How sports turf saved a life - page 20



FIV res

The importance of mowing - page 32

nce

Calibrating backpack sprayers - page 36

April 2014

SPORTSFIELD AND FACILITIES

MANAGEMENT

FIELD OF THE YEAR: Eyes on the ball @ - page 40 PARK

ALSO INSIDE: WHAT DID THAT PhD SAY? Statistics made easy

SportsTurf

OFFICIAL PUBLICATION OF THE SPORTS TURF MANAGERS ASSOCIATION

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FEATURES

Facilities & Operations

- 8 What did that professor say? Statistics made easy
- **12** The Price is right: Chad's certifications make him an industry leader
- **14** Super Bowl groundskeeping crew beats outdoor conditions
- **18** Sewing synthetic fields v. gluing
- **20** How sports turf saved a life
- 22 Student's senior project is a "Diamond in the Rough"
- 28 The new Chicago Cub spring facility: one groundskeeper's saga

Field Science

- **32** The importance of mowing
- **36** Backpack and hand-held sprayer calibration

2013 STMA Fields of the Year

40 Schools/Parks Sporting Grounds: Infinity Park, Glendale, Colorado

Tools & Equipment

43 Sprayers

DEPARTMENTS

- 6 From the Sidelines
- 7 STMA President's Message
- **17** John Mascaro's Photo Quiz
- **46** STMA in Action
- 47 STMA Chapter Contacts
- 48 Marketplace
- 49 Advertisers' Index
- **50** Q&A



On the cover:

"Our city management team trusts us to make decisions on the playing surface and is always concerned how many hours the field is being used. This trust allows us to make the best decision possible not only for the short term but also future of our facility."-Noel Harryman, manager, turf operations, Infinity Park, Glendale, CO.

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From the Sidelines

Eric Schroder Editorial Director eschroder@specialtyim.com 717-805-4197

Why aren't you a member?

s spring sport athletes began hitting the fields here up North after the brutal, forever winter, thousands of folks whose job responsibilities include preparing and maintaining those fields were and are working overtime. Heck, even many of you fortunate enough to live in warmer climates have probably faced different problems than normal following the USA's SOB Old Man Winter.

How many people are facing problems that they really aren't sure how to handle? And if so, where do they turn for help? Conditions such as we're seeing now provide a terrific example of why ponying up the dough for membership in the Sports Turf Managers Association is money well invested (plus your employer might reimburse you—ever asked?).

The STMA founders got together initially because they wanted to improve the sports turf industry through sharing knowledge and exchanging ideas. And that's still the true core mission of the association. Conference attendees' discussing their field issues and offering advice to one another over coffee or beers is a great STMA tradition treasured by members. But you don't have to attend the Conference to have access to this advice; your membership alone can do it.

Here are just a few of the topics about which the STMA provides information, and the sources of this info are the best minds in the industry: professional development; turfgrasses; construction and renovation; recordkeeping; environmental stewardship; cultural practices; turfgrass insects, weeds, and diseases; and university research.

The biggest resource though is the membership itself. For example, I have yet to hear a story about a member responsible for 20 acres of parks and fields in a small town calling the guy or gal who manages Division I fields at the state university and being told, "I'm too busy to help you" or "I'm too good to return a call from a parks and rec guy." I'm not saying it's never happened but if anyone reading this knows of such a situation please let me know and I'll report it here, aka eat my hat.

Of course there are other benefits to membership as well, such as access to the Members Only section on www.stma.org where you'll find a Career Center that offers help in finding or filling positions in the industry, as well as resume and interviewing tips and other career advancement assistance specific to our industry. There's also the Playing Conditions Index, a tool developed to assess the playability of your fields at specific points in time. Using it can provide guidelines to maintenance practices, assist in communicating with user groups, and prove to your boss why you need more resources.

And of course there are normal association benefits of membership like a directory of members (to find that Division I person who won't rebuff you) and awards programs. Perhaps the most important among these benefits is the Certified Sports Field Manager program, an earned designation that signifies you as a serious professional with expert credentials.

I am sure there are plenty of turf managers out there who consider themselves serious and professional who aren't members; maybe it's time to show your family, friends, bosses and co-workers just how serious and professional you are by joining the STMA.

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1030 W. Higgins Road Suite 230 Park Ridge, IL 60068 Phone 847-720-5600 Fax 847-720-5601

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Chief Executive Officer Kim Heck

STMA OFFICE

805 New Hampshire Suite E Lawrence, Ks 66044 Phone 800-323-3875 Fax 800-366-0391 Email STMAinfo@STMA.org <u>www.ST</u>MA.org

EDITORIAL

Group publisher: Jeff Patterson Editorial Director: Eric Schroder Technical Editor: Dr. James Brosnan Art Director: Brian Snook Production Manager: Karen Kalinyak

Stma Editorial Communications Committee

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Subscription Services Phone: (847) 763-9565 Fax: (847) 763-9569

Reprints Debra Welter dwelter@specialtyim.com

Group Publisher

Jeff Patterson Phone: (763) 383-4458 jpatterson@epgmediallc.com

Account Representatives: Chris Pelikan Senior Account Manager - East Phone: (954) 964-8676 cpelikan@epgmediallc.com

Peggy Tupper

Senior Account Manager - Mid-West Phone: (763) 383-4429 ptupper@epgmediallc.com

Leslie Palmer

Senior Account Manager - West Phone: (248) 731-7596 Ipalmer@specialtyim.com

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President's Message

David J. Pinsonneault, CSFM, CPRP dpinson@lexingtonma.gov



Spring thoughts: "Can Do" does not always mean "Yes"; don't hide

pring has finally arrived after such a long winter of being cold and confined indoors. Spring invariably brings a multitude of practices and games of soccer, lacrosse, baseball, softball and even track meets. Hopefully the hard work you did in the fall coupled with your renewed energy from Conference has your fields ready to shine for users young, old and in between. Safe and playable is what we do. This profession also brings a positive "can do" attitude to our jobs. It sets us apart from other professions. We always try to accommodate our user groups and stakeholders; sure you can play today; sure we can prep the field after a rain storm; sure we can set up portable lights for extended play; sure we can mow the field again for proper ball roll or to put in a pattern; and so on.

There are many other examples of how we as professionals accommodate our user groups so they can go out and enjoy their activities without having to worry about the playing surface. All of this is done while keeping the fields safe and playable. The spring season brings time crunches and bad weather so we have to elevate our games so they can play theirs.

Here in Lexington the Public Grounds Division is the "can do" provider of fields for sports and special events. But "can do" cannot always mean "yes." For example, we are in the planning stages for the Lions Club Carnival. This event used to be held every year on our varsity baseball and softball fields. Each July for a week there are large rides (Ferris wheels are big), food and game trailers, and thousands of people enjoying the grass fields and leave their mark. When the carnival leaves on Sunday the fields have to be repaired for our semi-pro baseball team to use on Wednesday. In 2010 the Town approved a \$1.5 million capital project to reconstruct all of the fields at this complex. Our "can do" became you cannot use these fields due to the investment and the elevated quality of the field. But our "can do" attitude did not leave the group hanging and we helped them find another park area to use that, although requires turf repairs after use, does not impact play. "Can do" means we will try everything to get a game or event in but it does not mean sacrificing a season for that one game or event. There has to be a balance.

My second thought is "don't hide." You all do great work, often with limited budgets, staff, resources, and time while still providing quality fields. Be the visible "go to" person that is the expert in all matters relating to your fields. Actively communicate with your user groups so they know and understand your maintenance program, what their responsibilities are and how you handle inclement weather. Let them know that if issues arise you need to be the first to know.

There are appropriate times to remain hidden in the background but not when it comes to field maintenance and use. It took years of discussion but we finally have teams picking up their own trash, not hitting or throwing into fences and not taking batting practice from the front of the mound. We also have soccer teams realigning their fields to spread out wear areas. Being visible and up front makes it easier to get buy-in and lets them know that what you do provides them with safer fields. It also makes it easier to say to no a game or practice when the condition of the field is at stake. This is budget time for many of us so being the leader and promoting what you do helps to secure the resources you need to provide safe playable fields. This profession is very humble which is good but we need to be visible at the right times so we have a say. Remember to make an impact and not an imprint. Enjoy the spring!

ashing et

WHAT DID THAT PROFESSOR SAY? Statistics made easy

e are surrounded by numbers every day. You may not realize it, but statistics plays a large role in our daily lives as well. Weather forecasting takes numbers and makes predictions about the weather based on weather models. Disease models for predicting turfgrass diseases do a similar service. Based on numbers related to temperature, humidity and leaf wetness, these models can forecast the startup of a turfgrass disease. We know that pest control products are tested for their effectiveness to control pests. Statistics are behind every medical study and batting average you hear about. Soon we will be bombarded with those political voter polls.

Statistics are sets of mathematical equations that are used to analyze what is happening in the world around us. It is a science of decision making. It is a science of "chance" or "probability." It is the science of collecting, organizing, and interpreting data whether it is numerical or non-numerical. We live in an information and technological age where we have everything at our finger tips. H.G. Wells, the father of science fiction, predicted that statistical thinking would be as necessary for daily living as reading and writing. Statistics may seem intimidating at first, but it is not once you develop a clear understanding of this simple subject.

BASIC UNDERSTANDING OF TERMS

Before we start, a discussion and understanding of some basic terms are needed. *Descriptive statistics*[are used to describe sets of numbers such as plants heights achieved due to applications of fertilizers. Researchers can organize these numbers into tables and graphs called *requency distributions* (the frequency a number may occur due to a factor involved). The following data set illustrates measurements of plant heights in centimeters after a fertilizer application). We will use this data to help us define some terms.

Plant Heights (cm) due to Fertilizer Applications							
10	14	11	12	15			
15	12	13	14	13			
12	8	12	9	10			
13	11	12	8	10			
9	16	7	11	9			

As we look that this simple data set, we can determine a **median**, a **mean**, and **a standard deviation**. The median is the measurement that lies in the middle of the data, at the 50th percentile. In this example, it is 12 (range is 7-16). At times, it is better to express the median rather than the average (also known as the mean, see below), especially if the data contains outliers. The median could be a better indicator of true center especially when NBA salaries are being discussed.

Plant Height (cm)	Frequency	Percent	Percentile
7	1	4	4
8	2	8	12
9	3	12	24
10	3	12	36
11	3	12	48
12	5	20	68
13	3	12	80
14	2	8	88
15	2	8	96
16	1	4	100
Totala	25	100	
TUTAIS	20	100	

The mean is simply the average (plant height x frequency observations = 286 cm / 25 frequency observations = 11.44 cm) for the data set. The standard deviation (SD = 2.38) indicates the average difference individual data varies from the mean; how concentrated the data are around the mean. So why is this important? Without standard deviation, you cannot get a feel for how close the data are to the mean or whether the data are spread out over a wide range. Without standard deviation, you cannot compare two data sets effectively. Two data sets can have the same mean, but vary greatly in the concentration of data around the mean; therefore different standard deviations.

The **distribution** of a data set can be a graph of all values and their frequency of occurrence. One of the most common distributions is called the normal distribution or *bell-shaped curve*displaying numerical data in a symmetrical curve.



The center of the bell is the mean and most of the data is usually centered on the mean.



The red area represents this data and one standard deviation +/from the mean, 68% of the data (34% on either side of the average). The green area represents two standard deviations +/- from the mean or 95% of the data (red plus green) under the curve. The blue area then represents three deviations +/- from the mean or 99% of the data. Since every set of data has a different mean and standard deviation, an infinite number of normal distribution curves exist.

