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SPORTSFIELD AND FACILITIES

MANAGEMENT

May 2014

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On the cover:

Eric Jones, head groundskeeper for the 2013 STMA Schools/Parks Softball Field of the Year Park Hill South Lady Panthers Softball Field, Riverside, MO, lines his field before a game last year. Jones started with the Park Hill School District 15 years ago as a summer worker and now manages the high school's sports complex and campus.

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From the Sidelines

Eric Schroder

Editorial Director

eschroder@specialtyim.com

717-805-4197

Is verticutting making a comeback?

Verticutting, also known as dethatching, was a victim of budget cuts and personnel losses over the past few years, according to Glenn Musser, president of TurfTime Equipment in New Holland, PA. "If a manager had to choose between aeration or dethatching the manager would most often choose aeration," Musser said. "Many fields were able to survive a few years without dethatching without seeing significant turf problems. However within the past 2 years those fields were starting to see fungus and insect damage. The accumulated thatch layer prolongs highly humid conditions, which favors diseases. The neglected thatch layer will also cause the grass to develop a shallow root system which makes it less able to survive tough conditions, especially in the heat of summer."

Musser said now he's seeing some sports field managers adding back dethatching as part of their management practices. "They realize that aeration without dethatching is not the Best Management Practice. To control diseases and push the turf roots downward, dethatching is a valuable part of the schedule."

We exchanged emails with James Bergdoll, CSFM, the turf manager and maintenance superintendent for Elizabethtown Sports Park in Elizabethtown, KY on his verticutting practices. Why is he now verticutting? "We like to lightly verticut our bermudagrass fields at the beginning of the growing season to stimulate lateral and vertical growth and remove any dead material that could be matted into the canopy," he emailed. "In the growing season, a deeper cut removes more material to allow moisture and oxygen to reach the rootzone more easily as well as control thatch. We also like to verticut following core aerification to help break up the cores and redistribute that material into the soil pro-

file. Verticutting can also aid with overseeding by opening the canopy giving ryegrass a place to make soil to seed contact. Adversely, verticutting aids in the transition by removing ryegrass and stimulating bermudagrass growth."

Another verticutter is Darian Daily, the sports field manager for the Cincinnati Bengals. "We verticut our fields to promote lateral growth of our bermudagrass, help control thatch and organic build up, and to help 'wake up' the bermuda as it comes out of dormancy, by opening up the canopy to allow sunlight and heat down to the ground," Daily said.

Bergdoll: "In the past we verticut only one or two times a season but we are planning to increase to hopefully three or four times a season. I have found that we need to be more aggressive with the bermuda to keep it stimulated and give it room to grow. We actually had an issue last summer where the bermuda was growing almost too aggressively and the runners were growing on top of the canopy."

Daily: "We verticut three or four times a year depending on field use. Most of the time it is in the spring and early summer because I have found the Patriot bermudagrass in my area doesn't respond well once the temps get above 90°. We use 1 mm blades in our verticutting because they don't damage the bermuda as bad as the 2 mm blades did. We used the 2mm blades when we had cool season with success, but the 2 mm seemed, I felt, too aggressive for the warm season grass and took more time to heal."

We asked Bergdoll and Daily for any tips for others to get best results when verticutting. "Watch your timing; obviously you want to verticut when the turf is actively growing due to the aggressive nature of verticutting. Verticutting too late in the season can weaken the turf going into dormancy potentially making it more susceptible to winter kill. Periods of heavy field use

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SPORTS FIELD AND FACILITIES MANAGEMENT

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

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STMA OFFICE

805 New Hampshire Suite E
Lawrence, KS 66044

Phone 800-323-3875 Fax 800-366-0391

Email STMAinfo@STMA.org

www.STMA.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

Phil McQuade, Brad Park, Jim Cornelius, CSFM, Jason Henderson, PhD, Gwen Stahnke, Cale Bigelow, PhD, Jamie Mehninger, David Schwandt, Mark Frever, CSFM, Joey Fitzgerald



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President's Message

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



Direct Mail List Sales
MeritDirect, Jim Scova
Phone: (914) 368-1012
jscova@MeritDirect.com

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
lpalmer@specialtyim.com

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STMA: working for YOU!

Can you believe it is May?! The warmer temps are here to stay, and the fields are in full use (or overuse depending on who you ask). Most of you are extremely busy keeping your fields safe, playable and looking good. Topdressing, fertilization, aeration, irrigating, painting, mowing, edging, grooming and general cleanup and maintenance are all taking center stage. Students and professors are finishing the school year, while other members are winding down the trade show season.

Just a quick note to say "THANKS" to our Commercial Members who continue to add value to STMA. Their dedication to your success, mentoring, product development, and sponsorship, coupled with timely, quality service and general support make them great partners who advance the profession.

Dedicated volunteers and staff are full into committee work. Calls are being made; work plans are being set; and recommendations are forthcoming. Committees directly enhance the value of membership by providing the tools and resources to strengthen your knowledge and professionalism. Here is an update on some of their work: 1) a task group has been formed to review the Innovative Awards so that we maximize the benefits to commercial members and to you by providing cutting edge products and services; 2) the Conference Education Committee is reviewing the many proposals you submitted so that we have well-balanced and pertinent topics; 3) the Conference Committees and the Finance

and Audit Committee will be reviewing the conference budget to present to the Board in July; 4) the Conference Tours Committee is busy finalizing some great venues to visit. Conference is only 7+ months away! I hope you share my view that trying something new is a good thing. Denver, a new conference venue, should be exciting, enriching and a welcome spot to gather after a long season.

Your Board had a very productive March meeting (on which you should have received an update from your category rep), and we are gearing up for the July meeting.

You have at your disposal a talented and dedicated staff who complete all of the behind-the-scenes work that keeps STMA moving in a positive direction. Kim, Leah, Nora, Kristen and Shant are working for you and ensuring that your membership has value. They do those little things and sometimes big things so you can focus on being a professional sports turf manager. As someone who was a long time NESTMA Chapter Board member, I can tell you from experience that the volunteer spirit can only go so far. You have great ideas, great suggestions and are doing great work, but without the common thread of headquarters and people working behind-the-scenes many things would simply not get done. So, concentrate on what you do, do it well and know that the day-to-day operation of STMA is working for you.

In this month of remembrance, let us also not forget Mother's Day or Memorial Day. For without those people we would not be where we are today. ■



THERE'S A TEST FOR THAT

▲ Author Sam Ferro busy at work in his lab in Linwood, KS.

Testing of soil, turf, and irrigation water now plays a very important part in building and maintaining quality fields. A variety of laboratories with expertise in various disciplines specialize in sports turf testing and are eager to assist the sports turf manager. Whether it's routine soil fertility management, disease diagnostics, drainage evaluations, or one of the many other issues that affect turf managers, there is a test for that. This article is intended to provide a brief introduction to

some of the tests that are available and information on how they may aid in providing successful fields.

NEW FIELD CONSTRUCTION

Sand-based athletic fields typically require soils and drainage to be brought in from off-site to construct the field. Before any soils are used for construction, they must be tested to determine compliance with project specifications or goals. The laboratory may also prepare trial blends of the sands, soils, and/or amendments in efforts to assess and optimize performance of the rootzone materials. Quality control testing is performed during construction to ensure quality consistent materials are used.

Drainage gravel should be tested for both natural and synthetic turf construction. For natural turf, gravel is assessed for performance and compatibility

» Important factors to evaluate

are sodium content, carbonate and bicarbonate content, total dissolved solids, and chloride amongst other analytes. These parameters can affect soil and turf quality, as well as the irrigation system.

with the rootzone. Synthetic turf gravel should be tested for drainage and stability.

Typical construction related laboratory tests include particle size analysis, mix ratio testing, infiltration rate testing (also known as percolation or permeability), and soil porosity evaluations.

ROUTINE MAINTENANCE

Soil nutrient testing should be part of every athletic field manager's tool bag. Macro-nutrient and trace element testing allows the turf manager to monitor current conditions and determine a baseline for their fields. This testing also provides a check of the effectiveness of fertilizers and soil amendments, and it offers the ability to adjust products and fine-tune applications based on science.

Samples should be sent to labs that specialize in turf testing. These labs will provide test results along with interpretative guidelines to aid in understanding

the data. Recommended testing intervals vary depending on intensity of management. Low input fields may only need testing every 2-3 years, while higher input fields benefit from annual testing.

Plant tissue analysis offers a snapshot of the nutritional status of the turf at the time the sample was taken. It provides information on the relative health of the turfgrass and interrelationships between all essential plant nutrients. Managers can determine if a specific nutrient is lacking before symptoms appear. When tissue testing is used in conjunction with a soil analysis, it can provide information on critical nutrient levels and how best to correct problems.

Irrigation water quality can be an important issue for sports turf managers. This is especially true for those who are using recycled water or gray water to irrigate fields. Important factors to evaluate are sodium content, carbonate and bicarbonate content, total dissolved solids, and chloride amongst other analytes. These parameters can affect soil and turf quality, as well as the irrigation system. Testing to monitor irrigation water quality can help prevent problems from arising with turf and equipment.

Many turf managers don't realize that topdress materials should be evaluated before use. Layering can occur if too fine of a topdress is used over the existing soil. When a finer soil layer builds up over an underlying coarser layer, there is a tendency for excess water to be held in the upper layer. This can lead to increases in disease pressures, shallow rooting, black layer formation, or excess surface compaction. A simple particle size test can determine topdress/rootzone compatibility and limit the potential for layering.

Testing of baseball/softball skin areas can help to pinpoint mix needs before purchasing sand, clays or amendments. Skin test results can be compared to industry standards for guidance regarding maintenance needs. Multi-field managers can use test results to aid in creating consistent performance throughout the complex.

Routine testing of synthetic turf? Yes, even artificial fields can benefit from analytical services. The consumer products safety commission and leading industry groups recommend biennial (every other year) Gmax testing for synthetic turf fields. In addition to Gmax analysis, synthetic field evaluations should include height of fibers, infill depth, inlay and seam analysis. This data supplies the information needed to show whether fields are in compliance with industry standards, pinpoints problem areas and provides recommendations for remedying trouble spots.

PROBLEM DIAGNOSTICS

It is extremely important to diagnose and eliminate turf problems before they become major issues.

