested in helping communities maximize the benefits of drought tolerant turf.

Focus on foundation

TWCA's focus on membership means the number of "members-only resources" has also increased. For easy communication of membership and qualification, TWCA members have access to the TWCA logos and taglines in several formats. TWCA is making communication to homeowners and end-users even easier with pre-formatted radio copy for one minute, thirty second and fifteen second airtime spots. For members who prefer print ads, TWCA offers preformatted ads in a variety of formats, as well as door hangers that promote the responsible use of turf. Finally, members that use TWCA approved ads in their promotional efforts receive a fifty percent rebate of their membership dues annually, making the program a more affordable option and an instant return on investment.

To make it easier for specifiers to require TWCA qualified materials, the program has created specifier sheets for TWCA qualified sod and seed.

Representing a broad spectrum of interests in drought tolerant turf, TWCA has added capacity, expanded services to members and the community at large, and created a broad network of motivated partners and non-profits. If you have questions about how you can improve your efforts to conserve water, please contact us at jack.karlin@tgwca.org or become a member today at <http://www.tgwca.org/membership/>. **/ST/**

Jack Karlin is program administrator for the Turfgrass Water Conservation Alliance.



► FIELD

HARLEY PARK

UNIVERSITY OF SOUTH CAROLINA UPSTATE

► LOCATION

Spartanburg, SC

- **Category of Submission:** College Baseball
- **Sports Turf Manager:** Travis Dill
- **Title:** Sports Turf Technician
- **Education:** High school diploma
- **Experience:** While attending and upon graduation from high school I was employed by Village Greens Golf Course for 5 years. I then took a position at Cliffs of Glassy Golf Links for 2 years. After the Cliffs I moved to Woodfin Ridge Golf Club as Assistant Superintendent. I have now been at USC Upstate for 10 years as the sports field technician for Harley Park.
- **Full-time staff:** Travis Dill, Bruce Suddeth, Ben Williams, Daniel Jackson, David McNair, James Shull, and Matt Fincher (head baseball coach)
- **Part-time staff:** Kyle Floyd (assistant baseball coach)
- **Original construction:** 2003
- **Recent renovations:** Harley Park has gone under major transformation in the past 2 years. It began with the installation of split block wall around the sides of the ballpark and the grading of the skin back arc, as well as the infield to improve drainage. In 2017 the field has had a total Cambridge underdrain system installed to improve drainage even further. With this installation also came the grading and resurfacing of the entire

warning track with brick chips to make the drainage system last for a very long time. The block wall installation was due to the existing chain link fence deteriorating and to improve aesthetics. The Cambridge drainage system was necessary due to standing water on the field during rains and the field going anaerobic. During initial field construction this important element was not installed so 14 years later it now works perfectly. Harley Park has been amended tremendously since its construction. With the additions of sand and the buildup of organic matter Harley Park is responding great and especially now that drainage has been installed in the field.

- **Turfgrass variety:** Tifway 419 Bermuda; Eagle Blend perennial ryegrass during overseed
- **Overseed:** We overseed with Eagle Blend 3-way blend of perennial ryegrass at a rate of 10#/1000 ft/sq. As the season progresses and signs of wear are evident we apply rye seed as needed to keep a nice turf canopy. Even before overseeding, we apply a PGR to keep the bermuda in check and growth regulated. Mowing height is typically 1/2" to 5/8" depending on weather patterns. After applying the seed we topdress with a light coat of USGA spec sand and turn on the water or use rainfall, whichever is necessary. The amount of irrigation and moisture content is

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

monitored daily to promote seed development and create a canopy for play in 2 weeks.

► **Rootzone:** Native soil, clay/sand mix; also, Stabilizer Solutions blended into the top 4" of skin profile.

► **Drainage:** In 2017 a Cambridge underdrain system was installed with 50mm lateral lines 10' on center and 12-18" collector in warning track.

Why STMA should consider your field a winner?

Harley Baseball Park is the home of the USC Upstate Spartans men's baseball team. The park is one of the largest playing surfaces for baseball in the Atlantic Sun conference. Since Harley Park was built it has undergone several upgrades to the surface.

The Upstate Spartans at one time played all home games on a now historic minor league field named Duncan Park in Spartanburg. As time went on and Duncan Park needed more work, the University invested in building Harley Park on University grounds, which made logistics much better. Although Harley Park may not have the huge seating capacity of much larger D1 universities, the actual playing surface of the field is second to none.