Confidence intervals (CI), usually set by the researcher, establish a level of confidence or reliability to an end result based on some treatment perhaps to a human being or plant in repeatable trials. The CI is represented by a percentage, so when we say, "we are 95% confident that the result of this herbicide application will provide 98% control of dandelion," we express that 95% of the observations will hold true. In practice, confidence intervals are typically stated at the 95% confidence level. However, they can be shown at several confidence levels like, 68%, 95%, and 99%. When a research trial is conducted, the confidence level is the complement of the respective level of significance, i.e. a 95% confidence interval reflects a significance level of 0.05, referred to as alpha (α). The level of confidence is often dependent on the number of observations with more observations yielding a higher level of confidence.

When data is collected, researchers typically look for something unusual or out of the ordinary and often ask if this is significantly different from a norm. Will it or does this happen with a very small probability of happening just by chance? **Least Significant Difference** (LSD) is a measure of significance usually with a level of significance (α = 0.05) denoted as LSD_{α = 0.05}=0.05 or LSD_{0.05}. We will revisit the use of this term when we show an example of a data table and bar graph.

EXPERIMENTAL DESIGNS

How an experiment is designed can make the difference between the collection of good data and bad data. The objective of experiments is to make comparisons of *treatments* that will support a thought or hypothesis about an area of interest. Treatments can include the applications of fertilizers or pesticides, the incorporation of a cultural practice or the evaluation of disease resistant turfgrass cultivars or combinations thereof. While comparisons of treatments are important, so are comparisons to an untreated control to determine the true effects of each treatment if nothing was being applied. The untreated control establishes a baseline for comparison. Collecting good data and then applying the proper data analysis is important for drawing or making appropriate conclusions about the experiment.

In experimental designs, data (measurements/observations) are usually subject to various, uncertain external factors. Treatments and full experiments are usually repeated, *replications*, to help identify any sources of variation, to better estimate the true effects of the treatments thereby strengthening the reliability and validity of the experiment. Statistically, replications help to reduce experimental error due to unknown or uncontrollable factors (i.e. variations in soils). Replicating treatments within an experiment is as important as repeating entire experiments to see if results can be repeated with confidence. **Randomization** is also an important component to experimental design. One way to minimize bias in an experiment is to randomize treatments. This will become clearer as we look at some experimental designs.

Two common experimental designs that you may hear of in a seminar or conference presentation are illustrated below.

Complete Randomized Block Designs are one of the simplest, most common experimental designs for field trials. Here, you may be looking at the effects of one type of treatment, i.e. herbicide effectiveness. Treatments can be replicated three, four or more times dependent on the type of trial it is. Disease trials tend to have more replications due to the high variability among treatments from replication to replication. Treatments also remain in single blocks.

Complete Randomized Block Design							
Replicate 1	7	4	6	1	3	5	2
Replicate 2	6	4	1	7	5	3	2
Replicate 3	5	7	2	3	1	4	6

You will note that seven treatments are completely randomized in each of three replications or blocks. The treatment numbers can correspond to a treatment list.

Treatment No.	Treatments
1	Untreated control
2	Herbicide A, Rate 1
3	Herbicide A, Rate 2
4	Herbicide B, Rate 1
5	Herbicide B, Rate 2
6	Herbicide C, Rate 1
7	Herbicide C, Rate 2

Again, it is the randomness of the treatments that will eliminate bias of plot location within each block along with replicating the treatments that will help to increase reliability of the data.

Split Plot Designs are a special experimental design when several factors are being evaluated or some constraint (i.e. turfgrass species) prevents you from using a complete randomized block design. A variable could be the application of fungicides to test disease control on these specific turf-



Split Plot Design

Split Flot Desi	iyii									
Replicate 1	Α	А	А	А	А	В	В	В	В	В
	5	2	1	4	3	1	3	5	4	2
Replicate 2	В	В	В	В	В	Α	Α	Α	А	Α
	3	5	1	2	4	4	3	2	1	5
Replicate 3	Α	А	Α	Α	А	В	В	В	В	В
	4	3	5	1	2	2	1	3	5	4

grass species. The diagram above demonstrates a split plot design.

In many cases you need to fit the experiment into existing resources, like an established stand of grass. You will note that blocks A and B (i.e. two turfgrass species) are planted in blocks as a constraint of the experimental design, but are randomized within each replication. Within each replication, fungicide treatments are then randomized within each species. Treatment 1 may correspond to an untreated control, while treatments 2 through 5 may correspond to four different fungicides.

Additional experimental designs are available dependent on the number of factors being looked at; however, the more factors (i.e. species, fertilizers, pesticides, cultural practices, etc.), the more difficult it is to analyze, make comparisons, and draw conclusions.

ANALYZING THE DATA

After all the data has been collected, the choice of analysis is just as important as the experimental design. This is often considered the black box of statistics. The wrong analysis can lead to wrong conclusions. Researchers need to ask themselves this, "Will I be able to legitimately and correctly answer the questions that I set out to answer after the data has been analyzed?" **Regression and Correlation** can be used to test a cause and effect relationship and how well that relationship is correlated. An **Analysis of Variance** (ANOVA) can be used to test the effectiveness of one product to another and how well that data may fit a regression line.

Regression is all about relationships answering questions like, "Does nitrogen fertilizer cause turfgrasses to grow taller?" Here we can relate two variables like fertility and growth and understand that we may observe a positive slope on a graph—turfgrasses will grow taller with increasing rates of nitrogen

Continued on page 44













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THE PRICE IS RIGHT: Chad's certifications make him an industry leader

ports fields are a hot commodity and the construction industry that creates and maintains them is as competitive as the sports that play out on them. So when your livelihood depends on building and maintaining those fields, doesn't it makes sense to learn everything you can?

Chad Price thinks so. As the owner of Carolina Green







▲ Chad Price, CSFM, CFB Corp., a full-service athletic field construction company in Indian Trail, NC, Price is a strong advocate of remaining informed about the ever-evolving sports facility industry.

"A lot of things have continued to improve," Price noted. "The equipment, the science behind it, the education for, the training for it, even the associations for it. It just keeps changing."

Price has made staying current on technology and techniques his priority, to the point where he holds not one but two certifications related to the sports field industry: Certified Sports Field Manager (CSFM) obtained through the Sports Turf Managers Association, and Certified Field Builder (CFB), from the American Sports Builders Association.

While the two certifications differ in focus, both have prerequisites, including in-the-field experience as well as educational and activity requirements. Once all those are satisfied, each certification includes a written exam.

Price, who maintains both certifications, said he is glad to have gotten them—and that they continue to reap rewards for him.

"Both certifications have been very helpful professionally and personally as well," he notes. "I will say this about both tests; the material is different, there is a different emphasis on things for each, but both are very fair and thorough examinations." The ASBA's Certified Field Builder program includes several options; builders can elect to gain certification as CFB-N (Certified Field Builder-Natural) indicating knowledge of natural grass fields, or CFB-S (Certified Field Builder-Synthetic), for those who concentrate on artificial turf. The CFB designation indicates a knowledge of both types of field.

In Price's opinion, while the ability to market his work is enhanced by the dual certifications, the increased benefit is to his customers, as well as other buyers, who can finally feel confident about finding an expert.

"It gives us the ability to give assurance to the owner that they will have people out there who know what they're doing. I'm just really happy and excited and thankful that STMA and ASBA offers these."

Price gained his CSFM certification approximately 10 years ago. He was delighted to see it offered in a still-developing industry.

"I've been in business maybe 27 years, and building fields exclusively for about 23 years. When I started, there was no construction manual; in fact, there was very little written information at all about how to do this or how to do that. There were very few contractors that specialized in it around the country."

Colleagues would share information, he noted, but "everyone was trying to learn from one another. I got the CSFM first; it was maybe the second or third year it was offered."

It wasn't until a number of years later that he heard rumblings about ASBA's plans to offer its own certification test, this one for field builders.

"Once I heard the CFB test had become available, I absolutely wanted to be the first one in that room."

The industry had grown, he noted, and a test was sorely needed to help owners find knowledgeable help.

"At the time, there were architects who knew how important it would be to have a qualified contractor, and how much we needed a pre-qualification requirement if someone wanted to bid on a job."

Owners, he noted, were not getting fair bids, since many contractors simply did not know all the facts about sports fields, whether synthetic or natural.

"You'd be competing for a job against someone who

thought you could go to the site and put stone down and grade it and put turf down and there you go. It's certainly not that simple. We were all hitting our heads against the same issues."

Badly built sports fields fail, and owners often did not have the funds to correct the myriad problems they were faced with. Price was glad to see a certification that would finally provide a benchmark.

"I think the certifications certainly hold a lot of weight," said Price. "More and more people are incorporating that into their specifications. Obviously it helps me when we see it on requirements."

The science of sports turf is growing overall. More universities are offering sports turf programs, and those programs are being expanded to cover not just golf (for which some were originally designed) but the plethora of other sports played.

"It's an exciting time," said Price. "I really feel like we're on the cusp of all that."

Certifications such as CFB and CSFM are not granted in perpetuity; those who hold them must maintain them on a regular basis by accruing educational and activity points.

"There's no question in my mind; if you can pass that test, without question you are qualified," said Price. "You have the knowledge."

It's not just personal opinion, either. In a 2008 decision by the Attorney General of Massachusetts, the AG upheld the right of a local school district to restrict bidding for a running track project to companies employing an ASBA Certified Track Builder. In defending its bidding restriction, the school district successfully argued it had encountered serious problems regarding the workmanship in prior track installations justifying the use of the certification requirement as a means of identifying qualified contractors. (It is also worth noting that the Massachusetts Attorney General Office supported a town's right to include minimum contractor experience clauses in bidding documents as long as they were reasonable).

Price is not surprised about the growing demand for certification and he is glad to see it. "I'd say certifications definitely sets us apart from other companies. It's good that there is a standard."

Note: Information on the Certified Sports Field Manager exam is available from STMA (http://www.stma.org/). Information on the Certified Field Builder exam is available from ASBA (http://www.sportsbuilders.org/)

Mary Helen Sprecher is a free lance writer who wrote this article on behalf of the American Sports Builders Association. ASBA is a non-profit association helping designers, builders, owners, operators and users understand quality athletic facility construction. ASBA publishes Sports Fields: A Construction and Maintenance Manual, a comprehensive guide to the design, construction and maintenance of sports fields. The book is available for purchase either in hard copy or in electronic form. Information is available at www.sportsbuilders.org.

▼ Mid-season turf replacement at Washington's FedEx Field using Carolina Green Corp.'s sod grown on plastic



SUPER BOWL GROUNDSKEPING CREW BEATS OUTDOOR CONDITIONS

▲ Snow at MetLife Stadium in East Rutherford, NJ before the Super Bowl.

n an otherwise empty MetLife Stadium near

midnight on February 2, several t-shirt wearing, helmetless Seattle Seahawks players and their loved ones raced joyfully along the sidelines, reveling in the team's 43–8 demolition of the Denver Broncos in Super Bowl XLVIII.

The celebratory confetti dotting the green field would have looked just an hour earlier like unseemly dandruff needing to be promptly scraped off for marring the playing surface's otherwise handsome mien.

For the approximately 30 groundskeepers who'd lovingly tended the pasture over the previous weeks, its pristine condition for the game was a source of pride—all the more so, given concerns over this being the first Super Bowl scheduled for an outdoor, cold-weather venue.

But the unseasonably warm day that produced an evening temperature of 49 degrees at kickoff did little to diminish the crew's satisfaction at having readied the turf for winter's worst.

Among most groundskeepers' first tasks upon arriving in New Jersey in mid-January was unloading snow plows and snow-blowing and -clearing machines from several tractor-trailers packed with equipment to prepare the stadium's field, as well as those at the Jets' and Giants' prac-

tice facilities, where the two Super Bowl teams trained for what routinely is television's most-watched American sporting event.

Regardless of the climate, the crew was composed, as it normally is, of groundskeepers who've been on Super Bowl duty for many years and even decades and who, much like the athletes, are team players.