Turf growth problems are often a result of improper nutrient levels. Soil and plant nutrient evaluations can provide guidance to correct and optimize growing conditions.

Many turfgrass diseases and problems look quite similar, making

visual diagnosis difficult. For an accurate diagnosis, samples can be sent to a turf pathologist. These scientists evaluate turf samples for pathogen signs and disease symptoms, identify problems, and make recommendations regarding management of the problem.

Every field has some pathogenic nematodes feeding on the plant roots. Many nematodes are harmless to plants, but others can cause damage. Nematode testing can indicate which nematodes are present, whether they are harmful, and provide guidance regarding control of pathogenic species.

Diagnostic profile core testing provides the ability to peer down below the surface of the field, and to see how the rootzone and drainage are working (or why they are not working). Intact subsurface soil samples (usually 6 to 16 inches deep) are broken down and evaluated at various depths throughout the soil profile. This allows for in depth portrayal of soil composition, soil layering, water holding and drainage characteristics. By providing detail on current soil conditions, profile core reports are especially beneficial when making field renovation decisions.



SAMPLING

The test results generated by the lab are only as good as the samples submitted for testing. If samples do not properly represent the field, then test results may lead to incorrect conclusions and recommendations that not only do not help but may

harm the field. Thus it is crucial that proper sampling techniques are performed. Different tests may require varying sampling and sample shipment requirements. If you are unsure of appropriate sampling techniques contact the testing lab for instructions.

As you can see, there is indeed a test or tests available to prevent, diagnose, and/or treat a multitude of field conditions. Most laboratories have personnel that are ready to discuss your particular situation before testing, and they are also ready to help you interpret and understand test results. Make testing a part of your turf management program, and you will see a positive impact on the appearance, playability, longevity and profitability of your sports fields. ■

Sam Ferro is president of Turf Diagnostics & Design, a leading physical testing laboratory serving the sportsturf, golf, and landscape markets.



ORGANIC MANAGEMENT and other systems employed in maintaining turfgrass

▲ **Calendar-based** preventative and curative applications can provide very good turf quality; however, the lack of site specificity can result in poorly timed and/or unnecessary fertilizer and pesticide applications.

There is increased interest in turfgrass management strategies that are intended to reduce or eliminate synthetic pesticides and, in some cases, synthetic fertilizers. Consumers' desire for organic food and its perceived benefits has translated into a growing demand for turf products and contracted services described as 'organic' or 'synthetic pesticide free'.

While the mischaracterization of a turfgrass management program may be entirely unintentional, marketing non-organic products or services as organic has numerous consequences, most obvious the customer not receiving what is being sold. In some cases, where synthetic pesticide free programs or organic management have been deemed 'successful,' these successes have served as a rationale to legislatively prohibit synthetic pesticide use. These 'successful' programs may have, in actuality, incorporated synthetic fertilizer and synthetic pesticide applications at some recent juncture, requiring a more accurate description of the programs, albeit a description less marketable than 'organic.'

The objective of this article is to describe the following turfgrass management philosophies to better enable

sports fields and grounds managers to sort-out common terminology used in the marketplace today: calendar-based preventative and curative applications; Integrated Pest Management (IPM); management without synthetic pesticides; and organic management.

For the purpose of clarity in this article, the term 'synthetic pesticide' includes products that meet each of the following criteria: 1) The product has a United States Environmental Protection Agency (EPA) pesticide registration number; and 2) The product is **not** approved for organic production per United States Department of Agriculture (USDA) National Organic Program (NOP) or Organic Materials Review Institute (OMRI) guidelines.

CALENDAR-BASED PREVENTATIVE & CURATIVE APPLICATIONS

Schools and municipalities are contracting-out pesticide and fertilizer applications at a more frequent rate. The lack of trained and licensed personnel, limited availability of application equipment, and other issues related to product storage have created a strong demand for contracted applications. Calendar-based preventative

and curative application programs that have traditionally served the home lawn market are often employed in the management of public sports fields and grounds due, in large part, to the fact that they can be readily integrated into the public bid process.

Contractor-submitted bids are typically based on a scheduled application of fertilizer and pesticide products on a specified date (or range of dates), to a known acreage, and at label-derived rates. Realistically, calendar-based contracted programs may be the only avenue in which fertilizers and pesticides are ever applied to sports fields and grounds in a public setting. However, the environmental suitability of these applications is often called into question as one-size-fits all protocols can result in pesticide and fertilizer applications that are poorly timed and/or unnecessary.

INTEGRATED PEST MANAGEMENT (IPM)

While numerous definitions have been authored to describe IPM, no conventional definition addresses fertilizer selection nor entails the elimination of synthetic pesticide use. The following is a definition developed by the Rutgers Pest Management Office: *As a long-term approach to maintaining healthy landscapes and facilities that reduces the risk to people and the environment, instead of routine chemical applications, IPM employs site assessment and monitoring, and pest management tactics that include horticultural, mechanical, physical, and biological controls and selective use of pesticides when needed to keep pests within acceptable limits.*

Site assessment and setting pest thresholds (i.e. acceptable limits) are IPM principles that can be used to reduce the quantity of pesticides applied to sports fields and grounds. Town properties and school district sports fields and grounds can be subdivided into zones (e.g. A, B, and

C) based on turf function and aesthetic priority. Pest threshold levels can then be established for individual zones.

For example, a school district may classify certain sports fields and lawns as Zone A turf locations on the basis that they have the highest expectations for function (playing surface quality) and aesthetics; thus, these locations have the lowest threshold level for weeds, diseases, and insect pests. Examples of Zone A turf areas may include varsity sports and practice fields used by high school athletes and high profile lawn and grounds locations.

Zone B sports fields and grounds may include turf locations where stakeholders have a moderate expectation level for playing surface and aesthetic quality such as sports fields used by middle school athletes, passive recreation areas, and lower visibility lawns. A greater level of weeds, diseases, and insect activity can be tolerated given the less intense recreational activity, younger age of athletes, and/or lower aesthetic importance.

Sports fields and grounds designated as Zone C can be determined to have the greatest threshold for pest activity and may include sports fields used by elementary school students, 'alternate fields' that are always open to users when high value fields are closed, and turf locations where soil stabilization (no wind or soil erosion) is the primary function of these grounds.

MANAGEMENT WITHOUT SYNTHETIC PESTICIDES

Laws essentially prohibiting the use of synthetic pesticides on school sports fields have been implemented in the State of New York (playgrounds, turf, athletic or playing fields at day care centers and schools [kindergarten through grade 12]) and Connecticut (grounds

▼ **Left:** As part of an Integrated Pest Management (IPM) plan, middle school sports fields may be deemed to have a higher threshold level for broadleaf weed populations compared to high school varsity fields. **Right:** Failure to develop any pest management plan resulted in nearly complete white grub damage of this municipal baseball outfield during late September.



of day care centers, elementary and middle schools [grade 8 and lower]). Additionally, at the time of the authoring of this article, a bill has been introduced in the New Jersey State Legislature prohibiting 'lawn care pesticide' use on the grounds of day care centers, schools, and sports fields at municipal, county and state park facilities. The proposed New Jersey Safe Playing Fields Act defines a 'lawn care pesticide' as "... any pesticide labeled, designed or intended for use on lawn, gardens, turf or ornamental plants". These laws and proposed bill provide allowances for 'emergency' pesticide applications per approval from varying authorities.

It is important to note that these laws and bill do not address fertilizer use; thus, it is a mischaracterization to state that organic management is being legislatively mandated in these cases.

The New York and Connecticut laws and proposed New Jersey legislation allow the application of Minimum Risk Pesticides. These products contain active ingredients that are exempt under Section 25b of the Federal Insecticide Fungicide Rodenticide Act (FIFRA) and do not require EPA registration (i.e. they do not require an EPA registration number) because the EPA considers their ingredients, both active and inert, demonstrably safe for the intended use. (www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm). Examples of minimum risk active ingredients included in products marketed for use in turf include, but may not be limited to: cedar oil, citric acid, clove oil, corn gluten meal, eugenol (oil of cloves), lauryl sulfate (sodium lauryl sulfate), 2-phenethyl propionate (2-phenylethyl propionate), sodium chloride (common salt), and sodium lauryl sulfate.

It is extremely important to understand the specifics of the laws under which one is governed. For example, pesticide products that

have an EPA registration number are not allowed for use on the grounds of day care centers and elementary and middle schools in Connecticut, regardless of whether or not the product is approved for use in organic production (e.g. Avenger Weed Killer; OMRI-listed; EPA Reg. No. 82052-1; and M-Pede; OMRI-listed; EPA Reg. No. 62719-515).

A thorough evaluation of the success of a management program that excludes synthetic pesticides must take into consideration prior management history. Sports fields and grounds where synthetic herbicides and insecticides have been routinely applied typically have few weed and insect problems. Initiating a program (and maintaining acceptable turf quality) without synthetic pesticides on properties with minimal weed and insect problems presents less of a challenge compared to beginning such a program on turf riddled with annual and perennial weeds and/or insect pests.

ORGANIC MANAGEMENT

The USDA NOP defines 'organic' as a labeling term that indicates that the food or other agricultural product has been produced through approved methods that integrate cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity (www.ams.usda.gov/AMSv1.0/nop). Materials allowed for use in organic production are either essentially derived from living things or naturally occurring minerals.

The USDA NOP definition underscores that organic management, to this point, has been employed primarily in agricultural production systems, as opposed to turfgrass and

▼ **Left:** Within a school district, the greatest broadleaf weed population can often be tolerated on the sports fields and grounds surrounding elementary schools. **Right:** This suburban New Jersey sports field has not received a synthetic pesticide application since 2009 (photo taken October 2013). Before this program, synthetic pesticides were routinely applied to the sports field which consisted of good turfgrass cover. Current cultural practices promote competitive turfgrass: regular mowing (3 inches), fertilization, aerification, and overseeding.



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landscapes. The USDA NOP was developed to create standards for organic farming and administer organic certification – which verifies that a farm or handling facility complies with the USDA organic regulations and allow the sale, labeling, and representation of a product(s) described as organic.