As well as our men's baseball team using the field it is also used for baseball camps, softball camps, alumni games, and travel ball clubs.

Harley Park was originally built on a budget this small university could afford and then upgrades have occurred over the last 14 years. Even with the need for improved field performance the playability was maintained in large part to the Upstate "U Crew" constantly managing and improving the field of play. When Harley Park was built it did not have installed drainage throughout the field. Everything surface drained, which over time created serious problems with turf quality. Even though the turf quality may not have been the best at no point was safety compromised. The U Crew always found ways to dry the field and manage the situation. Practices like solid tine aerification before rains were routine, performing DryJect applications of sand and calcined clay continued in efforts to alleviate wet areas, and then the use of surfactants to help move the water through the soil profile were applied.

When the field was first built it was used for practice and game day play. That created even more stress on the field. Our Sports Turf Team, the U Crew, 100% in-house built our infield practice facility to take away some of the game field stress. Using those savings of building it ourselves we were able to use the funds to focus on Harley Park with its own upgrades. Those upgrades came in the way of installing a new block wall on each side of the field to replace deteriorating chain link fencing as well as renovating the infield. The infield renovation included stripping the sod, removing the heavy clay, regrading, adding a sand cap, and resodding. This helped infield performance greatly but the field still needed drainage.

The University administration knew we had done all we could to preserve the field and it was time to do something. This past summer in 2017 the field underwent major renovation with the installation of a Cambridge drainage system every 10 foot on center and went into a collector around the perimeter in





the warning track. The warning track was then capped off with new brick chips to improve drainage and appearance. Since the system has been in place we have had several rain events and the system performs flawless and we're able to get on the field to do maintenance immediately. Even more important, the team can now practice and play without waiting for the water to drain.

The U Crew has worked hard to provide our baseball team a first-rate, safe field. As we wind down the 2017 year and begin preparing for the 2018 season, Harley Park is one of the best facilities in the A Sun conference.

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

DILL: I remember as a kid growing up watching baseball on TV. I thought it was cool the way the fields were mowed and getting the glimpse of the grounds crew working and seeing how they done things. So I started working on golf courses and fell in love with the turf industry. And after 13 years on golf courses I found out USC Upstate was looking for someone to work on the baseball field. I've been here 11 years come November and I can say it's been one of the best decisions I ever made.

ST: What are your main responsibilities? And what does a regular working week entail, if a “regular week” even exists?

DILL: My main responsibility is Harley Park but I float around to Cyrill Stadium, our softball field that Daniel Jackson takes care of. We help each other out on both fields and it makes it easier that way. We do all the mowing, spraying, and infield work on both fields. I also get help from the baseball coaches on Harley Park, which helps out a lot as well. I am very thankful for Coach Fincher and his guys. We start our day at 6:30 and finish up at 4:00 on regular days; game days are longer but most of the time we are out of here by 10 pm.

ST: How do you keep up-to-date re emerging technologies, best practices, etc.?

DILL: That would be Twitter; I can say that is the best thing about Twitter. I love getting on at night scrolling through and seeing what everyone is doing with his or her fields. And if you would like give us a follow @theUgroundscrow, we are also on Instagram too. Also I learn a lot at our South Carolina STMA chapter meetings; our chapter is growing by the day. Every time we have a meeting there are more people there, which is a very good thing. We also have a Twitter handle for that as well @SC_STMA, give us a follow.

ST: What changes if any are you considering or have implemented for the winning field in 2018?

DILL: I would really like to do some fraze mowing in our outfield. We have talked about it for the past couple of years and if we are able to do so that is on top of the list.

ST: You know a lot of sports turf managers. What are they saying are the biggest obstacles to overcome for them to be successful today?

DILL: I'm not sure about everyone else but I think ours are transitioning from the ryegrass back to bermudagrass as well as compaction in our outfield spots and baselines. And our summer camps we have two big camps each summer as well as travel baseball and softball games.

ST: How has your career benefitted from being a member of STMA?

DILL: It has benefited a lot; I've met so many people because of the STMA. I've been lucky enough to go to the past three national Conferences and it's always a cool thing to be at the national show and somebody comes up to you and says are you the Ugroundscrow guys? I've had it happen a good bit. Always a good thing to meet other people and get a feel of how they do things and just take a few minutes to talk with them.