They included men and women recruited from the National Football League, Major League Baseball, college football, an Alabama turf farm, The Toro Company, and even two professionals from Japan and an Iowa State University senior majoring in horticulture.

"The Seahawks won the game, but the crew members, in my book, were also Super Bowl champions," said George Toma, who knows of what he speaks, having now worked every Super Bowl since the inaugural one in 1967.

Toma is retired from a long, full-time groundskeeping

career, primarily with the Kansas City Royals. But he's drawn back to the turf for baseball's spring training and such highlight events as the Super Bowl, whose crew he once supervised. That job now belongs to Ed Mangan of the Atlanta Braves.

"This year was probably the most challenging [Super Bowl] on so many fronts, and they did an unbelievable job maintaining that field



▲ Left: Lee Keller, University of Vermont, painting an end zone. **Right:** Terry Lee, George Toma, Gerald Anderson, & Randy Baker in frigid New Jersey.

and getting it to perform the way it did," said NFL director of event operations Eric Finkelstein.

The league, he explained, selects crew members who are "the best of the best."

While it's the biggest of the big games, the Super Bowl has company at the NFL's summit. Other important dates drawing the cream of the league's landscaping crop include the annual Pro Bowl exhibition and the regular-season contests played overseas. For 2013, that meant two games in London's Wembley Stadium; three are scheduled there for 2014.

Absent conflicts with their full-time jobs, most Super Bowl crew members work those special NFL dates, too.

Everyone must be a jack-of-all-trades, doing "a little bit of everything" to help whip the sites into shape, said Lee Keller, the University of Vermont's athletic turf manager for whom New Jersey was his 15th Super Bowl.

For the Super Bowl, that means, primarily, tending to the turf throughout the weeks of preparation, along with a heavy dose of painting: of the yard-lines and their numerical designations; team names; and NFL, AFC, NFC and Super Bowl trophy logos.

Getting it all done involves emptying much of the warehouse where the equipment is stored for shipment to the Super Bowl site. The items include standard gardening and carpentry tools, like rakes, shovels, brooms and drills; machines, such as motorized carts and sod cutters, and even end zone and sideline pylons.

The artistic-design side requires an abundance of supplies, too, such as multiple 5-gallon pails of specialized field paint, rails, boards to mark the lines, stencils of the numerals and hash marks, and turbine blowers to dry paint. Painting the teams' names and the conferences' logos in the end zones means having four stencils onsite, not two, since the shipment typically reaches the Super Bowl venue before the AFC and NFC championship

games.

The frigid temperatures and snow in the days leading up to the Broncos-Seahawks matchup necessitated unusual measures. Heated tents were put up to prevent the paint from freezing as it was being applied. The Saturday night before Sunday's game, the artificial turf field was covered and heat blown under the tarpaulin to assure excellent on-field conditions.

The planning began as far back as last year's Super Bowl in New Orleans's weatherneutral Superdome, several

groundskeepers said.

The preparations also included such micro issues as preparing the supply list, since departing and re-entering the game and practice sites involves security-related, hours-wasting delays.

"To leave the stadium to get a gallon of paint striper, paint rollers or sandpaper takes so much time, so we bring a lot of that stuff with us. If we need 'em, we got 'em," Keller said.

Getting the field ready is complicated by other Super Bowl-specific schedules. While sports' great appeal lies in its unscripted nature, so much about the Big Game's sidelights is choreographed. The pre-game, half-time and post-game shows are the products of rehearsals—not just of the musical performances, but also to swiftly erect and deconstruct the television, trophy-presentation and concert stages.

Sometimes, faux fields for that purpose are painted with precision in the host park's parking lots. At MetLife Stadium, that wasn't the case, so the field guardians had to work cooperatively with the entertainment and television producers. When rehearsals ended, the groundskeeping staff put their powerful vacuums and magnets to work, scooping up such debris as errant nuts, bolts, paper clips and safety pins to prevent injuries and unsightly litter. That routine also is followed in-game.

In New Jersey, "there were probably more rehearsals" than at other Super Bowls, said Arizona State University's facility manager, Pete Wozniak, who would know, having now worked 19 Super Bowls. But the other crews, he added, "work well with us," including by taking care to stay off the freshly painted logos during rehearsals and on game day.

Another member of this year's grounds crew, Josh Lenz, is now just 18 Super Bowls behind Wozniak. From a national pool of 62 applicants from 40 colleges, the Iowa State student was selected by Toro and the NFL to work the game on the basis of an essay-writing contest on why the profession appeals to him.

The week-long Super Bowl internship program is an effective way to cultivate the next generation of talent, said Toro's sports fields and grounds sales manager, Dale Getz, CSFM.

From the moment he reached New Jersey the Sunday preceding the Super Bowl, his turf-management professors were plenty understanding of his absences from class, he said, Lenz kept busy handling whatever tasks he was assigned at the practice and game-day fields. He spent one day doing only snow removal, another primarily painting.

And he took smart advantage of the continuous networking opportunities.

"I tried to interact with as many [professional groundskeepers] as I could during the week. It was really cool to meet George Toma."

George, it turned out, wasn't the only Toma on duty. His son, Ryan, took time off from his job as an airline pilot to lend a hand, too.

As they departed the stadium hours after the game and after all the post-Super Bowl packing and clean-up was done before the snowstorm due Monday morning, the Tomas smiled.

For while Ryan's dad now has a 48-year Super Bowl streak going, XLVIII marked a first for George, since none of the previous 47 had been played on a Feb. 2.

On the enormous, end zone scoreboards appeared the elder Toma's likeness, along with the message, "Happy 85th Birthday, George."

Despite the first outdoor, cold-weather Super Bowl's failure to produce a single snowflake or hint of wintry pigskin magic, it was, for Toma and his colleagues, a singular experience.

Hillel Kuttler is a Baltimore-based journalist who writes regularly for the N.Y. Times. He may be reached at hk@hillelthescribecommunications.com.

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John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Dark green and light green lines on field **Turfgrass area:** College baseball infield **Location:** Arlington, Texas **Grass Variety:** Tifway 419 bermudagrass

Answer to John Mascaro's Photo Quiz on Page 31





SEWING SYNTHETIC FIELDS V. GLUING

Editor's note: The author is CEO of Turf Sewing Machines.

know what you're all thinking: here comes the most

biased article I've ever read. As much as I'd like to put on my sewing pompoms, I'll go against my better judgment and remain mostly unbiased. For years I have heard the questions about sewing vs. gluing—which is better? Which lasts longer? Which is easier? Which is more cost effective? The fact is both are effective and both have their advantages.

WHY ARE GLUED SEAMS BETTER?

• Gluing is widely considered easier and I surely agree. See that, glue guys? I'm not so bad.

• The need for skilled, technically proficient labor is not required. This is an enormous advantage for crews that travel state-to-state or nationwide. Why? You can easily pickup unskilled labor anywhere you land. Finding and affording skilled labor is often an arduous task. Not to mention, you have to pay for their hotel, airfare, food, and expenses. Hey, that adds up.

• Glue doesn't need a technician or service station. By employing glue you don't have to contend with a sewing machine malfunction half way down a seam.

WHY ARE SEWN SEAMS BETTER?

Sewn fields cost exponentially less. Let's compare apples to apples in a cost analysis. Say Crew A, which sews, and Crew B, which glues, both install 10 full fields a year for 10 years. Crew A will make an initial \$20,000 investment for two cart-style sewing machines; including repair maintenance and supplies, two cart sewing machines will cost you roughly \$40-50,000 over the course of 10 years. Crew B will purchase glue for every field they sew. To glue a full field (with quality glue) it will cost approximately \$15-20,000 per field. Let's go on the low side



and call it \$15,000 per field. A gluing operation over 10 years will therefore cost \$1,500,000. Crew A will have spent \$50,000. Double-check me, because I almost don't believe it. Tack another \$300,000 in skilled labor for the sewing crew and sewing still saves you well over a million dollars.

Sewing fields can be performed year round; you don't have to worry about glue expanding/contracting in extreme temperatures. In addition, you don't have to waste a full day waiting for a field to cure. Crews can immediately work/walk/drive over a sewn seam.

If you are waiting for that biased "sewn seams last longer" comment, I won't go there. I'm just going with facts here.

Just to further prove I'm an equal opportunity, non-biased guy, my advice is, if you're going to glue go with the best product.

One installer's perspective

"Like everyone we glue and we sew. We've glued entire fields in the past, and we have also sewn entire fields and all combinations in between (inlays). From a skill set, we believe it is easier to glue full panels vs. sew. There are pros and cons to both but if you truly look at the bottom line over time, the sewn seam has proven to us to be a better product. Classic example is an all-green field with sewn seams from sideline curb to sideline curb; we have had almost no call backs to repair a seam. We've kept track of almost every repair from the fields we've installed since 2000 (about 45 million sq/ft) and about 95% of redo's and repairs are of glued seams.

Gluing full panels is surely trending up which may be a reaction to the tighter stitch gauges, underlayments and lighter infill weights being used. From our experience, the sewn seam has lasted longer than the average glued seam and has less call backs for post install care. "-John Huard Jr., vice president, Northeast Turf

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HOW SPORTS TURF SAVED A LIFE

or 28-year-old Craig Sampsell working in the

sports turf industry has been his passion as long as he can remember. From youth sports to the professional ranks, he has manicured athletic fields of all shapes and sizes. But the path has been anything but straight and narrow.

Growing up near Indianapolis, Craig was quickly drawn to turf management through his father, who owned a sports field construction and renovation company called Diamond Designs. Before Craig could drive a car, he would accompany his dad and uncle to projects around the state to lend a helping hand. While most kids were competing on these fields, Craig was learning about proper safety and field preparation techniques.

His love affair with natural grass turned serious at 16, when he dropped out of high school to work full-time for Diamond

Throughout his journey, Craig has numerous people to thank for their support and confidence that he would, one day, succeed. He's been so impressed with the STMA and how the organization has always emphasized the importance of acting like a professional and doing the job right.





Louisville Slugger Field. Photo by Mike Stewart.

Designs. Three years later, the company folded and, in early 2003, Craig and his dad were without jobs.

Fortunately, their sports turf expertise was quickly acknowledged by Carmel Dads' Club, a 100-plus acre sports complex near Indiana's Clay County. Dad and son were hired full-time in August 2003 and spent countless hours together mowing, aerating, edging, overseeding and topdressing. As things just started to feel normal again, the family would suffer an even larger tragedy.

In January 2004, Craig's mom took her own life. Racked with grief, he began to head down a very dark road. For the next few years, he was uncertain of his purpose on earth. He didn't have a high school degree or any direction to follow. Craig gained significant weight and began smoking to deal with the stress. Regardless of the tough times, his appetite for sports turf never faded and he tried to stay focused on his work at Carmel Dad's Club.

Finally, Craig's luck began to turn. In January 2006, just 2 years after his mother's passing, he met his future wife, Caroline. She immediately started guiding him back to a better track and questioned why he hadn't pursued his GED. Craig didn't have an answer and, to be honest, he didn't have an answer for most questions in life.

With Caroline's persistence, Craig was a high school graduate by August 2006 with an Honors GED and, soon after, enrolled at Indiana University-Purdue University of Indianapolis (IUPUI) to study sports management.

To learn more about his specific trade, Craig became a member of the Sports Turf Managers Association (STMA) and conducted extensive research online. He reached out to other sports turf managers via e-mail, phone and social media to try new techniques in hopes of improving the fields he was managing. The response was overwhelming and members from far and wide shared best practices with Craig.

His skills in sports turf management, especially baseball, improved and were slowly being noticed by others in the industry. Long-time STMA member Tom Nielsen took a particular liking to Craig's kind personality and tireless work ethic. In May 2010, he hired Craig to work for the Louisville Bats' turf crew, the Triple-A minor league affiliate of the Cincinnati Reds.