To meet USDA NOP certification requirements for crop production, organic farmers are prohibited from applying non-conforming substances to the land for three years before the harvest of an organic crop. This requirement, albeit rigorous, preserves the integrity of products labeled organic and drastically contrasts with a recent effort to develop standards for organic land care (including lawns) that allows applications of non-organic materials under an ‘Emergency Non-Organic Rescue Treatment’ provision. The standards, developed by Northeast Organic Farming Association (NOFA), emphasize that emergency non-organic rescue treatments must be rare, must only be undertaken as a last resort, and must be approved by the client (www.organiclandcare.net/accreditation/standards). Where a pest population exceeds a pre-established threshold (established by the turf manager and/or client) and a synthetic pesticide is used reduce the pest population to an acceptable limit, the management system should be characterized as IPM.

In its broadest sense, organic turf management seeks to apply the principles of organic crop management to the maintenance of turfgrasses. A primary tenant of organic management is the emphasis on systems-based management as opposed to product-focused management. Synthetic pesticides and fertilizers are commonly applied using a calendar-based approach; organic-conforming products can be applied in a similar manner by simply removing the synthetic product from a calendar program and inserting an organic product. Organic philosophy discourages this type of simple input substitution as it is inconsistent with broader systems-based models that emphasize soil preparation, proper establishment methods, turfgrass selection, and cultural practices that favor healthy, competitive turfgrass.

Per USDA NOP guidelines, synthetic fertilizers, sewage sludge, irradiation, and genetic engineering may not be used in organic agricultural systems. “Materials for Organic Crop Production” (NOP 5034-1), currently in Draft Guidance form, lists materials (including some synthetic) that comply with USDA organic regulations (www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5103311). Additionally, Organic Materials Review Institute (OMRI) is a nonprofit organization that provides organic certifiers, growers, manufacturers, and suppliers an independent review of products intended for use in certified organic production, handling, and processing (www.omri.org). The OMRI Products List is a directory of all products OMRI has determined are allowed for use in organic production, processing, and handling according to the USDA National Organic Program.

To preserve the integrity of an organic turf program, turfgrass managers should confine their product choices to those that are OMRI-listed or can be found on the “Materials for Organic Crop Production” list. All too often, confusion arises over what materials are allowable as part of organic management. Restricting product use to those products that appear on OMRI and USDA NOP lists provides a level of validation that the system is being managed in a manner that can legitimately be characterized as organic.

An example of non-organic materials readily mischaracterized as organic involves ‘organic-based’ fertilizers. These fertilizers will often contain one or more natural organic fertilizer sources (e.g. bone meal, blood meal, feather meal, etc.) allowable in organic production but also contain synthetic nitrogen (N) sources and/or biosolids. Synthetic N sources and biosolids are prohibited for use in organic production; thus, when these materials are applied to turfgrass, the management system should not be characterized as organic.

Because there is no national organic program for turf management, the validity and integrity of an organic program is the responsibility of the turf manager, whether the manager is directly employed by the property owner (i.e. school or town) or working as a contractor.

CONCLUSIONS

The underpinnings of successful IPM, synthetic pesticide free, and organic turf management programs include sound agronomic decision making, as opposed to simply figuring out what products can be applied and when (including Minimum Risk Pesticide, organic-approved products, etc.). Examples of systems-based management include utilizing construction methods that preserve topsoil quality and if necessary amending soils with compost to improve soil organic matter; timely establishment and selection of the best adapted turfgrass species and varieties that have demonstrated lower disease and insect susceptibility; and properly executing all cultural practices including raising mowing heights to encourage more competitive turf and returning clippings to recycle nutrients. Systems-based management strategies for sports fields include the aforementioned in addition to frequent cultivation to alleviate soil compaction on native soil fields; aggressive overseeding to account for voids in the turf cover caused by traffic; supplying ample fertilization to ensure active turf growth and recovery; and using growth blankets to promote seed germination and turfgrass growth when soil and air temperatures discourage turfgrass physiological activity. ■

Brad Park is Sports Turf Research & Education Coordinator, Rutgers University, New Brunswick, NJ; a member of the Sports Field Managers Association of New Jersey Board of Directors; and a member of the STMA Editorial Communication Committee.

John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Brown areas on field

Turfgrass area: University athletic field

Location: Denton, Texas

Grass Variety: Celebration bermudagrass

Answer to John Mascaro's Photo Quiz on Page 33



Background illustration courtesy of istockphoto.com

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SOIL DYNAMICS and effective irrigation management

Over the past year, I have had the opportunity to become involved in the day to day management of an irrigation system installed 3 years before a newly reconstructed sports complex. I must admit that since becoming a sports field manager 25 years ago, I have never had the opportunity to become so intimately involved in irrigation management. However, on this particular field, problems had arisen which required serious consideration of all the facets of the turf management program.

Conceptually, irrigation management is simple. Just replace the water lost to evapotranspiration; the combined effects of soil evaporation and moisture loss thru turf transpiration. I was told by one employee that the previous year he had gotten daily evapotranspiration data from a local weather-related website. A basic understanding of his irrigation system allowed him the ability to use this information and program the system to apply what was required.

As I ran through the different irrigation zones on the field, I noticed

some heads were not rotating, others were puddling and still others were watering in the wrong direction. Irrigation heads within the same zone were randomly fitted with different size nozzles. An irrigation audit completed by a certified irrigation auditor later reported that the system was only about 60% efficient.

Examination of the soil profile revealed major differences in soil compaction. In some areas of the field I could insert a soil probe 7 or 8 inches, in other areas only two or three. By coincidence, areas of sod replaced the year before due to fungus, coincided with these areas of heavier compaction. The areas of heavy compaction were programmed to receive the same amount of water as areas with much less compaction. Poor drainage in the heavily compacted areas was causing standing water to accumulate after irrigation. I can only assume that wet feet coupled with restricted root development had some bearing on sod loss.

In an attempt to optimize the effectiveness of the irrigation, I purchased a soil moisture meter. I did this intent on gaining a better

understanding of the moisture needs of the turf. Initial readings revealed differences in soil moisture which at the time seemed counterintuitive. Areas of the field with minimal compaction showed moisture content to be around 25%. Areas of high compaction with visual signs of standing water and obvious saturation showed soil moisture content only to be around 18%. I am not the sharpest tool in the shed and came to the conclusion that these moisture readings, alone, meant absolutely nothing to me and I would need more information. I continued to take readings hoping an epiphany would suddenly make it all clear to me. It instead became clear that my efforts were in vain.

As I began to research a little deeper, it started to make sense that in order to competently program irrigation based on evapotranspiration data; it would first require a baseline soil moisture measurement or irrigation threshold. This irrigation threshold would be used as a reference point from which to determine the need for supplemental irrigation. To better understand this concept it becomes important to have a basic understanding of soil. The following information helped to clarify my confusion.

Soil is typically a mixture of inorganic and organic particles. The inorganic particles are mineral based and come from rocks that have been weathered and broken down into smaller pieces over a long period of time. The organic particles contain carbon compounds and they come from anything that was once living and has since died and decayed, including plants, microbes, insects and animals.

Soil texture is determined by the relative amounts of sand, silt and clay.

Soil structure refers to the arrangement of the sand, silt and clay particles joined together into larger aggregates of different sizes and shapes and the pore spaces that are left between them. It is in these spaces that root hairs grow and take in water and nutrients from the soil.

In heavier textured soils, soil structure favorable to turf growth is one that has stable aggregates. These aggregates result in a network of both small and large soil pores that has good aeration and drainage and allows for efficient exchange of air, water and nutrients. In sandy soils, typically having more than 85% sand, adequate pore space is primarily a product of particle size rather than soil aggregation.

The processes of root penetration, wetting and drying cycles, freezing and thawing, and microbial activity combined with inorganic and organic cementing agents produce soil structure. Soil structure can be severely compromised in many ways such as by compaction, playing on a field when it is too wet or by over tilling during construction or repairs.

After rain or irrigation, the pore space in soil typically fills with water. **Saturation** occurs when all the pores are full of water and the soil can hold no more water. This is the time when playing surfaces are generally most unstable and most vulnerable to damage caused by traffic. As moisture drains from the soil, the soil will typically become more stable. For this reason, it makes sense for the turf manager to manage soil moisture at a level favorable to turf survival yet providing a root zone stable enough to resistant damage by traffic.

Not all of the water will drain due to gravity. Some water will stay in the soil. Moisture will remain in the smaller pore spaces and as a thin coating on the outside of the soil particles. This remaining moisture held

in the soil against the force of gravity is known as **capillary moisture**.

After the gravitational water has drained away, the soil is said to be at **field capacity**. At field capacity water in the pores is typically easy for the plant roots to use. Once the pore water is used up, there is normally a thin coating of moisture remaining around the soil particles. The **permanent wilting point** is defined as the point at which remaining soil moisture is held so tightly that it is unavailable to plants. Plants subjected to this level of soil moisture will not typically recover. Turf will usually exhibit signs of drought stress before the soil reaches the permanent wilting point. The amount of water held in the soil between field capacity and the permanent wilting point is called the **plant available water**. A sandy soil will typically hold less water at field capacity than a heavy textured clay soil but a larger percentage of that water is plant available water.

There are two means of identifying soil moisture content in the field. Volumetric soil moisture is measured as a percentage of the total soil volume. Soil moisture tension is a measure of how tightly water is held in the soil.

Volumetric soil moisture is a method of measurement used by many moisture meters to measure moisture in the soil and can be used as a means of monitoring irrigation requirements. Each location should be evaluated individually and the volumetric soil moisture compared to turf quality and soil conditions at the time the reading is taken. The



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accumulation of volumetric soil moisture data for a given location, over time, can give the turf manager the ability to correlate soil moisture readings, predict turf needs and irrigate accordingly.

Soil moisture tension is a phenomenon caused by the capillarity of water. **Capillarity** is the combined effect of cohesion and adhesion. **Cohesion** is the attraction water has to itself. It is the reason water beads up on a sheet of glass. **Adhesion** is the attraction water has to another surface; in this case it is the attraction to the soil particles. Moisture adhesion to the soil is typically the stronger of these two properties. Capillarity causes some water to remain in the soil after gravitational water has drained away. Capillarity also allows for water movement thru the turf plant against the force of gravity. This movement of water against the force of gravity is called **capillary motion**. Soil moisture tension increases as the volume of soil moisture decreases. Soil moisture tension can increase to a point where moisture remaining in the soil is held so strongly, it is unavailable to the turf. This is the permanent wilting point as previously described.