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

DILL: Greatest pleasure is coming to a place where you love to work and love the people you work with, and knowing they have your back when a problem comes up. We work hard to make our fields the best they can be every time those players step out on them. My biggest headache for me is, and nothing against



the baseball guys, but I can not for the life of me understand why they have to stand on the foul line to throw the ball during warm-ups. I didn't play high school or college baseball so maybe one day somebody can explain it to me. And why do softball players always stand in the same spot in the outfield? I guess those two things would be my biggest headache.

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

DILL: I saw it on an Instagram post from the STMA (@fieldexperts); it was by Tommy Campione and said, “Perform your job with pride and do not take short cuts or rush. Be proud of your work; do it properly and allow yourself enough time to accomplish the desired results.” I really liked that. I've never met Mr. Campione but maybe one day I will have the opportunity. /ST/



Kubota RTV-X1120

KUBOTA RTV-X1120

The RTV-X1120 is Kubota's most well equipped utility vehicle offered at a value price point of \$13,999 MSRP. Designed for 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 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.

TORO OUTCROSS 9060

Toro recently introduced the all-new Outcross 9060, a revolutionary, turf-friendly machine that delivers on the benefits of both a tractor and a super-duty utility vehicle. Designed to allow turf managers to do more with less stress, less labor, fewer resources and less time, the multi-purpose Outcross 9060 is a versatile, powerful and productive addition to any operation. In contrast to many traditional compact tractors, the Outcross 9060 is turf-friendly, thanks to a weight-balanced chassis and four-wheel steering, coupled with full-time four-wheel drive. All four wheels turn individually at a

rate determined by the machine's ground speed and turning angle. Turf managers can also pre-program attachment parameters, reducing the possibility of operator error. The Outcross incorporates a standard 3-point hitch with PTO, drawbar and universal loader mounting plate, enabling the machine to accommodate a variety of standard turf maintenance attachments.

KIOTI K9 UTV

The new Kioti K9 UTV is a fully featured, tough and reliable work companion. With a

24-hp, 3 cylinder, in-line vertical, water-cooled Daedong diesel engine and ground speed up to 31 mph, the K9 2400 is a workhorse that can pull, tow, and haul with ease. Operators will value one of the largest metal beds in its class with 1,102 lb. capacity, a standard spray-in liner and an optional hydraulic dump kit. Enhanced ergonomics and an abundance of storage make work a breeze. Other features include: 1,300 lb. towing capacity; 1,598 lb. payload capacity; hydraulic power steering; protection package with skid plates, front grill guard and front/rear hitch receivers; and 12.5-in. clearance with HD, Turf, ATV and Tomahawk tire options.

JOHN DEERE 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, which offer sports turf professionals spraying flexibility and control. Additionally,



Toro Outcross 9060



Kioti K9 UTV

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.

INFINICUT BY CUB CADET

"It's in a class by itself," says Neil Stubley, Head Groundsman at the All England Tennis Club, talking about the Infinicut by Cub Cadet. "These are some of the most prestigious tennis courts in the world, so we want the best equipment to help us maintain a championship performance.

We've seen an improvement in the quality of the playing surfaces since using the Infinicut." The Infinicut has been turning heads throughout the professional sports turf community. Widely celebrated for unrivaled results on prestigious European venues, the Infinicut is proving its worth on American golf courses, baseball diamonds, and grass stadiums. Sporting features like a dynamic return floating head, variable cut rate, and flexible setup using a wide variety of cassettes, the Infinicut delivers a spectacular quality of cut while ensuring healthier turf.



Infinicut by Cub Cadet

NEW REEL CONFIGURATIONS HELP REDUCE MAINTENANCE TIME AND COSTS

Toro introduces a new way to provide parts to its customers with the launch of Reels+ and EdgeSeries Reels+. Instead of providing reels, bearings, seals and spacers separately, Toro and its channel partners will be providing Reels+ and EdgeSeries Reels+ in a complete assembly, reducing the time required for technicians to install new replacement reels in Toro cutting units.

Demand in the marketplace and customer feedback has been a key driver behind the introduction of the new Toro Reels+ and EdgeSeries Reels+, which allow technicians to streamline their operations. With the bearings already pressed on with required low-drag flock seals and spacers, customers can save approximately 15-20 minutes of installation time per reel.