Craig and his wife packed their bags and headed south to follow his dream of one day helping to manage a professional baseball field. Once Craig got settled into his new position, Tom took a deeper interest in his lifestyle, helping him quit smoking and lose more than 70 pounds. By August 2010, Craig had transferred to the University of Louisville to continue his sports management degree while working full-time for the Bats.

Craig and Caroline wed on July 24, 2012. This past December, Craig graduated from the University of Louisville and was hired as the Bats' assistant groundskeeper February 1, 2014.

Throughout his journey, Craig has numerous people to thank for their support and confidence that he would, one day, succeed. He's been so impressed with the STMA and how the organization has always emphasized the importance of acting like a professional and doing the job right.

After receiving the new job offer from the Bats, Craig's family urged him to take time for himself and relax. While a few days to catch his breath was nice, it also have him an opportunity to reflect on the sports turf managers he had connected with along the way, and how they had been so instrumental in his career ascension.

The more he thought about it, the more people he realized he needed to acknowledge personally. In mid-January, Craig attended his first STMA Conference & Exhibition in San Antonio. It was the perfect opportunity to reconnect with friends and colleagues, while also thanking those whom he had never met but had spoken with online over the years.

On April 10, the Louisville Bats open the 2014 campaign versus the Columbus Clippers. Craig and the turf crew are putting in long hours before the first pitch at Louisville Slugger Field to make sure fans and players are greeted with a top-notch field. Every blade of grass and speck of dirt will be treated with care. It's something Craig has taken pride in his entire life and April 10 is no different.

Glenn Gray is with Buffalo Communications, the public relations agency for the Sports Turf Managers Association, @glenncgray on Twitter.



Facility & Operations I By Steve Peeler, CSFM



Student's senior project is a **"DIAMOND IN THE ROUGH"**

▲ The Freedom High School baseball team with a bat Steve Peeler, CSFM, won at an STMA SAFE Foundation auction.

n September 2013, Landon Kincaid had a dream

when he set out to complete the senior high school project that is required for graduation in North Carolina; he wanted it to be unique. Landon found his first love in life, baseball, at a very young age. His dedication to the game is superior to a normal high school player and his work ethic is unstoppable. He is also a team player and he wanted to do something that would not only help keep his love of the game alive, but would also help his teammates and others for years to come at Freedom High School, Morganton, NC.

Rebuilding a baseball infield is not an easy task. It takes funding, time, and expertise to get it done the right way. But even facing these challenging obstacles, Landon was determined to make it happen. A plan was developed to raise funds and to bring his project to a reality, and through community support, professional mentoring, and a lot of determination, he reached his goal.

At the beginning of the project, the field was overgrown with no defined shape. The windscreen to cover the chain link fencing was in shreds, dugouts had been in disarray since a massive flood in 2010 when the entire field had been under 6 feet of water for days. Once the water had subsided, the field was totally covered with fine silt from the river which runs directly behind the outfield. To top that off, all of the equipment had been stolen 2 years after the flood and the team had very limited funding to



🗲 Landon Kincaid

Landon got the ball that night to pitch on his newly renovated mound and he performed well, pitching five solid innings and getting the win.



replace it. Fencing and all other structures had damage 3 years after the flood.

Landon approached his coach, Clint Zimmerman, and I to gauge our interest in his project; Clint and I are both former players of the program. We both agreed immediately to assist him in his quest as professional mentors and a plan was designed to address the key factors on the field.

First on the agenda were the most important areas on the field: the pitching mound and the infield. Lips had formed over the years of play and the turf had grown in as much as 4 feet in some areas. The back arc had areas that were over 4 feet. Therefore the field would have to be laid out and reshaped to regulation. The pitching mound was more of a peak and had neither table nor landing area, or consistency of shape. There was no good quality clay for push off or landing to maintain the structure or help the pitchers perform better. Landon, being a pitcher, considered the mound his "office" so he took on the challenge to improve its performance. New mound clay was added to build a mound table and landing area. The slope was corrected to regulations of 1 inch per 1 foot. Landon was pleased with the progress and looked forward to using the mound for the 2014 home opener.

The infield skin and base paths were next. Over the past 30 years, a local infield mix had been added every year. The result of all the additional infield mix was an elevated surface more than 1 foot above foul territory and outfield. Grass edges were holding water on the infield at the back arc and had to be removed before any grading could take place. The Freedom HS baseball facility had never

been graded with consistency before this project. Laser grading was the best approach to remedy the high and low spots in the infield and also drain any surface water away from the infield skin (70% sand and 30% silt, clay, and fines).

Drainage was not a major problem through the profile, but it had no stability once in play and left large divots after heavy use. Laser grading and balancing the current mix was the first step in getting the maximum benefit for the playing surface and player performance. Once the surface had been graded with the proper slope, a Stabilizer Solutions product was added to the surface and incorpo-

Sponsors help!

Landon would like to thank all of the sponsors that donated materials and funding to make his Sr. project a reality:

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- Healthtique Group - Table Rock Heating & Air

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- Scott Mauney
- Virgil Elkins
 - Tom Ford
 - Andrew Tallent

rated into the infield profile at a 1 inch depth. Results were instant. The surface held together and there was far less divots than before. A snow storm dumped 5 inches which was followed by an inch of rain on the morning of the first outdoor practice. The field was playable by that afternoon and allowed the team to practice while other surrounding fields were saturated and unsafe. Ball bounce was more consistent.

The dugouts damaged in the flood had many leaks through the back walls from ground water as algae had started to take over the dugout floors. Water lines had been leaking for some time and contributed to the additional damage to the footings of the dugouts. Graffiti had been painted on the wall and floors by vandals and were to be pressure washed and painted with team colors. Once the dugouts and backstop walls were a bright red color, a new windscreen was installed on the outfield fence to connect each new renovated section of the ballpark. The field really caught everyone's eye when up close or at a far distance as did the new warning track material that was placed from dugout to dugout and in front of the backstop wall. To finish off Landon's project, Opening Day logos were painted in front of each dugout on the grass.

February 27 was opening day for the Freedom Patriots baseball program. Work that began in October 2013 was complete and it

was time for Landon's project to take center stage. What a proud moment it was! As the team prepared for the game, it seemed to have a spark of energy and motivation to perform to the best of their ability. A big league atmosphere had come to the small town of Morganton, NC.

Landon got the ball that night to pitch on his newly renovated mound and he performed well, pitching five solid innings and getting the win. What Landon had accomplished was not only for himself and his team; it was for the entire community and for many players to come in the future. A master plan has been developed by Landon for additional improvements to be made after he graduates and begins his college career at St. Andrews University, where he has received an academic/baseball scholarship.

Steve E. Peeler, CSFM, is a project manager for Carolina Green Corp. The author would like to acknowledge his former MLB colleagues who sent infield samples to put on this infield for Opening Day: Trevor Vance, Kansas City Royals; Bill Findley, St. Louis Cardinals; Dan Bergstrom, Houston Astros; Andy Bartley, Pittsburgh Pirates; Luke Yoder, San Diego Padres; Larry DiVito, Minnesota Twins; Roger Baird and Justin Spillman, Chicago Cubs; and Grant Trenbeath, Arizona Diamondbacks.



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▲ Left: Opening Day at the new stadium. Top Right: Shooting bermuda stolons. Bottom Right: The design team decided to go with traditional Tifway 419 bermudagrass overseeded with perennial ryegrass.

The new Chicago Cub spring facility: ONE GROUNDSKEEPER'S SAGA

Editor's note: The author is director of operations, Stabilizer Solutions, Inc., Phoenix, AZ.

MARCH 2014:

Thousands of fans lined up outside the new stadium as 2 years of pent up anticipation finally comes to a head. Opening weekend at a new ballpark can be very stressful on a groundskeeper. Opening weekend with a torrential rain can be a nightmare. For John Knight CSFM, director of facilities and fields at the new Cubs Park, it was time to take a deep breath. "It's actually been a relief to get into day-to-day game activities. It is my first chance to exhale!" he said.

The new training facility for the Chicago Cubs, conjoined with the new Riverview Park in Mesa, AZ sits on the largest site of spring training homes in MLB, 146 acres. With dimensions modeled after Wrigley Field, the 15,000 capacity stadium should make visiting "North Siders" feel right at home with a brick wall behind home plate, light standards that mimic Wrigley's, and even a roof top deck in left field. Completed just in time for Opening Day, the park had a July 2012 groundbreaking which set a hurried con-

▼ Johnathan Knight, CSFM

struction pace for architecture firm Populous and Hunt Construction Group. For Knight, it felt as if he had been holding his breath on this project, not just through construction, but years beforehand.

From 2006 to 2010, the City of Peoria gave Knight his first taste of spring training excitement. Working at the Peoria (AZ) Sports Complex and being very involved in the construction of Rio Vista Community Park prepared him for the magnitude of this project.

> "The amount of earthwork was very time consuming. Some areas were very sandy, some areas were hard compacted

clay soil," he said. Being on the edge of the Salt River complicated the Cubs Park construction timeline. An archaeological survey was completed to preserve any Native history that might be exposed. All of the wildlife on the site had to be relocated, and an attempt was made to nursery the existing trees. These site challenges put a major delay on actual field installation.

JANUARY 2013

USGA sand without amendment was imported at a depth of 12 inches for the stadium field and two major league practice fields, and at an 8-inch depth for the four minor league fields and two half fields. The sand layer was placed over a 4-inch pea gravel layer on top of a geotextile fabric, which drains into a Varicore lateral flat pipe drainage system. The system drains to retention basins on site, then evaporates or goes into dry wells, recharging groundwater.

Although he jokes that construction is still not complete, Knight said the most difficult aspect of the process early on was that it raised more questions than answers, questions specifically pertaining to his employment. In a strange twist of fate, his participation in construction weaved in and out, and back again, first as a City of Mesa employee and later as a Cubs employee.

As usual, the role of water in a desert spring training complex was critical. John believes his previous experience in the golf industry helped him better grasp watering efficiency for the park as a whole ecosystem. "Other Arizona Spring Training sites are on a horizontal pumping system, we are on a vertical system more like a golf course," he said.

The pumping system, an area of shared use between the Cubs and the City of Mesa, is more of a booster type station. The Rain

Bird pumping station uses three 75-hp vertical turbines that draw from an 8-acre lake on site. The lake doubles as an architectural feature and a fishing pond for Riverview Park. At the pumping station water pressure is around 105 psi. This is moderated down between 60 and 70 psi through a traditional valve block system. The water then makes its way to a combination of Hunter I40 and I20 heads for turf, and Hunter I25 heads on all skin infields.

The infields are constructed with Stabilizer Ballyard Brown infield mix, installed at 5 inch depth on both major and minor fields. The mounds are constructed with a combination of Stabilizer Ballyard Clay and Hilltopper Waterless mound clay.

Knight chose not to install warning track heads, instead opting for waterless warning track mix on the stadium field. "I decided on the Hilltopper warning track mix because of labor savings, but also to control dust. I looked at the contract costs of cleaning the seating bowl. Each dust related cleaning cost \$3,000," he said.

In 2003, with Marriott Golf at the Royal St. Kitts Golf Club, Knight spent the greater part of 3 years learning the idiosyncrasies of paspalum turf. "What people don't realize is that although in the Caribbean, the island of St. Kitt's has an arid climate and little water. That is why I feel so strongly about using that turf in the desert." Using Seashore Paspalum Platinum TE on the Riverview Park soccer fields and common areas of the complex really became a passion project for Knight while employed by the City of Mesa. Some may view this as taking a risk, but he views it as "an opportunity." "That's one thing I learned from Ken Mangum (while working at the Atlanta Athletic Club); always look for opportunities to be innovative. We were definitely going outside the box."