Kilopascals (kPa) are units of pressure measurement used to measure soil moisture tension. Suction is a negative pressure or tension and is therefore referred to by negative numbers. Soil moisture tension is a measure of suction, and the correct way to refer to it is minus or negative X kPa. Numbers closer to zero refer to less suction and therefore wetter soils. As a soil dries out the kPa value becomes larger (and more negative).

One benefit to measuring soil moisture tension as opposed to volumetric soil moisture is that soil texture is largely irrelevant. -25kPa in clay is the same as -25kPa in sand. Turf in either of these soils is basically working the same to extract moisture.

A **tensiometer** is a hand-held device that is forced into the ground for the purpose of measuring soil moisture tension. The hollow ceramic tip of a tensiometer is porous, allowing water to move into and out of a sealed water storage 'reservoir' or tube inside the tensiometer shaft. As the soil dries out, water is sucked out of the tensiometer through the porous ceramic tip. This creates a partial vacuum inside of the tube, which is registered by a vacuum gauge. Tensiometers usually operate accurately over a range of 0 kPa to -80kPa. **Gypsum block** sensors are also available for measuring soil moisture tension and can be buried in different locations of a field to allow for soil moisture tension measurements. Gypsum is a naturally occurring porous mineral. When shaped into a block and buried in the soil, water from the surrounding soil moves into and out of the gypsum block as though it were soil.

A gypsum block sensor consists of two electrodes embedded in a block, 'tablet' or cylinder of gypsum. When water moves into the gypsum block some of that gypsum dissolves, allowing a current to move between the electrodes. As the amount of water in the block changes so does the resistance to current flow.

As the soil dries out, water leaves the gypsum block and the resistance between the electrodes increases. Conversely, as the soil wets, soil water is drawn back into the gypsum block and the resistance decreases. These resistance values are then translated into soil moisture tension readings by a meter connected to the two electrodes, which displays the soil moisture tension as units of kilopascals (kPa).

The level of soil moisture tension required to sustain turf can vary by turfgrass species, region of the country and other environmental factors.

-50kPa to -80kPa may represent an approximate irrigation threshold for cool season turf above which the sports field manager could anticipate draught stress and a decline in turf quality. As always, it is the responsibility of the sports field manager to evaluate soil moisture tension readings as they compare to turf quality and use good judgment when establishing an irrigation threshold from which to initiate irrigation.

Dielectric Constant or Dielectric Permittivity Sensors use electric fields to monitor a dynamic of soil called its 'dielectric constant'. Water greatly changes a soil's dielectric constant. Dry soil has a dielectric constant of between 2 and 5. Pure water has a dielectric constant of 80. Consequently, as the moisture level in the soil changes, the dielectric constant changes accordingly.

This class of sensors uses the dielectric permittivity as a means of reporting soil moisture content. A key advantage of these sensors is that mineral particles such as salt barely affect the dielectric constant of soil so the soil moisture readings are largely unaffected.

Although each employs a different technology, thetaprobes, capacitance or frequency domain reflectometry (FDR) probes and time domain reflectometry (TDR) devices all rely on the dielectric permittivity of soil for their soil moisture measurements.

In addition to soil moisture monitoring being available as a manual method of establishing and maintaining an irrigation threshold, manufacturers of automated irrigation systems have integrated similar methods of soil moisture monitoring as means of controlling supplemental irrigation. Whether you choose to monitor soil moisture yourself or incorporate it into an automated irrigation system, your choice becomes another tool in your sports field manager's tool box.

The methods of monitoring soil moisture mentioned in this article should not be considered the only options available to the sports field manager. This article is intended only to suggest the benefits that can be realized through soil moisture monitoring and the tools mentioned are used only as examples to help better understand the principles provided.

In the past 25 years, I have attended many classes and read a lot of books and articles on the topic of soil. However, I had not seriously considered the interrelationship between soil dynamics and effective irrigation management. The positive or negative influences that in sum total contribute to an improvement or decline in turf quality warrant understanding and consideration. Knowledge acquired thru success is far less expensive than wisdom acquired thru failure.

As for the field I mentioned at the beginning of the article; a basic review of these few principles concerning soil and soil moisture gave me the ability to comprehend why and how the compacted soil I had previously identified as having 18% moisture could conceivably measure less moisture, and exhibit a higher level of saturation than other areas of the field. We look forward to having the irrigation system repairs completed in the spring and hope to be able to establish an effective irrigation threshold from which to program the supplemental irrigation needs of the turf. We will also be working to further relieve compaction across the board. ■

Jim Hermann, CSFM, is President of Total Control Inc. Athletic Field Management.

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NICKEL AND TURFGRASS GROWTH: ALL YOU NEED TO KNOW



▲ These two photos show reduced growth with increasing Ni treatments from Clemson's toxicity study. Each one shows four representative plots of either Diamond zoysiagrass or TifEagle bermudagrass under Control, 400, 800, and 1600 uM Ni treatments. The reduction in clipping yield is significant and easy to see.

Turfgrass managers are always trying to leverage acceptable conditions with minimal inputs (water, nutrients, and pesticides). Maintaining optimal plant nutrition is the foundation of sustaining healthy turfgrasses that require fewer inputs. Liebig's Law of the Minimum states that plant growth is controlled not by the total amount of resources (nutrients) available, but by the most scarce resource (limiting factor). Due to the fertilization of macro and most micronutrients, this principle isn't usually a problem. However, there are trace micronutrients that play critical roles in the plant that we should consider, such as nickel (Ni). Nickel constitutes approximately 3% of the earth's crust and is the 24th most abundant element. Nickel is a trace micronutrient that was discovered to be essential for plants in the 1980s. Typical ranges of Ni in soils range from 5-500 ppm; however, measuring bioavailability in soils is difficult because the plant available form Ni^{2+} readily oxidizes in the soil rendering it unavailable. Nickel is commonly forgotten in the world of turfgrass nutrition because of the low concentration found in plants (0.05-10 ppm) which is thought to be adequately provided by the soil. However, Liebig should not be disregarded when it comes to Ni and turfgrass.

NICKEL BIOAVAILABILITY

Sports turf grasses are commonly grown in conditions conducive to reduced bioavailability of Ni:

- Dry and/or cool soils in early spring, (Common throughout the Carolinas)
- Soil pH > 7, (Limestone based calcareous sands, which are commonly used for turfgrass root zones typically have pH values in the 8.2 range)
- Sandy and or low CEC soils (Putting greens, tees, and frequently top-dressed playing surfaces)

In addition, the following management factors influence Ni bioavailability:

- The presence of root-knot nematodes (*Meloidogyne* sp.) (Root-knot nematodes are not as damaging to turfgrass as sting or lance nematodes but are still commonly found in soils and can contribute to reduced Ni bioavailability)
- Exceedingly high concentrations of Zn, Cu, Mn, Fe, Ca, and Mg, (Rooney et al., 2007; Wood et al., 2006) (Many constructed root zones are derived from calcareous sands. Additionally, liming materials and other Ca sources (gypsum) are commonly applied in turfgrass management increasing Ca in the root zone)
- Ni deficiency was triggered in pecan with foliar applications of Fe, and heavy early spring application of N. (Turfgrass managers commonly fertilize with both of these nutrients to correct deficiencies and improve turf color.)

Ni TOXICITY, DEFICIENCY, HYPERACCUMULATION, AND PLANT DEFENSE

Minimal information exists on Ni toxicity and deficiency for turfgrasses. However, by way of other plant research, we can make some conclusions about Ni. One of the most well documented Ni deficiency cases has been in pecan trees, in which the deficiency caused a disruption in carbon metabolism resulting in stunted growth leaves termed "mouse ear." Foliar sprays of Ni corrected the deficiency, but only in newly emerged leaf tissue. The diagnosis and management has brought to surface the importance of Ni in plant health and suggests the possibility that many horticulture crops may possess a "hidden hunger" for Ni.

Plants found growing on serpentine soils containing elevated levels of metals (Zn, Cu, Co, Fe, Cr, Mg, and Ni) can hyperaccumulate Ni without deleterious effects. Nickel hyperaccumulator species have been studied for their potential in the phytoremediation of soils contami-

nated with metals by industrial processes. It is hypothesized that these hyperaccumulators evolved to exploit high soil Ni concentrations to enhance plant defenses from herbivory and disease.

NI NUTRITION AND UREA NITROGEN METABOLISM

Nickel is a highly mobile element in the plant due to chelation with organic molecules and tends to accumulate in newly formed tissue. Several enzymes in biological systems require Ni as a catalyst; however, the most well-known role of Ni in plant metabolism is its function in the activation of the enzyme urease. Urease hydrolyzes (breaks down) urea into ammonia and carbon dioxide. The hydrolysis of urea by the Ni dependent enzyme urease is necessary to make the nitrogen (N) in urea available to plants. Urease cannot work if it is not accompanied by Ni. Urea is the most popular N source in management due to its solubility, high percentage of N, low price, and ease of handling. Urease and Ni are also important for plants being fertilized with other N sources (nitrate and ammonium) because of the need to cycle urea generated as a byproduct of metabolic processes within the plant. Nickel deficiency has been recorded in several species and leads to an accumulation of urea in leaf tissue causing toxicity, foliar burn, and inefficient urea-N use. Research has determined that plants can directly absorb urea through urea specific channels and aquaporins (water channels found in cell membranes), which changes the previously hypothesized view that urea-N was absorbed by the plant only after being hydrolyzed by urease in the soil or plant surface. Soil urease inhibitors have been thoroughly researched and employed to limit gaseous N loss by ammonia volatilization after hydrolysis. However, the directly absorbed urea from leaf surfaces is directly hydrolyzed by urease in the plant tissue before being assimilated into organic N containing compounds.