Additionally, the overall cost to the customer is lower due to the fact that additional bearings, seals and spacers are sold at a discount from the individual part retail price for each component. Integrating the reels and components together also eliminates the guesswork for technicians and ensures the recommended bearings are utilized, which can contribute to the overall longevity of the cutting unit.

In most cases, Reels+ assemblies will replace all reels currently offered through Toro's distribution network. In some cases where reels do not require bearings – for



John Deere ProGator 2020A

example, in gang reels and some greens applications – singular reel units will be available. Reels+ and EdgeSeries Reels+ are being phased in during 2018.



ECHO TURF APPLICATION SPREADERS

The newest ECHO spreaders, the RB-80 and RB-100S, contain sturdy steel frames to resist corrosion and maintenance-free gear casing. In addition, the oversized hopper contains a patented auger to help aid clumps of material to flow. The large blade design pulls material towards the opening and is double fastened onto the gear cases to not come loose like many competitor “pin” designs. The most innovative element is the unique spread pattern design. Unlike similar products, the four-pattern spread control mechanism comes standard on both models. Users have the option to use a standard full spread, a left pattern spread, a right pattern spread and a narrow spread for more precise applications. This is easily adjusted with the pull of two tabs located under the hopper.

CATALYST TECHNOLOGY FOLIAR NUTRITION

Amp Agronomy’s Catalyst Technology, a proprietary process that employs multiple U.S. patents, is a foliar nutritional line that provides the most efficient nutrient delivery system available on the market today. With agronomic and biochemistry advances, the benefits of growth hormones for maximizing plant performance have been seen throughout agriculture. TB-3

brings these same advantages to sports field turf and professional sod producers in a package that also includes vital nutrients for growth. As a tool for finishing, TB-3 will prepare your turf for the rigors of the playing season, or for harvest. Color, plant strength and resistance to stress are all enhanced with TB-3, helping give your turfgrass its look before and after a high wear or high stress event.

TEMPLINE CAN NOW BE ORDERED ONLINE

TempLine was the market’s first brand of removable synthetic turf paint and has been raising the performance bar ever since. Our paint works as hard as you do, to make your job as easy and risk-free as possible. We are excited to announce that you can now order TempLine on line. Whether you need paint for synthetic turf or grass, we’ve got you covered. Find what you need, choose the color and quantity, and add it to the cart. Review and complete your order by clicking on the shopping cart icon at the top of the page. Our system is fast, convenient, secure, and works harder so you don’t have to. We developed our TempLine products with the environment in mind. Professional football and soccer teams, universities, municipalities, and other athletic venues across North America have trusted our eco-friendly water-based paints since 1991.



BARENBRUG USA INTRODUCES NEW SEEDED BERMUDAGRASS: MONACO

Exclusively from Barenbrug, Monaco seeded bermudagrass is continuing the legacy founded by Riviera. The newest release from the Johnston Seed breeding program, Monaco, Cynodon dactylon var. dactylon, is a synthetic variety produced by the intercrossing of five clonal parent lines. Bred for a genetically darker green color, it also has quicker spring green-up, high fall color retention, and winter hardiness to help further extend the growing season for transition-zone areas. In the 2016 NTEP

trials, Monaco was a proven performer. Rating high in several categories, Monaco specifically stood out in trials encompassing overall turfgrass quality, early spring green-up, and fall color. Included in over 10 trial sites from coast to coast and from the transition zone to the Deep South, Monaco exhibits superior adaptability. This range of implementation makes it the perfect choice for traditional bermudagrass regions and transition climates alike. Dr. Charles Taliaferro said, “Monaco bermudagrass has performed well in turf evaluation trials conducted over a range of environments. It’s demonstrated performance makes it a good choice for a wide range of applications in the turfgrass industry.”



NEW INFIELD TOPDRESSING FROM TURFACE

Turface SlideMaster is a premier infield topdressing that plays a crucial role in improving sliding surfaces on skinned infields, and water management especially in dry conditions. Researched, developed and tested in the lab and on the field, SlideMaster meets the demands of today’s groundskeepers and coaches, making maintenance easier for field managers. SlideMaster is durable, long lasting, and offers the cleanest, most uniform particle screening of any vitrified clay or shale product. The all-natural reddish color blends well with Turface Pro League Heritage Red and Pro League Champion Brown calcined clays, and will not stain uniforms. SlideMaster particles are designed to allow water to quickly penetrate into the infield skin for deeper saturation, and can be combined with Turface calcined clay for optimum moisture management at the surface and in an infield mix.