For Knight, advocating for the use of paspalum, being so involved in the design, and even establishing a soccer field/parking area proving ground, truly made relinquishing control of this portion of the project bittersweet. The original design included an 8-inch sand cap over the existing bermudagrass, as a result of value engineering; this sand cap was left out, leading to bermuda contamination. Knight is currently researching how to solve this problem, which he thinks can be contained through patience and diligence. "It's tough to let the whole responsibility go, but I still get to consult for the City and share the responsibility to make it work."

JUNE 2013

At the optimal time in June and July, landscape contractor Siteworks stolonized threequarters of the project, with the exception of the infields, which were sodded. For the baseball fields, the design team decided to go with a more traditional Tifway 419, overseeded with perennial ryegrass. The entire stadium field and berm were completely sodded in September 2013 without overseeding.

Construction delays pushed Knight's overseeding plans all the way back to November 26, not a good time for overseeding in general, but the new stadium made it even tougher. While a great design feature for fans, the majority of the seating area is shaded, especially along the 1st base line. Knight, still unsure of how overseeding worked out just in time for the season, could only explain, "I was really fortunate for a warm winter."

In September 2010, amidst rumors of the Cubs' leaving, Knight accepted the head groundskeeper job at HoHoKam Park for the City of Mesa. While the new ballpark was not yet approved, he took a calculated risk, believing the Cubs would not leave Mesa. Although welcomed, the 2012 announcement of the new complex created even more uncertainty. No one knew whether the Cubs or Mesa would be responsible for maintenance. To make matters worse, City officials were negotiating with the Oakland Athletics to lease HoHoKam Park. This pretty much meant that the A's would bring Chad Huss from Phoenix Municipal Stadium to manage HoHoKam, potentially leaving Knight without a home. "It was very challenging not knowing what would happen," he said.

After the groundbreaking, one piece of the puzzle was finally made clear. A facility use agreement was signed between the Cubs and Mesa, outlining the role of the Cubs in the stadium, facility and field management, and the role of the City in regards to the minor field timeshare,

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Riverview Park and common areas. The Cubs began interviewing for the Director of Facilities and Fields position in February 2013. Knight quickly submitted his name. Still awaiting the Cubs decision, the City offered him the position to manage the Riverview Park portion of the complex. What should have brought relief, spurred even deeper soul searching. "I was happy to manage the paspalum for the city, but still very much wanted to be involved with professional baseball. For their patience and understanding I am very fortunate, and thankful to the City of Mesa management."

Despite the uncertainty, Knight continued



the spring 2013 season operating as he always had, a loyal City employee treating the Cubs as a valued client. "I had to walk a fine line, being a fiscally responsible City employee and to be very customer service oriented at the same time. Although I'm a Cubs employee now, I still think of the coaching staff as my client. I think it helps me do my job better."

FEBRUARY 2014

Involvement in the construction and maintenance of the facilities is the reason why Knight made the leap from the City of Mesa to the Cubs when finally offered the position. The Cubs will use the 65,000square-foot training facility, with 10,000 square foot gym space as a year round rehab center. Featuring hydrotherapy rooms, weight room, and agility field, it is considered a medical facility, and maintenance must abide by stringent medical standards.

As Knight and his crew transition from construction to maintenance, an interesting dynamic is emerging. Responsibility for the site is shared between the Cubs and the City of Mesa. Maintenance must be coordinated between the two parties on a day by day basis. "We are still learning the facility and learning how to interact. It has been challenging and rewarding discovering a new operation method," Knight said. Many of Mesa's maintenance staff were employees of his at HoHoKam. The familiarity there, combined with his laidback personality, make this potentially tough sharing arrangement, a productive method for both parties.

Being part of the design with the City of Mesa, while executing his own spring training daily responsibilities at HoHoKam, not knowing his employment fate, then overseeing the construction process for the Cubs, and finally taking over the facility with a short timeframe before opening, have made the last few years a blur. At one point Knight, being the only Cubs employee on site, was responsible for giving tours of the stadium. Now that he finally gets to reflect on his journey, the challenges were what he learned from the most. "I'm starting to see a big picture view of how great a project this really is. I learned so much from the infrastructure construction. What I really learned is that without the help of my crew, we wouldn't be sitting here today."

John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

Answers from page 17

The dark green and light green lines on this college baseball infield are the result of an off-course crop duster applying liquid fertilizer. April fools! It's the result of a tarp. However, the reason for the lines is almost as unique as the crop duster joke. I am sure some of you guessed that the tarp caused heat injury, however what actually happened was the sports turf manager put down the tarp and then had a couple days of rain. The rain only paused during times that he did not have anyone to help pull the tarp off to allow the turf to get sunlight and air. When they were able to finally pull the tarp off, these lines were on the infield. Since the tarp is older, they speculated that yellow areas, where the turf became a little chlorotic, are where the turf simply elongated to find light. However, the greener areas are probably where the tarp has worn and more light was penetrating the tarp and getting to the grass plants. This event took place before the field was overseeded so it all occurred on actively growing bermudagrass. After a couple of days of sunshine and a fertilizer application, the field was all back to normal.

Photo submitted by Andrew Siegel, sports turf manager for baseball and softball fields at the University of Texas at Arlington.



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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THE IMPORTANCE OF MOWING

owing is one of the most important cultural practices for maintenance of a healthy turf. Proper mowing height increases turfgrass density and promotes deep root growth, both of which lead to a stronger turf that is more competitive against weeds and better able to persist under environmental stresses.

Two important components of mowing are cutting height and frequency. Both of these factors depend on the turfgrass species, utility of the grass, cultivar, and the level of lawn quality desired. Other important considerations are clipping disposal, mowing equipment and mowing safety.



▲ Figure 1. St. Augustinegrass (on the left) has coarse leaf blades and requires a higher height of cut. Bermudagrass (on the right) has much finer leaf blades and can be mowed at much lower heights.

MOWING HEIGHT

The optimum cutting height is determined by the growth habit and leaf width of the turfgrass species. Grass species that have fine textured (narrow) leaf blades and that grow horizontally can usually be mowed shorter than an upright-growing grass with coarser (wider) leaf blades. For example, bermudagrass and creeping bentgrass are mowed at low heights because of their numerous narrow leaf blades and low growth habit (**Figure 1**). In contrast, St. Augustinegrass is mowed at higher heights because it has coarse-textured leaf blades.

Turfgrass undergoes physiological stress with each mowing event, particularly if too much leaf tissue is removed (**Figure 2**). Scalping, or removal of too much shoot tissue at one time, can produce longterm damage to the turf. This can leave turf susceptible to other stresses such as insects, disease, drought, and sunscald. Mowing also influences rooting depth, with development of a deeper root system in response to higher mowing heights. Advantages of the deeper root system are greater tolerance to drought, insects, disease, nematodes, temperature stress, poor soil conditions, nutrient deficiencies and traffic. Repeated mowing below the recommended heights for each species is a primary cause of turf injury and should be avoided. It is also important to not mow at higher than the recommended heights, as this may result in increased thatch.

MOWING FREQUENCY

Mowing frequency is determined by the growth rate and the utility of the grass. The growth rate is influenced by grass species, time of year, weather conditions, and level of management. In the south, grass may need year-round mowing, while many parts of the country only mow in spring, summer and fall. Grass that receives repeated athletic use will need more frequent mowing to reduce potential injuries and to improve the playing surface, while low maintenance lawn areas would need less frequent mowing. Some species, such as bahiagrass, often require mowing for seedhead removal rather than for leaf blade reduction.

Grass should be mowed often enough so that no more than 1/3 of the blade height is removed per mowing (**Figure 3**). For example, if recommendations call for a 2" mowing height, the grass should be mowed when it gets to 3" in height. It is important to always leave as much leaf surface as possible so that photosynthesis can occur, particularly in a grass that is subject to environmental or site stresses.



CLIPPING DISPOSAL

The function that the grass serves will often determine whether clippings are left on the ground or removed. Grass clippings contain nutrients and organic matter that is broken down by soil microbes. The nutrients can be taken up by the turf and reused and the organic matter will contribute to the soil. Because they are readily decomposed by microbes, clippings do not generally contribute to thatch. On some surfaces, such as athletic fields and golf greens, clippings are generally not desirable and are usually bagged. In these cases, the clippings can be composted. To avoid pollution of water bodies, it is extremely important to blow any grass clippings left on sidewalks, driveways, or other hard surfaces back onto the grass. These clippings contain nutrients that could contribute to water pollution if they go down a storm drain or blow into a water body, so be sure to not leave them on these surfaces.

MOWING EQUIPMENT

Mowers are available in a wide variety of sizes and styles with many features. The two basic types are reel and rotary mowers, with variations of these available for specialized or utility uses. Reel mowers use a scissors-like action to cut the leaf blades and are used on grasses that require a low height of cut. They are suited for use on high maintenance, fine-bladed grasses such as those found on golf courses and athletic fields where a precise clean cut is desirable. Reel



Figure 4. Reel mower



▲ Figure 5. Rotary mower

mowers require higher maintenance than other mowers. Lawns can be mowed

with either reel or rotary mowers, depending on grass species and recommended height of cut (Figure 4). Rotary mowers can be obtained as push or self-propelled models. Front, side, and rear-clipping discharge models are also available. A gasoline or electric engine is used to turn the horizontallymounted mower blade. The grass blade is cut on impact with the mower blade. Most rotary mowers cannot mow lower than 1 inch and are best used for mowing heights above 2 inches.

Mulching mowers are modifications of rotary mowers (**Figure 5**). These are designed to cut leaf blades into very small pieces that decompose more quickly than leaf blades cut by conventional mowers, providing nutrition and organic matter to the soil environment. The mower blades are designed to create a mild vacuum under the mower deck until the leaf blades are cut into small pieces. Mulching mowers do not have the traditional discharge chute like most rotary mowers.

Electric mowers are another option that some prefer for reduction of noise and CO_2 losses. Improvements in recent years in these mowers have increased their power and durability. They come in cordless and with cord models.

Regardless of what type mower is used, keeping blades sharp is very important for the health of the turf. Ragged, torn leaf blades are not only unsightly but also contribute to poor growth and further injury.



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GOOD MOWING PRACTICES

Follow these best practices for safe mowing:

• Pick up all stones, sticks and other debris before mowing to avoid damaging the mower or injuring someone with flying objects.

• Never mow wet turf with a rotary mower because clippings can clog the machine. Mow only when the turf is dry.

Sharpen the mower blade frequently enough to prevent tearing of leaf blades.

• Mow in a different direction every time the lawn is cut. This helps prevent wear patterns, reduces the grain (grass lying over in the same direction), and reduces the possibility of scalping.

• Leave clippings on the ground. If clumping occurs, rake or use a leaf blower to distribute them.

• Check your mower every time it is used. Follow manufacturer's recommendations for service and adjustments.

• Adjust cutting height by setting the mower on a driveway or sidewalk and using a ruler to measure the distance between the ground and the blade.

• Never fill a mower engine with gasoline when the mower is hot.

• Always wear durable closed shoes when mowing the lawn – no sandals or flip flops.

• Sweep up any clippings left on paved surfaces to avoid potential water pollution.

Table 1. Suggested mowing heights for warm and cool season grass species.

Turfgrass Species	Optimal Mowing Height (inches)
Warm Season Grasses	
Bahiagrass	3.0 - 4.0
Bermudagrass	
(Use Dependent)	0.5 - 1.5
Centipedegrass	1.5 - 2.0
St. Augustinegrass	2.5 - 4.0
Zoysiagrass (Coarse types)	2.0-2.5
Cool Season Grasses	
Creeping Bentgrass	0.2-0.5
Kentucky Bluegrass	
(Cultivar Dependent)	0.75-2.5
Perennial Ryegrass	1.5-2.0
Tall Fescue	1.5-3.5

Laurie E. Trenholm, PhD, is professor and graduate coordinator, Environmental Horticulture Dept–Turfgrass Science Program, at the University of Florida.