Nickel nutrition

- Very little is known about Ni nutrition and fertilization of turfgrasses.
- Due to the extensive use of urea and the necessity of Ni in urea N metabolism, further research is required to determine best management practices for foliar urea N fertilization and supplemental Ni fertilization.
- Increased leaf tissue growth due to Ni supplementation was observed in 'Diamond' zoysiagrass and 'TifEagle' ultradwarf bermudagrass during research at Clemson University.
- Nickel is an essential plant micronutrient
- The reduced Ni bioavailability in common turfgrass management scenarios requires further research to determine Ni sufficiency and deficiency ranges
- Nickel is required for functional urease activity in plants
- Urease is a Ni dependent enzyme that hydrolyzes urea making the N available to plants
- Urease and Ni are important in the cycling of urea generated within the plant and can reduce urea toxicity (foliar burn)

CURRENT RESEARCH

Research conducted at Clemson University reported increases in urease activity, amino acid content, and growth of 'Diamond' zoysiagrass and 'TifEagle' bermudagrass fertilized with foliar urea and supplemental Ni. Plants not receiving supplemental Ni contained <1 ppm Ni in leaf tissue, whereas Ni supplemented plants accumulated up to 17 ppm by the conclusion of the study. At this concentration, no toxicity symptoms were observed. In a second study at Clemson University, Ni toxicity was examined in the same species. Symptoms of toxicity progressively increased as Ni concentration reached 100 ppm and resulted in growth reductions up to 32% in 'TifEagle' at the highest Ni concentration supplied. Due to these findings, 'Diamond' and 'TifEagle' are considered moderately tolerant of Ni and further research should be conducted to measure the effects of Ni supplementation and toxicity of other commonly used turf species.

FUTURE PROSPECTS

Not much is known about other roles Ni plays in the plant and current research is lacking in most agricultural crops including turfgrass. However, from the limited research already conducted, increases in growth and plant health with supplemental Ni nutrition have been recorded. Future research is required due to the popularity of urea as an N source in turfgrass management and strong relationship with the Ni containing enzyme urease that makes the N available to the plant. Further, several questions have been raised concerning Ni nutrition and turfgrass management: Can turf be established more quickly (seeding, sprigging) when supplemental Ni is applied? Are there synergistic effects with pesticides to reduce total inputs and improve plant health? What are the long-term ecological impacts of Ni supplementation? Can Ni supplementation improve urea N use efficiency and does it improve foliar uptake? Can increased Ni concentration in foliage inhibit herbivory? Is there enough Ni bioavailable for turfgrasses that supplementation is not necessary?

Currently, no Ni fertilizer sources are marketed for turfgrass, while other micronutrients with similar concentrations within the plant (Mo) are commonly included in liquid micronutrient products. Only one Ni fertilizer is currently marketed (Nickel Plus, Nipan LLC.) for use in pecan. To investigate Ni nutrition and possible turfgrass deficiency, an estimate of Ni input needs to be determined for managed turfgrass surfaces. Additional research determining bioavailability in turfgrass scenarios also needs to be conducted to examine if Ni supplementation would be beneficial. ■

Dr. Nick Menchyk is Postdoctoral Fellow, School of Agricultural, Forest & Environmental Sciences, Clemson University. Dr. Dara Park is Assistant Professor, School of Agricultural, Forest & Environmental Sciences, Clemson University. Dr. Haibo Liu is Professor, School of Agricultural, Forest & Environmental Sciences, Clemson University. References for this article can be found on www.sportsturfonline.com.

ARE YOU "INTERVIEW-READY"?

IN TODAY'S CHANGING JOB CLIMATE and transitional workforce, the average employee changes jobs every 2 to 3 years. It is estimated the average worker could have as many as 20 different jobs in his or her working lifetime. Some occupations average longer periods than others, but the days of working for the same company until retirement are almost unheard of. With that in mind, how prepared would you be if you had an interview today? The truth is we should be conducting ourselves as "interview-ready" everyday.

Each day we are presenting ourselves to employment "decision makers," in both our work and private lives. Unfortunately we don't always take advantage of these encounters by either being under-prepared or by failing to market ourselves in a professional, positive manner. By being cognizant of the fact our professional image is always on display to current and potential employers/decision makers, we can position ourselves into an "interview-ready" state simply by taking a few important steps:

bursement for college classes or will pay for continuing education courses through trade industry seminars. These classes, paid out of pocket, can be worth thousands of dollars, but are worth far more as future career-building and advancement tools. If reimbursement funds are not available, ask your HR department about what courses are currently available through your organization. Often supervisory classes, time management, first responder courses, etc., are available through your company. These classes are not

only resume builders but sends a message to HR and company officials that you want to grow and improve yourself.

If classes through your company are not available, check the website at your local library or county extension office: computer classes, public speaking courses, etc., are

available for little to no out of pocket cost. Upon completion of any course, be sure to forward your HR department a copy of your certificate of completion to update your employee file with the personal improvements you've made. Most importantly, update and maintain a running list of the names, locations, dates, and thesis or summary statements of any courses you complete for a resume attachment. Showing potential employers a desire to continually educate yourself and update skills is always impressive.

Resumes must be current and a hard copy within reach at all times with no exceptions! Even with all of the electronic media available for posting online resumes, there is something special about being able to present a current, well-written, hard-copy resume in person. Your resume should be a growing/changing record of your career, and with today's technology there is NO EXCUSE for not keeping it updated and current. The need for having a copy of your resume available at all times is because you never know when those "in-person" meetings with decision makers will be. Luck has been described as "being prepared for great opportunities." Make your own luck happen by being prepared to introduce/sell yourself to potential employers wherever you may meet them. Have multiple copies of your resume stashed every-



Resumes must be current and a hard copy within reach **at all times with no exceptions!**

Know who your target audience/potential employers and "decision makers" are. The short answer is—EVERYONE. Potential employers and decision makers are everywhere. People mistakenly think of potential employers as being limited to owners/managers in their chosen field. But decision makers can be those in associated fields who have connections. Vendors for instance, call on numerous customers/organizations in your same industry and may know of potential job openings. Sometimes they are even asked their opinions/references on job candidates. Co-workers who are not in positions of authority today could be promoted to positions of authority tomorrow at your, or an associated, organization. Your industry peers may be used as references or asked for name suggestions when organizations are looking at potential openings. Are you treating these and other potential decision makers *every day* with the same respect and professionalism as you would a potential employer?

Give yourself a raise today; make your resume a constantly growing and updated reflection of you. In today's economic times, raises can be few and far between, especially with local/state government employers or schools. But why wait for a raise when you can reward yourself? Many employers still offer reim-


where; your briefcase, your car, at work, at home, etc. Never fly without a resume handy; talk about the place for a truly “captive audience”! A resume instantly provides someone access to your best selling points, all the ways in which you can be contacted, etc. Anyone trying to get “discovered” in the music industry never leaves home without a demo CD to sell themselves; why should a resume be any different?

Network! Network! Network! As important as resumes are in providing a decision maker with a synopsis of your skills/work experience, they do not open doors like they used to. The days of sending your resume to a random person on a company listing/website and receiving a callback are almost extinct. Doors are opened by who you know and, more importantly, who knows you! Joining industry and local networking groups can be crucial in keeping you informed of upcoming job openings and keep your name in the right circles for opportunities. Media social circles can cast your net beyond local boundaries to opportunities throughout the state, country, even the world. Joining sites like LinkedIn, Facebook, Twitter and industry-specific websites allows your resume to be in the hands of decision makers before you are even aware of a job opening. According to the online magazine *The Recruiter File*, one in every six people gets hired using a form of social media.

You are your own marketing department. Every day, every encounter, every project, every “tweet,” every Facebook entry; you are selling yourself. But are you selling yourself to potential decision makers in an “interview-ready” mode? As helpful as social media can be in opening doors, it also has the ability to shut doors tightly when not used correctly. We would like to think that our private life is separate and apart from our work image; but social media has blurred those lines like never before. Companies want to know what potential employees are interested in, what they are like, and how they work with others; social media can be a great insight to these questions. It’s not hard to “Google” anyone, and some hiring companies now request that job seekers provide their LinkedIn, Twitter, and Facebook links as part of the interview process. While college friends may appreciate hearing about late Saturday night activities, will potential employers appreciate it as well? If you are working hard to market yourself in the best light, make sure you are covering all of your bases. ■


Carole Daily has more than 15 years in the Human Resource industry in factions such as retail, corporate, manufacturing, and consulting. She specializes in business communications. Her husband is Darian Daily, head groundskeeper for the Cincinnati Bengals.

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SYNTHETIC FIELDS: END-OF-LIFE ISSUES: How do you evaluate an older field? What's the next step?

Nothing lasts forever. Including, unfortunately, your synthetic turf field. And that field, which has remained cheerfully green and bright through wins, losses, sun and rain, is now showing its age.

It hardly seems fair. But if it helps any, you're not the only one going through this.

"A lot of fields are now coming up on their end-of-life," says Zach Burns of the Motz Group in Cincinnati, OH.

The first generation of synthetic fields, installed approximately a decade ago (give or take a few years), is showing its age. Field builders, and those who work with sports facilities, say the symptoms are easily recognizable.

"The fibers start to degrade," notes Darren Gill of Field Turf in Montreal, Canada. "You'll notice a 'hairing' of the fibers and they will start to break. You'll start walking off the field with broken fibers on your shoes. The infill also hardens."

According to John Schedler of AirFieldturf in Spokane Valley, WA field owners can walk the field and find definitive signs of wear.

"Areas of wear typically are between the hash marks and on the sidelines of a football field where there is the most use or foot traffic and around the goal mouth and corner kicks on a soccer field. Baseball and softball are different but typically you'll see the highest wear in the

▼ **Beginning of life.** All photos courtesy of The Motz Corporation, Cincinnati, OH



batter's box area and pitcher's mound area. Other areas to be watching are around the bases and sliding areas as well as where the players for each position typically place themselves."

The signs of wear, he adds, can be deceiving. "Most fields will have a displacement of infill in the higher wear areas. This exposes the fibers to more UV exposure and more wear from use. The infill is key to protecting the fiber and keeping it upright and preventing what is called lay-over. Maintaining the infill levels is a key part of any synthetic surfacing system by checking the high wear areas and grooming them specifically on a more regular basis than the rest of the field. The more stable the infill the more protected the fiber is from laying over. Fiber lay-over is the beginning of the breakdown process."

For those with access to testing equipment, the field's Gmax level will also be a telling point. "The field's Gmax will begin to rise," adds Gill. "It should be monitored and as it approaches 200 gs, the field should be remediated or replaced."

Remediated. Replaced. "Gosh," you're thinking. "Isn't this why I got a synthetic field in the first place, so I wouldn't have to go through this?"

Well, yes and no. For years, you've avoided mowing, sodding, weeding, seeding and feeding, the remediation and replacement other field owners go through regularly. But nothing lasts forever and that includes synthetic fields.