SportsTurf

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STMA RECOGNIZES ITS 5, 10, 15, 20, 25, 30 & 35-YEAR MEMBERS

Thank you to members who have supported STMA through continuous membership for 5, 10, 15, 20, 25, 30 and 35 years! We appreciate your commitment to helping your

association grow stronger. All 5, 10, 15, 20, 25-year members will be recognized with their service pins this summer. Thirty and 35-year members will be receiving a special plaque.

35 YEARS

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Stephen Horne

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C. Tom Rudberg, CSFM

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25 YEARS

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20 YEARS

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STMA.org goes international

One of the features of the newly redeveloped website, STMA.org, is its ability to be translated into virtually any language. STMA's 2017 International committee, chaired by Abby McNeal, CSFM, strongly recommended to the 2017 Technology Team, chaired by Matt Anderson, CSFM, that the website be easily translatable into a variety of languages; that element became a core objective. All the pages on the site are translatable. Educational resources posted as PDFs on the website are presented in English only. The 2018 International Committee, also chaired by McNeal, is working to identify specific languages and resources to translate. There are several that are already translated in Spanish.

This translation capability helps to further the international efforts of the association to develop comprehensive global collaborations.

Have friends who speak Igbo and need technical information like the content on fraze mowing below? We hope you do! Please encourage them to go to STMA.org.

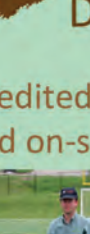
FRAZE ỊSỤ:

Fraze ịsụ na-inweta ewu ewu maka ike na-ewepụ thatch na organic buildup, enye a ezigbo mgbanwe site jụụ-oge na kpoo-oge ahihia, wepu ata, akwalite ọhụrụ turfgrass ibu, mma nkpuru Germination, ma melite ubi nchekwa. Pjā ebe a maka STMA si ngbasa ozi na Abamuru na-emeli nke Fraze ịsụ .



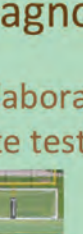
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STMA Affiliated Chapters Contact Information

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>

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bornino@purdue.edu or Contact Joey Steven-
son, 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 Association of New Jersey: www.sfmanj.org

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

North Carolina Chapter of STMA:
www.ncsportsturf.org

Northern California STMA:
www.norcalstma.org

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

Oklahoma Chapter STMA:
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Dr. Justin Moss okstma@gmail.com

Oregon STMA Chapter:
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Ozarks STMA: www.ozarksstma.org

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

Southern California Chapter:
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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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coincidence, these categorical areas are also the three areas of definition under most sustainability frameworks. Resolving these pressures and challenges to achieve a sustainable future will require the turfgrass industry to address each area and the interactions between these areas.

For most turfgrass managers, economic challenges are known and experienced commonly whether that be through increased input costs (e.g., fertilizer, water, others) or labor costs. The industry is also seeing environmental challenges emerge with increased restrictions and regulations on input use.

While many of these challenges will continue, one of the biggest pressures on our industry will continue to be around how society views landscapes and whether or not they value landscapes as something of value. Our industry needs to continue to explore ways to measure and promote the value of turfgrass and landscapes with respect to the broad social, economic, and environmental value they can provide when properly designed, constructed, and managed. As the saying goes, the 'best offense is a good defense'. By working proactively to create a defensible value position around the role of turfgrass and landscapes, the turfgrass industry will be able to create new opportunities and means to combat future pressures that may be social, economic, and/or environmental. **/ST/**

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tall fescue, 10% Kentucky bluegrass mix, and that has been mowed at the same height as the existing field. The soil should match the existing soil as much as possible. If thin-cut sod (1/4-1/2" soil depth) is used it may take a while for it to root and be stable enough to play on. Thick-cut sod (1-2") allows for immediate play. If you are lucky enough to have enough space to create a small sod farm on site, a sod cutter could be used to switch out the goal mouth.