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BACKPACK AND HAND-HELD SPRAYER CALIBRATION



²hoto courtesy of Michael Goatley, Jr., Ph.D.

ackpack and hand-held sprayers consist of a tank to hold the spray mix, a pump to provide pressure, and a spray wand with one or more nozzles to deliver the spray solution in the desired spray pattern. Most backpack sprayers hold 4-6 gallons of spray mix, and hand-held sprayers usually hold 1-3 gallons. The small size, transportability, and ease of use make the sprayer a versatile tool. Backpack and hand-held sprayers are good for small acreages, spot spraying, and hard to reach locations.

Proper application of pesticides is only possible with an accurately calibrated sprayer. Calibration is the process of measuring and adjusting output of application equipment in order to apply the correct amount of active ingredient per unit area. Failure to care for and correctly calibrate spray equipment can result in misapplication of pesticides, repeat applications, damaged plants, excess cost, and environmental contamination.

PRE-CALIBRATION CHECKLIST

Proper maintenance and preparation of spray equipment will minimize application mistakes and prolong the life of your sprayer. Follow the guidelines below before making a pesticide application.

• Fill the sprayer tank ½ full of clean water. Use only clean water. Do not add pesticides until the sprayer has been checked for leaks, is in good operating condition, and has been calibrated.

• Inspect the sprayer to be sure all components are in good working order and are undamaged. Pay special attention to the pump, spray wand, strainers, and hoses. Check that there are no obstructions or leaks in the sprayer. Fix any leaks before calibration or making a pesticide application. If the sprayer has a pressure gauge, check it for accuracy. If the sprayer has a pressure regulator, follow manufacturer recommendations for periodic cleaning and inspection.

• Be sure your spray tips are the correct type and size for the spray application you want to make. The spray tip is perhaps the most important, yet most neglected, component of the sprayer. It is critical to use the appropriate nozzle tip for the intended pest target and turfgrass conditions. The spray tip determines the spray pattern and droplet size. For single nozzle band applications, it is recommended to use even-flat-fan or flood-jet types. For spot applications, hollow or solid-cone nozzles, even-flat-fan, or flood-jet types will work well.

• Remove, clean, and replace (if necessary) the screen behind the spray tip. Clean the spray tip and screen in soapy water with a soft brush. Remove any deposits from the nozzle opening with a toothpick or compressed air. Never use a knife or metallic object to clean tips as it will ruin them. Never try to unclog a tip by blowing through it with your mouth.

• With the spray tip removed, and in a place away from wells and water supplies, pressurize the sprayer and flush the system with plenty of water to remove any particles or debris.

• Reassemble the nozzle and pressurize the sprayer to check the tip for a uniform spray pattern. This can be done by spraying water on a paved or bare surface and watching for streaks as the spray dries. Wet streaks that occur directly under the nozzle may result from damaged or worn spray tips, low operating pressure, or holding the wand too close to the ground. Clogged tips may produce streaks anywhere in the spray pattern of the affected nozzle. If a spray tip has an improper spray pattern, replace it with a new tip that is the same style and output volume.

• Consistency with this calibration technique is dependent on how evenly the operator can spray an 18.5 feet by 18.5 feet area. This can be performed on a concrete or asphalt driveway/parking lot to observe how evenly the surface dries. The angle of a nozzle's spray pattern and the height at which it is held from the ground determine the width of the spray pattern. Try different spray heights and observe the drying rate. A uniform drying rate indicates uniform coverage. Nozzle height can be adjusted to control excess streaking. Once your application techniques are consistent, then you can begin calibrating your backpack or hand-held sprayer.



• Constant pressure must be maintained for consistent application rates. High pressure equals more product being applied per unit area as well as higher drift potential, while lower pressure equals less product per unit area. Few hand-held and backpack sprayers contain pressure regulators. Pressure fluctuations can be prevented by installation of a pressure gauge or spray management valve (SMV) or constant flow valve (CFV) on the spray handle or boom. Spray rates and patterns will be more consistent, drift potential can be reduced, and calibration is easier. If a pressure regulator is not an option, fairly even pressure can be maintained if the hand pump is operated by a constant number of pumps per minute. It is not necessary to know the exact pressure output to calibrate a sprayer, but the pressure must be kept constant throughout calibration and application. Keep in mind that each operator will have a different walking speed and will regulate pressure differently. Therefore, it is important to calibrate a sprayer for each operator.

CALIBRATION PROCESS

The amount of spray applied to an area will depend on walking speed, pressure, spray swath width, and the spray tip selected. If you change any one of these, the amount of spray applied changes and the sprayer must be calibrated from the beginning. There are several different ways to accurately calibrate a sprayer. The process being outlined in this bulletin is based on the 128th Acre Calibration Method. The spray collected from a single nozzle measured in fluid ounces directly converts to gallons per acre regardless of the number of nozzles. Because there are 128 fluid ounces in a gallon, the fluid ounces collected from 1/128th of an acre will equal gallons of solution per acre.

Remember:

1 acre = 43,560 square feet 1/128th of an acre = 340.31 square feet 1/128th of an acre = 18.5 feet by 18.5 feet 1 gallon = 128 fluid ounces

Collect materials needed to calibrate the sprayer:

- Sprayer
- Correct spray tips (if using more than one, the tips are identical)
- Measuring tape
- Water
- Flags or turf paint
- Measuring container (measurement in fluid ounces)
- Stopwatch

Step 1: Determine application pressure and timing.

Mark off an area 18.5 feet by 18.5 feet. Turf paint or flags can be used to establish boundaries.

Fill the sprayer tank ½ full of clean water. Use only clean water during calibration. Never add pesticides to a sprayer until it is properly calibrated and ready for use. Pump to the normal operating pressure to simulate the average spray situation.

Walk at a comfortable, steady speed while spraying to achieve uniform coverage. Maintain consistent pressure while spraying. Measure the time in seconds it takes to uniformly spray the 18.5 feet by 18.5 feet area. Record the time.

Example: It took 46 seconds to spray the 18.5 feet by 18.5 feet area. **Step 2: Measure nozzle output**

Nozzle flow rate is the amount of liquid sprayed from the nozzle in a given amount of time. Operate the sprayer with water in the tank at the desired pressure. Using a stopwatch and measuring cup marked in fluid ounces, collect water from the nozzle for the time (in seconds) it took to spray the predetermined area. Record the amount collected. Repeat this process 2-3 times to get the average nozzle output.

Note: Application rates can be highly variable with backpack or hand-held sprayers. Simple adjustments can be made to ensure a consistent application rate. To increase application rates, the opertor can increase pressure and to decrease application rates, the operator can decrease pressure.

Example: The first amount collected after 46 seconds is 44 fluid ounces. The second amount collected after 46 seconds is 45 fluid

Backpack and hand-held sprayer calibration worksheet

Color-coded squares are meant to help in entering repeated numbers.

- amount of tim	ne in seconds it takes to spray the 18.5 feet by 18.5 feet area
- sum of fluid o	unces collected from the nozzle
- average nozz	e output measured in fluid ounces
- number used	to determine acceptable range for nozzle output
- minimum nun	nber of fluid ounces that is acceptable from each nozzle
- maximum nur	nber of fluid ounces that is acceptable from each nozzle
Remember:	

1 acre = 43,560 square feet 1/128th of an acre = 340.31 square feet 1/128th of an acre = 18.5 feet by 18.5 feet 1 gallon = 128 fluid ounces

Step 1: Determine application pressure and timing.

Mark off an area 18.5 feet by 18.5 feet. Turf paint or flags can be used to establish boundaries

Measure the time in seconds it takes to uniformly spray the 18.5 feet by 18.5 feet area. Remember to walk at a comfortable, steady speed and maintain consistent pressure while spraying.

Total: seconds to spray the 18.5 feet by 18.5 feet area.

Step 2: Measure nozzle output.

Operate the sprayer with water in the tank at the desired pressure. Using a stopwatch and measuring cup marked in fluid ounces, collect water from the nozzle for the time (in seconds) it took to spray the predetermined area.

Collect water output for seconds Amount collected

1	unounc	0011001004.	
1)	fluid	ounce

2) fluid ounces

3) fluid ounces

Total output from the nozzle (sum of the 3 collections): fluid ounces Determine average output:



The sprayer is calibrated to deliver gallons per acre.

Multiple Nozzles

If there are multiple nozzles, check that all nozzles are within 7 percent of the average nozzle output by determining the range.

0.07 x fluid ounces = (range)
Minimum acceptable fluid ounces that can be collected from each nozzle:
Maximum acceptable fluid ounces that can be collected from each nozzle:
The acceptable range for individual nozzle output is between second second sec

If a nozzle does not fall within the acceptable range, clean or replace the nozzle and repeat this step. Once nozzle output falls within the acceptable range, the sprayer is calibrated

Remember, the concept of the 128th method is based on the time it takes to spray 128th of an acre with a single nozzle. That time requirement is then used to collect fluid ounces from a single nozzle. Since there are 128 fluid ounces in a gallon, the simple conversion or result is in gallons per acre (GPA).

Average nozzle output: fluid ounces is equal to GPA The sprayer is calibrated to deliver gallons per acre.

ounces. The third amount collected after 46 seconds is 44 fluid ounces. The average output of the nozzle is 44 fluid ounces.

Example:

44 fluid ounces is the average nozzle output. Therefore, the sprayer is calibrated to deliver 44 gallons per acre. Remember: The concept of the 128th method is based on the time it takes to spray 128th of an acre with a single nozzle. That time requirement is then used to collect fluid ounces from a single nozzle. Since there are 128 fluid ounces in a gallon, the simple conversion or result is in gallons per acre (GPA).

MULTIPLE NOZZLES

If there is more than one nozzle being used, check the uniformity of all nozzles on the boom. Collect the water sprayed from each nozzle individually for the time (in seconds) it took to spray the predetermined area. After catching the spray from each nozzle individually, add the amounts collected and divide by the number of nozzles to get the average output per nozzle. If the flow rate of any spray tip is 7% greater or less than the average nozzle output, clean or replace the nozzle tip. If any of the nozzles need to be cleaned or replaced, recheck the output from all nozzles and recalculate the average.

Example: Nozzle Test Output collected from each nozzle after 46 seconds: Nozzle 1 – 44 fluid ounces Nozzle 2 - 45 fluid ounces Nozzle 3 – 44 fluid ounces Total output from all nozzles: 133 fluid ounces Determine average output for each nozzle:

133 fluid ounces

= 44.3 or 44 fluid ounces average nozzle output 3 nozzles

Remember:

Sum of total fluid ounces

Number of nozzles

average nozzle output in fluid ounces

Check that all nozzles are within 7 percent of the average nozzle output.

 0.07×44 fluid ounces = 3.08

The acceptable range for nozzle output is between 40.9 to 47.1 fluid ounces. All of the nozzles in the example fall within the acceptable range. If they do not, clean or replace the spray tips and repeat this step.

The sprayer is now correctly calibrated. The average amount of water collected in fluid ounces equals the gallons applied per acre (GPA).

Example:

44 fluid ounces was the average nozzle output. Therefore, the sprayer is calibrated to deliver 44 gallons per acre.

TIPS FOR PRODUCT APPLICATION

Correct and accurate application of any pesticide product to a turfgrass area is essential to prevent damage to the turfgrass and prevent pollution of water sources. Use the following tips for accurate and safe applications with your sprayer:

• Read all product labels to ensure safe handling, proper application, and correct use rates. In addition, be sure to comply with all state and federal environmental regulations.

• Make sure the sprayer is in good operating condition. Review the Pre-Calibration Checklist before each pesticide application.