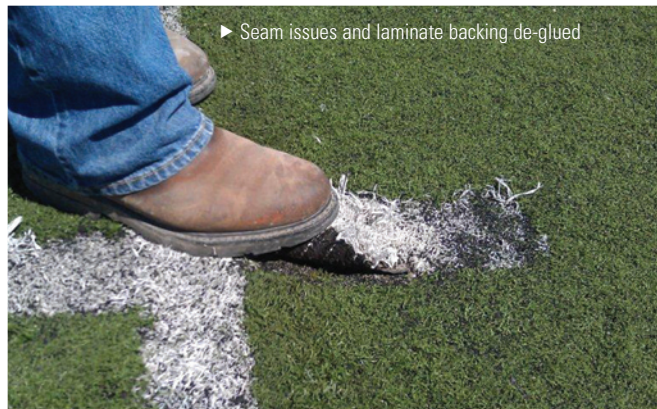
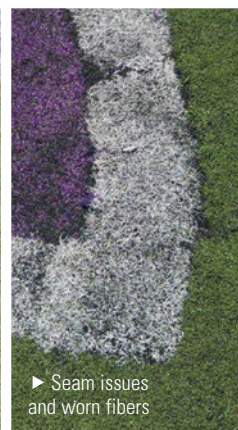
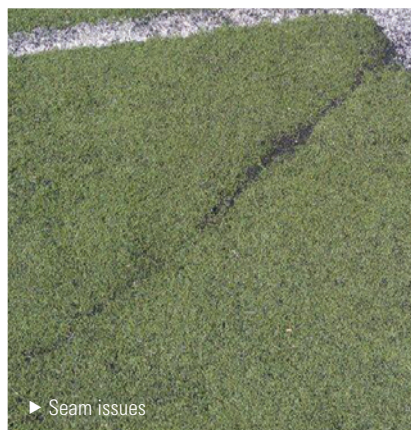
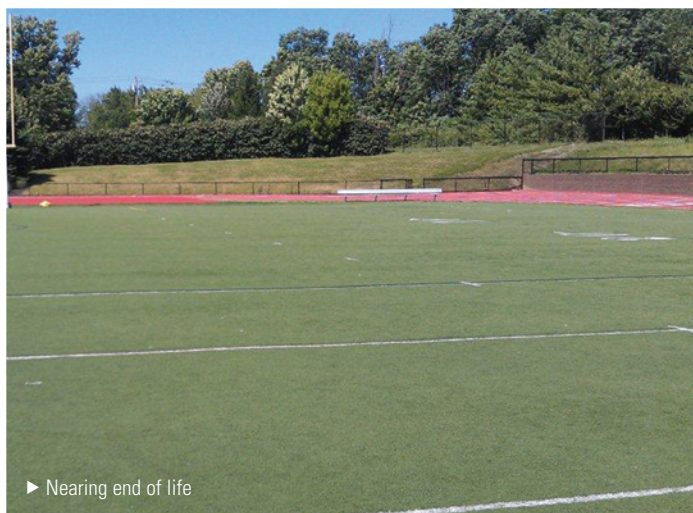
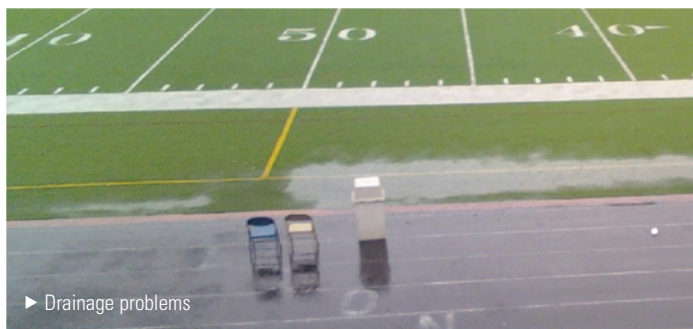
According to Burns, a field that needs to be replaced may show a

» "But again, **the key is to follow the operations and maintenance guidelines submitted by your manufacturer** and keeping in touch with your manufacturer's rep for the life of the field. A phone call or e-mail with pictures of any area of concern can be handled quickly by the manufacturer's rep and can keep the field manager protected."

— John Schedler.

decrease in performance and/or it may present a danger to users. However, he notes, there always are those owners who try to eke out a little more time.

"Sometimes, we know the field needs to be replaced, but we hear, 'Maybe we can get another year out of it.' More often than not, you'll hear that because people just don't have the money right now to replace it. We do have some people who have budgeted for this and planned for replacement in year eight, though. It depends on the owner."



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Facility & Operations

If the field is safe for the users, he adds, an owner may try to keep the facility going. However, all builders agree: safety should always be the paramount concern.

While the majority of fields that are being installed in North America are supplied with a specific year-term warranty, Burns says the actual longevity of a field will depend on a number of factors including but not limited to use, climate, system component quality, maintenance and installation quality.

"I think something that would be incredibly helpful for a manager is a yearly assessment (including seam integrity, fiber loss, testing protocol, infill depth, etc.) of the field conducted by the field manufacturer or an industry expert," he notes. "Having a benchmark set at installation and then an annual check provides the manager and owner data to weigh when a field is ready to be replaced. Most turf manufacturers conduct this kind of service."

Regular maintenance, including grooming the fibers and maintaining the level of infill, as well as addressing any minor problems, can help the field perform well during its useful life.

"Consulting with your manufacturer is key during the life of the field," says John Schedler. "Make sure you're following the maintenance procedures lined out by the manufacturer and keeping the field clean and free from as much debris/contamination as possible. Spot maintenance is also key in the high-wear areas. Sometimes, overall field grooming and brushing isn't necessary

▼ Worn fibers



“Consulting with your manufacturer is key during the life of the field,” says John Schedler. “Make sure you’re following the maintenance procedures lined out by the manufacturer and keeping the field clean and free from as much debris/contamination as possible.”

if the high-wear areas are maintained separately. But again, the key is to follow the operations and maintenance guidelines submitted by your manufacturer and keeping in touch with your manufacturer’s rep for the life of the field. A phone call or e-mail with pictures of any area of concern can be handled quickly by the manufacturer’s rep and can keep the field manager protected.”

However, when regular repairs can no longer keep the playing surface consistent, when the field starts feeling hard, looking bald or patchy or shiny, or when other symptoms appear, it is time to take that next step.

Having the field replaced might seem like a daunting prospect but, says Burns, “It’s not as disruptive of an event as the first installation. You’re not doing what you did initially, which included excavating and bringing in stone and pipe. The benefit is it’s a lot less time the facility is out of use. You are talking about three to four weeks instead of eight to ten weeks.”

And this brings up another question: once the surface of the old field is trucked away, what is the next step for it?

“Most customers aren’t thinking about recycling very much,” says Darren Gill, “but they should be.”

The next article in this series will discuss synthetic sustainability and turf recycling. ■

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 field construction. ASBA offers the publication, “Sports Fields: A Construction and Maintenance Manual,” which discusses, among other topics, sustainability in the construction and maintenance of synthetic fields, as well as synthetic turf recycling. For information, visit www.sportsbuilders.org.

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Q&A WITH MURRAY COOK ON MLB IN AUSTRALIA

Editor's note: SportsTurf caught up with global traveler Murray Cook, president of the Sports Turf Services Division of the Brickman Group, former president of the Sports Turf Managers Association, and the international face of field preparation for Major League Baseball, to ask questions about his experience preparing the cricket grounds in Australia for MLB's Opening Day series last March.

▼ **Tom Nicholson**,
Director of MLB's
Oceania office, left,
with Murray Cook.

SportsTurf: What is your relationship with MLB?

Cook: I've worked for the Commissioner's office in varying roles over the past 25+ years managing Opening Day games and numerous MLB events around the world. Over the past 12 years, the consultation and project management services have been provided through our Brickman Sportsturf team, which is a division of Brickman.

ST: What other projects have you worked on for MLB?

Cook: MLB has played games internationally for many years and we typically oversee the entire field of play operations for those games. In addition we assist with new ballpark evaluations and educational clinics related to field and ballpark maintenance. Field safety is a major issue with MLB and the MLBPA.



We have managed MLB games in numerous countries; when the Montreal Expos (now Washington Nationals) played parts of two seasons in Puerto Rico I wore a couple hats, Head Groundskeeper/Stadium Ops at Hiram Bithorn Stadium. We continue to manage this venue's MLB events including the past World Baseball Classic in 2013 and New York Mets series in 2011. MLB also receives requests from international federations to use professional players to compete in international tournaments. Some of those events have been the Olympics and Olympic qualifying games, Baseball World Cups, IBAF tournaments and the World Baseball Classic. Since players' contracts are owned by MLB clubs, we are responsible for evaluating and managing field of play operations in each of these countries before and during the tournament.

ST: How far in advance of the games in Australia did you begin planning on the work that had to be done?

Cook: Planning for the MLB opener in Sydney actually began about 16 months ago. The Sydney Cricket Grounds (SCG) has a storied past rich in history that goes back to the mid 1850's. It is the holy grail of cricket in Australia. Due to our past experience in working with the folks in Australia on projects like the Sydney 2000 Olympics and the Australian baseball league, we had a pretty good idea what it would take to build a baseball field there. However, constructing a Major League level field at the SCG we knew would be a challenge. Back in 1993 we did play an MLB exhibition series at the Oval in London so understanding a cricket pitch a bit was a huge plus. The challenge of this project was more than just constructing a field; we had to create a ballpark. That meant fencing, padding, backstop, batters eye, bullpens, batting tunnel, locker rooms, dugouts, foul poles, etc. And just to add a twist, we had to get it all completed in 16 days.

ST: Share with us what exactly you had to do with the field in Australia and include any especially interesting details or problems that you had to overcome.