Lastly, at the end of the season, carry out as much maintenance as possible to get a jump-start on the next season. As Dr. Dave Minner used to say, it's important to "put your field to bed." **/ST/**

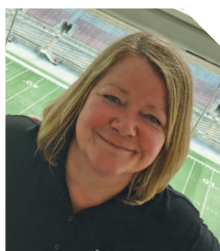
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Q&A with PAMELA SHERRATT

Sports Turf Extension Specialist

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Dang goal mouths!

Q: What are some tips to keep grass growing in soccer goal mouths?

A: A lot of action takes place in the 6-yard box on a soccer field, particularly in front of the goal line, or the “goal mouth.” Constant traffic can wear away the grass and trample soil, resulting in soil compaction. Soil compaction then leads to hard, unsafe playing conditions when dry, and mud baths when wet. Additionally, surface compaction makes it really difficult to get grass re-established. However there are several things you can do to increase the longevity of goalmouths over the playing season.

Pre-season, set your goals and thresholds. Aim to enter the playing season with 100% healthy grass cover. Make sure each goal area drains ($K_{sat} > 1''/\text{hr.}$) and is even, because if there are any surface evenness issues, puddles will form after a rain event. Communicate with field users and coaches on issues like whether the game field is used for practice. Set thresholds on field conditions; for example, fields should not be used if there is standing water or they are frozen. Talk about creating a warm-up space with a portable side goal for goalkeepers before games. The side goal could be placed inside the 18-yard box, off to the side of the main goal. This will keep goalies out of the game field goal and will help minimize traffic. Plan for, and document, times in the season when fields can be taken out of play to rest. This is especially important if fields cannot be moved.

Avoid, wherever possible, permanent goals that are cemented in. Portable goals will allow for field rotation and relocation to spread wear (see Google Maps satellite image showing field rotation program at Headley Park in Gahanna, OH). Soccer fields are typically orientated N-S so that the sun doesn't get in the players' eyes, but if goal mouths get worn down, fields that aren't land-locked could be moved. Per the Football Association, there should be 6 yards of space between fields (3 yards run-off for each field), 8 yards if you factor in spectators. Keep in mind all portable goals must be securely anchored during games and no one should climb or hang on them.

As the season starts, closely monitor grass cover. When density decreases, start a weekly overseeding program at a rate of 6 lbs. perennial ryegrass per 1,000 sq.ft. Pre-germinating the seed may provide a slight jump-start on germination, but perennial ryegrass is pretty fast already and should be up in 3 days. Combining the overseeding practice with light applications of fertilizer and making sure the seed stays moist will ensure success, since maintenance practices done in combination with each other usually yield better results than if they are done alone.



If there are any divots or wet spots in the goal mouth, use a hand fork to open up the soil and apply a light topdress of medium-coarse, uniform sand. This takes just a few minutes but is very effective at getting rid of puddles and allowing oxygen to get into the rootzone. Lightly hand forking goal mouths should be part of the standard routine. After a rain game, use a brush or leaf rake to stand the grass back up. This is especially important if the grass is laying over, covered in mud. Standing the grass back up will allow for greater photosynthesis and quicker drying of the leaf tissue. A walk-behind rotary mower can also help to stand grass up and remove any surface debris.

Between games, minimize traffic in the goals. This can be done by roping off the goal areas, removing goal posts, and/or covering the goal area with a growth blanket. Growth blankets encourage seed germination, conserve moisture and discourage traffic. Temperatures under the blankets can be increased by several degrees, which is very helpful with early spring and fall games. These are just suggestions and some may not be doable, especially in a public-use setting.

As wear increases, consider cutting the grass at a slightly higher height of cut, but be careful that there is no distinct difference between the larger playing surface and the goal mouth, since consistency is key for both player performance and safety.

If goals get severely damaged, consider sodding them. Per Weston Appelfeller, CSFM, director of grounds for the MLS Columbus Crew, it's important to maximize stability within the goal mouth by using large rolls of sod. So even if the worn area is only 2' x 2' in size, replacing it with a piece of sod measuring 4' x 10' will ensure greater consistency and stability. Use sod that has good lateral strength, such as a 90%

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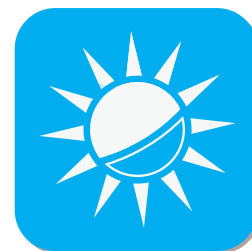
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