• Calibrate the sprayer every fourth application (if using the same applicator) or every application (if a new applicator) to ensure the sprayer and nozzles are still delivering the correct volume of product.

• Always stay a safe distance from water sources to prevent any possible pollution.

• Don't apply pesticides on windy days (less than 7 mph or less than 5 mph near sensitive crops).

• Maintain a consistent walking speed and pressure during calibration and match it during application to deliver an accurate amount of product.

• Use different sprayers for insecticide and herbicide applications.

• Be sure to clean the sprayer thoroughly after applying pesticide products to prevent build up and corrosion on sprayer parts.

This material was originally produced by the 2013 STMA Information Outreach Committee. Members included: Darian Daily; Alec Kowalewski; Brad Fresenburg; Bryan Myers; David Kimel; Doug Linde; Jason Bowers; Jason Kopp; Jason Kruse; Jeff Langner; Jim Plasteras; Mike Goatley; Neil Cathey; Ryan McGillivray; Steven Phillips; TJ Brewer; Tony Strickland; Vickie Wallace; Wayne Horman; and Weston Floyd. ■

References:

STMA Information Outreach Committee

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WHY STMA SHOULD CONSIDER YOUR FIELD A WINNER?

The season opened this year on March 3, 2013. We had a fair amount of snow in February and one corner of our field remained frozen through January and February. We were hoping that the corner would thaw out enough to have a safe playing surface, however with 2 weeks until the season opener we were forced to come up with a different plan. We had to rent a heating system that they use to thaw the ground before they pour concrete. The system was very labor intensive and also expensive to rent. The thawing process took about a week to complete but we were able to get in the scheduled game and made sure the field was safe for play.

March and April ended up being our biggest snow months and the snow always seemed to come the day before our matches. We were forced to plow the field multiple times in order to make sure the games were played.

The field was rented to Magpul on June 29. They hosted a farewell to Colorado and had approximately 4,500 people on the

field. The event went well and there was very limited damage from tents vendor booths and concessions.

Another challenge that we had was Colorado State University asked to host a spring scrimmage at Infinity Park to try and rally the Denver alumni. The field was already scheduled for rugby tournaments the following day so we had to figure out how to effectively and efficiently flip the field from football to rugby. We spoke directly with the CSU coaching staff and convinced them that since it was only a practice to leave the goal post where they were. This made the field 10 yards shorter than a normal field but no one knew because we did not paint numbers on the yardage markers. The evening after the practice we painted the football lines green (big thanks to Bret Baird of Dick's Sporting Good Park on green paint selection) and then restriped the field for the next day.

The biggest challenge of the year came after the Serevii and Glendale invitational sevens tournament. On the playing surface we had 42 games in a 2-day span. The field held up to all the play very well but did need a lot of divots filled throughout the following week.

• Level of Submission: Schools/Parks

• Category of Submission: Sporting Grounds

• Sports Turf Manager: Noel Harryman

• Title: Manager Turf Operations

Education: Bachelor's Degree in Business Management

● Experience: 2002-2003 Landscape Supervisor (Fresh Aire Enterprises); 2002-2007 Material Supplier Manager/Designer (Landscape Solutions); 2007-2009 Project Manager (Graff's Turf Farms); fields worked on include Coors, Invesco, Dicks, Folsom, Wrigley, Infinity Park, Haymarket; 2009-2011 Assistant Turf Manager, City of Glendale; 2011-Current Manager Turf Operations 2012 City of Glendale

● **Staff:** Josh Bertrand, Gene Hazlett, Vickie Allen, Kevin Brown, Matt McCord, Jody Yonke, Joe Fererra, Christi Clay, Corey Williams, and Chris Roozing.

Original construction: 2007

• Renovation: Irrigation replacement on the playing

surface. The laterals had to be lowered because they were not installed according to the specs. The lines were punctured do to deep tine aeration. The sod was stripped out along the laterals running east to west on the field and then new sod was installed. We were forced to use thick cut sod in order to be able to play on the surface shortly after the renovation. The renovation was done because of the punctured irrigation lines and because the original installation did not follow the irrigation specifications. The lines were anywhere from 4-8" depths. By lowering the laterals we are able to deep tine aerate up to 12" depth and still be safe. The city has also thought about putting in the Desso system in the grass and would not have been able to entertain this system without lowering the lines. The renovation went very well in 2011 and not at all noticeable at this point. In hindsight I would probably push to have the entire field pulled out and laser leveled and a complete resod. Pulling out a 4 foot wide area is difficult to get a

perfect grade. We still notice a few imperfections. Turfgrass variety: Midnight, Awesome, Impact, Nu-Destiny-Kentucky Bluegrass (70%) Caddieshack, Accent, Top-Gun-Perennial Ryegrass (30%)

• **Overseeding:** Overseeding is done with Kentucky bluegrass. The pitch is overseeded four times a year (last week of March, first week of May, mid-June, and the last week of August). The first three overseedings were done with 10#/1000sq.ft. and the last overseeding in August was done with 15#/1000sq.ft. The seed mix is Midnight, Awesome, Impact, and NuDestiny Kentucky Bluegrass. For divot repair we use a 1:3:1 ratio of pregerminated seed, USGA Sand, and fertilizer.

• **Rootzone composition:** 92% Sand; 8% other (4% silt, 2% Clay, 2% organic matter)

 Drainage: GraviTURF designed by Dan Almond of Millennium Sports. Using 4-inch ADS drain pipe, located on 15-foot centers, set in pea gravel, 10 inches below surface.

Equipment List

-Buffalo Turbine-Cyclone PTO blower -Graco Fieldlazer -John Deere -4520 Tractor with cab -400X loader with bucket, pallet forks and 6' plow -Toro ReelMaster 5610 reel mower -2000 Aercore Aerator -Gator XUV w/ V-plow -Lely 1250 Fertilizer Spreader -Rain Bird - Maxicom Central Control System, 1800 series pop up head, 7005 series rotary head and ESP-Site-

O Noille

Sat-40 sprinkler controller -Toro- Aerothatch 83/Seeder 93 -Pro Sweep 5200 -Workman Sprayer 200 gallon -Workman 3300 (2) -Ty crop MH-400









Infinity Park

Rugby is a unique sport in that the game must go on. Games are played regardless of any limiting factors. There could be a foot of snow on the ground and they will still play. The culture of rugby is that the players are tough and if there is an injury that is just part of the game. For example, during a rugby game if a player is hurt the play does not end until the ball is kicked out of play.

Editor's note: Noel Harryman and his colleagues in Glendale also won the Sporting Grounds category last year. We asked Harryman to comment on his success and the interesting dynamic between his facility and the City of Glendale. Here is his response:

"Glendale is a unique city to work for and is a town where change is always expected. The city is always looking for ways to make our city different and looking for future opportunities to set us apart. Our crew is no exception to this status quo; we are responsible anything and everything that happens within the public works department. This includes the water distribution system, parks, streets, pitch, and my personal favorite, the sanitary and sewer collection system. Since we are responsible for collection and distribution throughout the city we are also required to hold licenses in both these areas.

"Our crew is crossed trained and very capable of taking on any task in any of these given areas. One week we might be doing a water line repair and asphalt and the next we might be forming and pouring concrete. This also presents some very major challenges since we tend to have multiple crews running five different directions in order to accomplish everything that we set out to do. One reason that this is a challenge for me is maintaining consistency of how things are done on the pitch. The way that I have worked through this challenge is to always document sprayer calibration, fertility programs, mower height, aeration, and everything else under the sun. I think that documenting not only gives a record of what we have done in the past for success but more importantly what strategies failed and how to change our process to make them successful.

"For me this Field of the Year is recognition of our crew and their tireless dedication to hard work and their pursuit of perfection. There have been countless hours spent making sure that everything is perfect for games and practices as well. Our goal is to give our athletes the best product possible to make them successful. Our city management team trusts us to make decisions on the playing surface and is always concerned how many hours the field is being used. This trust allows us to make the best decision possible not only for the short term but also future of our facility. Our coaching staff also plays a key role in maintaining a quality surface. The coaches that we have are more than willing to move drills around and even use a practice field whenever possible. There is a great deal of pride in the facility and what are small city has to offer.

"I was asked, 'What do you different that makes you successful?' I am surrounded by people that all have the same goal as me. We all want to continue to promote the sport of rugby and we want to make sure that we have a world class facility and experience when playing here."



SPRAYERS FROM JOHN DEERE

The HD200 and HD300 offer the ultimate in flexibility, with a choice of centrifugal or diaphragm pumps, manual or automatic rate controls, and boom options that come standard with an electro-hydraulic lift. More versatile than a single-purpose sprayer, no tools are needed for tank removal, and storage stands allow the operator to get more out of the vehicle, even while not spraying. The optional CleanLoad chemical agitator makes it easy to load chemicals by ensuring that every last drop is used, and a powerful jet agitator makes sure the tank solution is mixed thoroughly. An efficient valve bank design simplifies operation and plumbing, while standard triple nozzle bodies make nozzle changes effortless.

John Deere

TORO MULTI PRO 1750 SPRAYER

The Multi Pro 1750 is a 175-gallon dedicated turf vehicle sprayer designed to maneuver in smaller turf areas like tees, greens and sports fields to improve productivity and spray accuracy. The Multi Pro 1750 features a completely redesigned polyethylene elliptical tank with side agitation nozzles, which eliminates the shelves and corners on which chemicals tend to stick, and ensures proper mixing and agitation. Unlike competitive models, the Multi Pro 1750 features an exclusive six-diaphragm pump, which provides the highest spray rates while simultaneously supplying a generous agitation flow. Together, these spray components create the Multi Pro spray system that sets the standard for chemical mixing and unmatched spray performance and accuracy. **The Toro Company**

TURFCO T3000I SPREADER/SPRAYER

Turfco's T3000i spreader sprayer features intuitive upgrades including hands-free speed control and trim-lock speed for consistency while in use. Additionally, the T3000i now has% more hopper capacity. The spreader sprayer features 12- to 18- foot spreading widths, six- and nine-foot spraying widths and a four-foot trim spray and 15-foot want for spot treating. Because it has the ability to cover 124,000 square-feet per fill and fit through a 36-inch gate, it's versatile enough for properties of any size. **Turfco**

CUSHMAN SPRAYTEK BY JACOBSEN

With the most consistent governing speed of any sprayer, the Cushman Spraytek by Jacobsen provides unmatched coverage consistency every time. Choose from a 300-gallon capacity and 24.8 hp diesel or 175-gallon capacity 33.8 hp gas model. A corrosion-resistant 316 stainless steel centrifugal pump provides up to 44 gpm maximum flow and up to 80 psi maximum pressure to handle your toughest applications. Both Spraytek models offer either manual, all-function electronic system or Raven flow-based computer boom control options.

Jacobsen

SPRAYER ATTACHMENT IDEAL FOR YEAR-ROUND JOBS

Bobcat's sprayer is manufactured to fit the versatile Toolcat utility work machine and Bobcat utility vehicles. The sprayers are designed for chemical applications ranging from spot spraying for weed control to broadcast spraying of liquid fertilizer and chemicals. All sprayer tank components are mounted to a formed steel skid-frame. Sprayer flow is controlled by a pump on/off switch conveniently mounted in the console of the Toolcat machine, or within easy reach on front of the skid for utility vehicles. The spring loaded boom wings break away horizontally (fore and aft) and vertically to help protect the boom on rough terrain or in case an obstacle is struck.

Bobcat

SMITHCO STAR COMMAND SPRAY SYSTEM

"This will change everything you thought you knew about spraying," said Emil Miller, the national sales manager for the new Smithco Star Command Spray System. Consisting of three integrated modules THE STAR COMMAND is a collaboration between Smithco and Sharpshooter by Capstan. It will help overcome many of the hard-to-solve spray problems most turf superintendents have long had to contend with. For example, speed no longer matters. You can spray from 2 to 10 mph. maintaining a constant rate, a constant operator-set pressure and a consistent droplet size and pattern...without changing tips you won't overspray between passes again. And savings can add up to 25% on chemicals annually. The Spry Star System is available on a range of models to accommodate varying needs.