Cook: It's amazing what great things we can do when no one worries about who gets the credit. The recognition for the success of this historical event belongs to a huge team effort. The vision for bringing the game to Australia belongs to Jason Moore (Promoter) and Tom Nicholson, MLB's Director of Oceania Operations. The core players in the project management were Tom Parker, the head curator, and project manager Scott Egelton. These guys were just remarkable. From this group we had to assemble the right team of contractors and vendors. Evergreen, better known as Dad & Dave's turf farm, was selected to perform the transition. Graeme, Mark and Chappo not only had to execute the transition but after baseball was through they had to flip it back to NRL rugby in a week. Back in February 2013, we found that the slope of the pitch on the northern end where the infield would be placed would not allow us to construct a level infield; therefore a proper mound would have been difficult to install. In the fall of 2013 the SCG engaged Evergreen to level the area and re-sod before the Ashes took place in January. The Ashes event is comparable to MLB's All Star series. It's a



▲ Laying out field and first harvest of sod from warning track area.

» Some of the items we needed for the project **became difficult to find and or create in Australia.** One key item to the field was locating the infield clay and mound clays.

match that pits England vs. Australia, which has been going on for more than a century. Other key players in the development of the games include Piers Morgan, Jamie Barkley and Michael Bangle, representing SCG Trust. They supported the event throughout the process which helped Tom, Scott and I to create something very special. It's great when the front office has your back.

Some of the items we needed for the project became difficult to find and or create in Australia. One key item to the field was locating the infield clay and mound clays. We worked closely with Andy McNitt's lab in the testing of soils to try and find a mix locally and after numerous tests and blending samples we were at a point of needing to order the clay from the USA. We gave Gail Materials a call and they helped out with a clay shipment that was transported in 11 containers (220 1-ton sacks). We also needed padding for the fence structure. We engaged Bob and Ken Curry of Covermaster to develop the pads and they had Greg Meeks from Turbo Link come over and handle the installation. We found a great terra cotta mix locally for the warning track.

The local turf, better known as cooch grass, is a hybrid bermuda-type turfgrass. We visited Evergreen's sod farm to see the



◀ **October 2013 renovation** of leveling area where infield would be placed.

"ready-play" sod several times. We had to use the ready-play in front of the dugouts and it was amazing. During cricket season it is mowed at 10 mil and we needed to raise the cut to 23 mm. Since the cricket season didn't end until February 27 we couldn't start until the 28th. The wear on the wicket was extensive and we knew this would be a challenge but in the end it looked pretty good.

Once the construction was completed we had to switch to maintenance mode. Early in the winter we engaged Jim Myrland from Beacon Athletics to assist us with the backstop design and also field maintenance equipment, BP equipment and various materials.

Tom Parker's staff of 12 became our core maintenance staff during the games. Their experience in managing the wicket clays was similar to our infield and mound clays; a few of Tom's guys did not know a great deal about the game of baseball but were eager to learn. Again, they were just awesome. The tarp crew was a group of volunteers, 40 guys in two shifts. These guys were life savers when it came to going above and beyond the call of duty. They were at the park for 16 hours a day taking time off from work and family just to be a part of this historical event. It was really special getting to know some of these guys who were members of local baseball club leagues around Australia.

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On Opening Night a large group of thunderstorms began to develop to the west of the ballpark and move our way. It had not rained in several days so obviously Opening Night was selected by Mother Nature. The storms shortened batting practice and the pregame show, but we were able to get the game started only a few minutes late. When rain threatened we had to cover two areas, the wicket and the infield. The wicket is constructed of materials very similar to the pitcher's mound. It's a heavy clay product with just enough organics to grow natural grass. The wicket cover was 100 x 100 feet and ours was 170 x 170. Because they overlapped at second base when they were rolled out, orchestrating the tarp pull was a bit of fun. What we knew is that if the wicket was left uncovered during a moderate storm we would be in danger of canceling the game because we could not amend the soil to dry it out with any conditioners or it would ruin the wicket clays that had been played on for 150 years.

ST: What other groundskeepers were instrumental in the Australian experience?

Cook: Our Sydney Sportsturf team was created several months ago but had to change due to a last minute added an event in Panama. The Yankees played two games against the Marlins at Rod Carew Stadium and that caused us reach out and find a few more guys since the two events were happening almost at the same time. In Sydney

we brought over Chad Olsen and Eric Ogden from our Brickman Sportsturf team and added Darrell Lemmer and Chad Kropff, both of whom have helped us on many other international events. In Panama we sent Brad Detmore from our team and added Joe Skrabek and Dennis Klein.

ST: What did you learn from the Australian experience that you can take to your next project?

Cook: With any major project we always learn so much and see so many different ways to perform tasks. This event was so special because it was the first time MLB had played a game in the country, the first season opener in the Southern Hemisphere, and the first MLB field to be constructed on a cricket pitch. By far, the best part of the project was working with the Australians. Everyone had the "glass half full" attitude even during times that were a bit worrisome for us Americans. We set the bar pretty high and in many cases due to our team efforts exceeded the expectations of the ballclubs and fans. I have met Team Australia's coaching staff on numerous occasions. They were so excited to finally see a field constructed in the country of this caliber. Before the event we had a couple exhibition games with the Australian National team. During their team batting practice they allowed some of their family members to take BP and catch balls on the outfield. Australia Team Manager Jon Deeble



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Photo by Murray Cook.

said, "This may be the only time some of these players and their families may ever play or see a field this nice in our country so we are having an Aussie baseball family BP."

ST: What is your next project?

Cook: Well there are several potential events in the works but I really can't share that info however we know that MLB international and the Commissioner's office are devoted to growing the game worldwide. Next year we will start the World Baseball Classic qualifier venue evaluations. The Toronto Pan American games will take place next year and this is playing on a couple new fields. This year we will have a series in Canada and Dominican Republic. We do several sets of field maintenance clinics each year. My heart has always been to give back and I truly enjoy sharing what I have learned and more importantly learning from others at these clinics. It's an exciting time for baseball with a great potential to get back in the 2020 Olympics in Japan. ■



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John Mascaro's Photo Quiz

Answers from page 15

John Mascaro is President of Turf-Tec International

These brown areas are actually sled damage, but not from being left for days on one area. It actually occurred over a fairly short period of time. The brown turf in this photo is a result of direct high temperature injury. This irrigated bermudagrass practice football field located in Texas had been subjected to 30+ days lack of rainfall when this occurred. As many of you may have training staff that are not necessarily very good about moving equipment around, this particular day was no exception. The training staff left this black

football practice sled on the same area of the turf during 100+ degree hot August day and the turf underneath it suffered from the heat as shown in the picture. As you can also see in the background, the training staff did not learn from their mistake the previous day.

Photo submitted by Lanse Fullinwider, MCPTM, Grounds Manager, University of North Texas, Denton, TX.



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

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PARK HILL SOUTH LADY PANTHERS SOFTBALL FIELD, Riverside, MO



Category of Submission: Schools/Parks Softball

Sports Turf Manager: Eric Jones

Title: Head Groundskeeper

Experience: I have worked on athletic fields in the Park Hill School District for 15 years. I started working here as a summer job and it eventually led to my managing a high school sports complex and campus.

Original construction: 2007

Turfgrass variety: The softball field was originally sodded with Quickstand bermudagrass in 2007. In the fall the field is overseeded with ryegrass to keep the field green once it cools down. When I have a bare spot I use a cup cutter to take sod pieces from my nursery.

Rootzone composition: Native soil and clay





WHY STMA SHOULD CONSIDER YOUR FIELD A WINNER?

In 2007 my district remodeled our athletic complex creating a new softball field. I was involved in the design process. I choose to use bermudagrass since it would play perfectly coming out of the summer and into the fall season and is very low maintenance in the spring. Bermuda is not common in the Kansas City area. I also had the idea to have a grass infield. Most people thought I was insane, but I was able to sell everyone on it.

Since the bermuda is a warm season grass it is able to take the use and abuse of softball camps in July followed by practices in August and games in September thru October. When the field was constructed, red shale was used for the infield; it was new to me and I did not know exactly how to manage it. I quickly learned not to work it up too much and keep it moist.

Before the season, we apply 25 bags of Turface MVP and nail drag it into the first ¼ of an inch. We apply moisture to it as much as possible. I have found the best way to manage the skin is to lightly nail drag and take a field broom over the top.

My biggest challenge with the softball field is time, balancing my other tasks along with maintaining the field. I am responsible for five athletic fields plus a high school campus. I am responsible for everything, I have to mow, seed, aerate, spray pesticides, irrigate, paint fields and set up and clean-up after events. I also have had to paint the dugouts and foul polls, do equipment maintenance and landscape the common area around the field. During the season I find myself constantly edging the field. I frequently use a loop hoe and edger.

In the summer of 2012, I started my own sod farm with the edgings from my field. After a year's worth of care it has multiplied exponentially. I have been able to use the sod pieces for filling in bare spots on the field.

The weather over the past year was a big challenge. We had a drought all last summer into fall then a winter full of snow. It seemed like the snow would never end, we even had snow in the beginning of May. Finally the summer was abnormally cool causing the bermuda to struggle, until late August when it then got hot.

I've learned in this profession you can't have a bad day or take time off, you have to make the best out of every second you have. Good or bad everyone sees your work. It is my goal every day to provide a safe professional looking field.

SportsTurf: What channels of communication do you use to reach coaches, administrators, and users of your facility? Any tips for communicating well?

Jones: Communication is actually one of the bigger challenges for me. I am outside working on the fields, while the coaches and administrators are in the schools doing their day jobs. The only time the coach has to contact me is the 5 minutes between classes. We find ourselves playing a lot of phone tag.

ST: What are your specific responsibilities?

Jones: I maintain an athletic complex consisting of five natural grass sports field and one artificial field, and several acres of common area.

ST: What tasks do you find most enjoyable?

Jones: The most enjoyable part of my job is being outdoors and at the end of the day getting to see the final product that the athletes enjoy playing on.

ST: What task is your least favorite and why?

Jones: My least favorite task is picking up the equipment and belongings that the teams do not clean up after themselves.

ST: How did you get your start in turf management? What was your first job?

Jones: I have worked on athletic fields in the Park Hill School District for 15 years. I started working here as a summer job but it eventually led to me managing a high school sports complex.

ST: What practices do you use to keep your infield skin in peak condition?

Jones: My infield skin is red shale; before the season I apply calcite clay and nail drag it into the top ¼ of an inch. During the season I lightly nail drag, field broom and apply moisture to it as needed.

ST: What changes if any are you considering or implementing for the winning field in 2014?

Jones: This year I would like to redo the bullpens by adding clay bricks to the pitching rubber and home plate area. It is my goal every year to try to do something new, such as a new logo, landscaping around the field or anything that will improve the field/facility.