Smithco

NEW SPREADER/SPRAYER WITH ELECTRIC FEATURES

TurfEx introduces the RS7200E spreader/sprayer with an electric start, adjustable electric spray pump, and a hand-held spray wand. The unit is driven by a 7-horsepower Subaru EX210 engine and has a 0.95-gallon fuel tank. Its heavy-duty transmission has two forward gears, neutral and reverse. A hand-operated transmission disc brake and foot-controlled sulky band brake allow smooth, confident operation of the unit, and the machine's low center of gravity further increases the safety of the RS7200E. A 17-gallon tank system has a single port for easy filling and a balanced design for enhanced stability. **TurfEx**















Facility & Operations

Continued from page 10

fertilizer (X-axis equaling increasing rates of nitrogen fertilizer and the Y-axis equaling turfgrass growth).



However, we also need to ask, "Is nitrogen fertilizer the only factor that can increase growth?" The answer is obviously "no." External variable such as temperature and rainfall can influence results as well. So we can see that statistical relationships are not so clear cut and analyses try to find the best fit (the slope of the line) for this relationship.

ANOVA is used to analyze differences or equality between treatment means. ANOVAs are useful for comparing two or more means for statistical significance. Significance between means is often determined by a threshold value such as the Least Significant Difference as one measure. Analysis of data can be very confusing, drawn out and beyond the scope of this article. Those of us in Plant Sciences often consult with statisticians to aid in the analysis of large data sets. Let's leave this up to the experts.

EXAMPLES OF TABLES AND CHARTS & WHAT TO LOOK FOR

Understanding data tables becomes an easier task now that you understand some terms like the mean, standard deviation and least significant difference. The following example comes from the National Turfgrass Evaluation Program website. All tables should be titled; columns labeled and have some indication of significance between means.

This example shows a data table for weed ratings in some bermudagrass cultivars. The numbers listed under TN1 are means of three replications of percent weed ratings. Several text boxes explain much of the information on the data table; however, the most important question to ask, "Are there any differences, significant differences? " You will noted that the Least Significant Difference (LSD) value is 1.6 If the differences between means is greater than 1.6, then you will see a different lower case letter adjacent to that mean. It also specifies that the LSD is an LSD set at 0.05 or a 95% confidence level. Means with the



same lettering adjacent to it, are statistically equal (even if numerically appearing different).

Understanding Bar Graphs can appear to be easier than large data tables. They can present data in a cleaner, more simplified format; however, some cautions should be pointed out. First look at the vertical or y-axis and determine what measurement is being labeled and the scale. All scales should start at "0", but sometimes do not. Look at the units on the scale. Unit interval (unit interval of 1 versus a unit interval of 20) may tell you that differences in the bars are not as great as they may appear.

Just as data tables should, bar graphs should have some indication of mean separation and significance. Bars labeled with the same letters are equal to one another. Those with different letters (A versus B) are significantly different from each other. Bar graphs should be titled as well and have both axis labeled.

Data tables and bar graphs can be used to present supporting data for conclusions being made. Researchers will sometimes present large data tables and cluttered bar graphs that will cause you as a viewer to lose interest simply because you are unable to keep up with what is being said by trying to follow the numbers.

When a presenter displays data in a table or chart, there should be a reason to show such data other than just showing the numbers. When a table or chart is used in a PowerPoint, the presenter should explain all of the parameters of the information: what is it showing, define the numbers, explain the X and Y axis on a graph, point out and explain the level of significance and where significance exist. Highlighting areas of interest to make a point, or two at the most, is often best where large tables are used, but often not followed. This becomes difficult for the participant to pick up on the key points and often interest is lost in the presentation. Most often it is best to express large amounts of data as text statements rather than showing the numbers. For it's the results or conclusions that you want to take home at the end of the day.

The best advice to give where statistics are involved is to ask questions when things get muddled. Any presenter should be willing to explain their research results if they took the time to include those results in their presentation. Do not be shy or intimidated about statistics, because a little understanding can go a long way for everyone in the room.

Chad Follis is a Horticultural Instructor at Mineral Area College in Park Hills, MO. Brad Fresenburg is an Assistant Extension Professor of Turfgrass Sciences at the University of Missouri in Columbia, MO. To see a list of references for this article, see www.sportsturfonline.com



Order recorded education sessions from 2014 STMA Annual Conference

All of the sessions were either video or audio recorded by IQ Media.

These recordings benefit conference attendees unable to make it to concurrent sessions as well as sports turf managers and crews unable to make it to the conference. See demo at www.intelliquestmedia.com/library/stmademo.

The sessions are available through an Online Learning Center where users can have access to education at any time throughout the year. Price for an all access subscription to the Online Learning Center is \$159 for all STMA members and \$199 for non-members.

A USB thumb drive is also available for purchase to those inter-

ested in a hard copy back up to the online content (inludes Online Learning Center subscription) for \$189 for all STMA members and \$229 for non-members. Individual sessions are also available via the IntelliQuest Media website for \$20 per session.

An order form is provided below for you to purchase the content. In addition, you can visit the STMA website at www.stma.org/2014-conference-education to order now. Make sure to take advantage of this valuable opportunity for yourself and your crew. Stay on track with the latest education, industry trends, and research.

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STMA continues new membership incentive promotion, referral rewards

STMA has decided to continue its successful New Membership

Incentive program, citing the extremely favorable reception it has received. The program offers a number of incentives to new members and a referral bonus program, both designed to help the association build on its continued growth.

New Member Benefits

Through the program, new members—those individuals who have not been an STMA national member since 2000—are eligible to receive a free conference registration (valued at \$375, to be used within 3 years) when they purchase an STMA membership. This new member offer is valid for the association's sports turf manager and commercial categories, including individuals at the associate level (sports turf manager and commercial associates). Unfortunately, new affiliate and student members are not eligible for the free conference registration benefit.

To see if you qualify for the free conference promotion, please visit www.STMA .org or call the STMA office at 800.323.3875.

STMA Referral Rewards

All STMA members are eligible for the association's new referral rewards program. Any current member who refers a new qualifying individual that signs up for a membership will receive a \$100 voucher that can be used on a variety of items, including STMA merchandise, conference registration fees or membership dues. There is no limit to the number of new recruits a member can refer; he/she will receive the \$100 voucher incentive for each new person they refer who signs up.

Stay tuned for more details at www.STMA.org.

2014 Committee Service underway

STMA President David Pinsonneault, CSFM, CPRP has named

current and past board members and other active members to Chair the 2014 Committees. Volunteers are in the process of being placed

Committees and Subcommittees Chair

Awards Bylaws Certification Chapter Relations Commercial Membership Conference Conference Education Conference Exhibition

Conference Tours Editorial Environmental Ethics Finance & Audit Historical Andrew Gossel Mike Trigg, CSFM Martin Kaufman, CSFM Debbie Kneeshaw James Graff Allen Johnson, CSFM Jeffrey Fowler Co-Chairs James Graff and Doug Schattinger Phil McQuade Brad Jakubowski Tim Van Loo, CSFM Ken Mrock Jeffrey Salmond, CSFM John Mascaro on each committee. For a complete list of volunteers go to www.STMA.org.

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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, Scott Grace, scott@sundome.org

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

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

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

Illinois Chapter STMA: www.ILSTMA.org.

Intermountain Chapter of the Sports Turf Managers Association: http://imstma.blogspot.com/

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

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

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

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.

Nebraska Sports Turf Managers Association: sphillips4@unInotes.unl.edu

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

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

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

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

Northern California STMA: www.norcalstma.org.

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

Oklahoma Chapter STMA: 405-744-5729; Contact: Dr. Justin Moss okstma@gmail.com Oregon STMA Chapter: www.oregonsportsturfmanagers.org oregonstma@gmail.com

Ozarks STMA: www.ozarksstma.org.

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

Southern California Chapter: www.socalstma.com.

South Carolina Chapter of STMA: www.sc-stma.org.

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

Texas Sports Turf Managers Association: www.txstma.org

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

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BY DR. DAVID MINNER

Professor, Iowa State University

Questions?

Send them to David Minner at Iowa State University, 106 Horticulture Hall, Ames, IA 50011 or email dminner@iastate.edu.

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



Winter woes? Come to St. John

'm still down in the Caribbean

but I have been getting an earful about your winter woes across the country. Snowfall records were set for Central Park in February as well as many Midwestern states, while municipalities have been reporting a record number of water main line breaks as the frost depth creeps well below 3 feet.

So maybe you have wondered what this all means for your athletic field turf. Snow is usually our friend because it insulates fields and reduces direct low temperature injury as well as winter desiccation. Even though air temperature and wind chill can be very cold in the winter the earth continues to emit heat from its core and the snow traps the heat much like a tarped field. The snow also prevents direct contact with the sun and wind that can cause excessive plant drying when water can't be extracted from the frozen ground.

Snow cover is a little unpredictable so turf covers are a good choice to prevent desiccation and offer earlier spring green-up. The only real down side to snow cover is increased disease from pink and brown snow molds. If snow mold is a real problem for your field situation then preventative fungicides can be applied in the late fall just before the first snow flies in the winter. If caught with substantial snow mold and a sea of matted grass, then fluff up the matted grass to speed recovery using a spring tooth drag, Fuerst harrow, or rake.

Direct low temperature kill can also occur during the winter from extremely low temperatures or moderately low temperatures that last for a long time. This year the deep frost line indicates that we have had both extremely low temperatures and moderately low temperatures for an extended period of time. Here is how I rank the potential for turf loss based on low temperature kill from most injury to least injury; bermudagrass > zoysiagrass > annual bluegrass >perennial ryegrass = turf type tall fescue > Kentucky bluegrass.

Fields often collect pockets of surface water that can freeze like little ice rinks with a half inch of ice. Ice injury is far more damaging on golf courses where mowing heights are lower and the amount of annual bluegrass is greater. Annual bluegrass is also becoming more of a nuisance as sports turf creeps below the 1.5 inch mowing height and our research shows that annual bluegrass does not like to be covered in an impermeable layer of ice. So improve your drainage and reduce your annual bluegrass or Mother Nature may do it for you.

As the ground begins to thaw and before things begin to green up there is usually a month where you are wondering just what the spring will bring. On questionable fields where injury may have occurred make the crystal ball a little clearer by gazing at a plug of grass a month in advance of green up. Every year since I've been in the turf business (except this year because remember, I'm stuck in the Caribbean) I have taken field samples of grass and grown them in the greenhouse to determine if the grass is dead or alive. Just keep them warm and moist and put them on the window sill; you don't need a greenhouse. A cup cutter won't work on frozen ground; use a sawzall or chisel and 5-pound hammer. Those of you pushing bermudagrass farther to the north would be wise to make this a routine practice. It would be nice to know if your grass is dead so you can anticipate all the problems that lie ahead from personnel communication to developing a regressing plan.

On another note I am still helping with the local school field here on St. John and they have been playing multiple sports for years on a field shared with the community that is mostly dirt and rocks. Last year the community rallied with their support of labor and the field was scratched up using backhoes, the only equipment available on the island. The field did well for a while but I am needing a few basic things to take this field to the next level of safety and pride: fertilizer, a hybrid seeded or vegetative bermudagrass, a walk-behind broadcast spreader, backpack sprayer, and a topdresser; the topdresser is an optional luxury because we used 25 people to spread 40 tons of sand and we can do that again. There is no doubt that we can grow grass on the field, I just need a few resources; any help would be welcome. Call me at 340-514-4740 and I'll send you a little warmth. Tank-u-mon. 🔳

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