ST: How do you see the Sports Turf Manager's job changing in the future?

Jones: In the future I see the sports turf manager's job becoming more professional and more concerned with safety of the student-athletes. ■

Equipment List

- 1977 B36000 Ford tractor
- John Deere 2653A Triplex Reel mower
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- 6 foot Aerway aerator
- McLane edger
- Earthway broadcast spreader
- Echo backpack blower
- Homemade nail drag
- 7 foot wide infield finish broom
- Aerosol field marking machine
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Why reel grinding matters

By Steven Nixon

Editor's note: Steven Nixon has been with Bernhard and Company since 2001 and was recently appointed its International Sales Manager, www.bernhardgrinders.com.



Everybody knows a sharp blade makes a cleaner cut. Much to our frustration, we have all used a blunt knife, scissor or razor blade at one time or another and know how it hacks and tears at whatever we're cutting.

When it comes to turf maintenance, surgically-sharp mowers slice through grass blades, severing them cleanly and with minimal damage. Because the grass left in the mower's wake is the same height and uniform in appearance, overall turf definition is improved and the playing surface more smooth, healthy and consistent.

Financial benefits are derived from reduced expenditures on fertilizer, fungicide, chemicals and fuel (for mowing equipment), as well as increased revenues due in part to greater end user satisfaction with the turf.

The grinding process is crucial to maintaining the sharpest blades and, therefore, optimal turf conditions. To help you understand how it works, let's look at the two components of the cutting unit: the bedknife and the reel.

THE BEDKNIFE

The bedknife is the most important part of any cutting unit. Although it looks simple, it is actually a very complex piece of steel. The bedknife gathers the grass and holds it in position until the reel blade comes around to cut it.

Grinding the top and front faces of a bedknife helps to maintain sharpness. As its name suggests, the "top face" sits on top of the bedknife. It is a negative angle, meaning it slopes away from the unit's point of cut. This allows grass to be directed away from grass coming into the mower. The requisite degree of angle varies depending

on the height and condition of the turf being mowed.

Once this angle wears down, the grass isn't ejected properly so the point of cut gets clogged. This prevents incoming grass from being cut cleanly.

The other angle is known as the "front face" angle. If the bedknife is the most important part of the mower, then the front face is the most important part of the bedknife, making good care of it especially critical.

The front face needs to be flat and even. If the face becomes worn or rounded, which it will over time because turf (and especially topdressing) is very abrasive, then grass will not be presented evenly to the cutting blades of the reel. Keeping the front face in tip-top condition is crucial to optimal turf health.



THE REEL

Often overlooked are reasons one should also spin grind the reel. Yes, it is to make each blade sharp, but it is also to ensure the reel is cylindrical and even.

There is no point in sharpening all the blades if only every third one cuts because they are not of equal height.

Naturally, a reel that is maintained regularly is going to be easier and quicker to grind than one sharpened only once a year. Sharpening of the bedknife and reel is integral to maximizing their effectiveness and, in turn, turf conditioning.

A dull cutting unit (bedknife and reel) will tear at grass, leaving it uneven. These ripped and ragged blades bleed and lose plant moisture and nutrients. The open tips also leave them more vulnerable to disease from spores such as *Fusarium* and other leaf-spot afflictions. Repairing and regenerating the plants then requires a greater demand for food and fertilizer, driving up costs and impacting budgets.

Agronomically speaking, a reduction in the use of water, fertilizer, fungicide and topdressing is a benefit. Not only is use of these expensive consumables decreased, but also costs associated with handling of the materials, generating electricity to pump water, etc. Mechanically, trials at several training colleges have demonstrated fuel consumption reductions.

Going a step further, one can translate fuel reduction into increased mower life, reduced engine wear, fewer replacement parts—and it soon becomes clear that the benefits are very attractive to your facility's bottom line. Another added bonus? Less fuel use means a smaller carbon footprint.

Baseball maintenance aided with right equipment and off-field tools

By Jason Kopp

With the official start of the baseball season upon us, sports field managers all across the country will be preparing their fields for the rigorous season that lies ahead. There are many tools at your disposal to assess your field conditions like the STMA Playing Conditions Index (PCI) and BTF Field Maintenance Guide. After completing either of these forms you may find one of the following conditions on your field raises a concern and needs to be addressed either before or during the season: irrigation, nutrient management, home plate and pitcher's mound repair, skinned surface maintenance, and/or edging and lip removal. These completed forms will help you get a plan in place to address these concerns and to have a successful season ahead.

The STMA PCI assesses your field conditions using a scoring system. The PCI worksheet is broken down into four sections: Resources, Activities, Agronomics Performance of Turf, and Baseball/Softball Specific. Within each section you select your answer that has a corresponding number based on various conditions. Once the worksheet is completed, add up the numbers and place the total score in the box provided—this is your field's PCI. Having a completed PCI on a field could also be a useful tool if you are planning to apply for Field of the Year.

Another useful tool is the Field Maintenance Guide form the Baseball Tomorrow Fund written with Murray Cook, a field consultant of Major League Baseball. When developing a field maintenance plan there are a series of questions to answer that will help in determining needs that will be critical to the overall success of the any field renovation project. The Field Maintenance Guide also provides a checklist for you to ensure you have the necessary equipment in the Suggested Maintenance Equipment section. You will also find in this guide a brief discussion on mowing practices, aeration, irrigation, and several other tasks that are performed throughout the season.

While various topics are discussed in these guides, having irrigation is probably the most critical ingredient, whether for the turf or to aid in moisture management of the skinned area. If you have a system installed already, doing your pre-season start-up will provide you with water needed to get your turf ready for the spring season. Throughout the season having irrigation to supplement insufficient rainfall will also be critical for proper turf care, skinned and clay areas. If you have multiple sites at one location or throughout an entire city, the latest irrigation controllers are an excellent option that give you control through any desktop or laptop computer.

If installing one is in the plans, understanding the soil type, water

service and flow, and field layout will be an essential part of the design process as will understanding the different rotors and nozzles available. Proper selection will ensure all areas get coverage to avoid hot spots in the turf that will come with the summer heat.

Turf concerns learned through these guides could be as simple as applying necessary amounts of nitrogen, phosphorus, and potassium and biostimulants to accelerate growth or it could be more complex like renovating portions of the field. When determining if a renovation project should be done on a particular field the rule of thumb noted in the guide is "if the turf has more than 50% weeds with a large amount of crabgrass or, if in the north, poa trivialis." Fall is the ideal time to do any field renovation which gives you the most amount of time until the start

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Tools & Equipment

of the season for it to become established which can be aided by the use of growth blankets. While renovating the entire field may not be possible due to many factors such as timing, budgets, and sod availability; doing smaller portions can also be effective in addressing field conditions. A youth organization for which I recently did a field renovation was given enough sod to do the entire infield and foul areas up to third and first base. With this portion done we were able to put together a plan to aerate, topdress, and overseed the outfield selecting turf type tall fescue seed, which would match the sod they were given, and with its dark green color and resiliency it is the ideal selection for their climate and situation. Seed rates could vary depending on seed type and establishment rates. With all the new seed varieties on the market and research being done on many others take the time before selecting your variety to do some research. Sites like NTEP.org or your local extension agencies are great resources as are other sports turf managers in your area.

When renovating the infield it is a great time to repair/replace the clay in both the pitcher's mound and home plate areas and check the slope and height of the pitcher's mound. Setting the pitching rubber at the correct distance and height is the foundation to build the rest of the mound off of. Take the time to ensure that all the measurements are correct and the intersect at the center point by pulling a measurement from apex of home to second, first to third, and apex of home to left and right corners of the pitching rubber. The landing areas of the mound are easily gauged with a slope gauge which should be set so every foot out from the pitching rubber the height is dropped one inch. Install your clay bricks in the landing area and cover with a thin layer of mound clay. After tamping this area you can lightly cover with soil conditioner or infield mix. The rest of the mound should have a gradual slope towards the turf edge. Lightly rolling this area will ensure proper footing for player safety. Dig out each batter's box and catcher's box to a depth of 3 inches. Install clay bricks and cover with a light layer of mound clay and tamp. Cover with conditioner or infield mix. Keeping these areas moist and covered with tarps will be important throughout the season to ensure they do not dry out.

With the majority of the work complete on the turf and clay, it's time to get the skinned areas ready. Proper footing and moisture management on these areas will be an important matter for you to ensure player safety and water is able to drain off preventing game cancellations or delays. Most field guides call for a typical grade of .5% up to 1% on the skinned areas and 1-2% for other areas. This will ensure water drainage and a near level playing surface for player safety. If the area is already established as little as 20 tons of infield material could be used to properly grade the area. If it has been neglected or a full renovation is done it could take 80 tons of material. Once the infield mix has been evenly spread and graded it is recommended that you incorporate a conditioner into the soil at a depth of 2-3 inches. Topping this off with another thin layer of conditioner will provide added benefits and give it a finished look.

Edging the turf on the infield can be accomplished with a walk behind edger and rake or a more efficient method is using edger and broom attachments available from Toro and other manufacturers. Edging your field should be done on bi-weekly during the season to ensure player safety and reduce the likely hood of lip build-up. Throughout the season proper dragging of the skinned area and base paths will ensure proper moisture management and keep a level playing surface. Be sure to keep all drags 6 inches from the edge of turf and base paths are raked from home to first and third and not side to side.

With these task completed you can now be sure that you have given yourself the best chance at a successful start to the season. Keep using your checklist which should be updated throughout the season to ensure your equipment is maintained, applications are noted, and you take several pictures will all be resources for you to use to plan for next season as well as have references if any issues arise during the season. Best of luck this season!

Jason Kopp has been in the sports turf management industry for more than 15 years. He currently is providing equipment solutions to customers in the sports turf and grounds industries and serving on the STMA Information Outreach and Chapter Relations Committees. ■

jasonkopp@turf-equipment.com.





Evolving waterless soils solve mechanical moisture issues

As I write this, the collegiate baseball/softball season is underway and pitchers and catchers have reported to spring training. Recently, while managing the production plant for Stabilizer Solutions, Inc., an urgent order came across my production board written in all caps, SURPRISE SPORTS COMPLEX- HILLTOPPER WARNING TRACK. Surprise had already received their typical infield mix order much earlier in the winter, and the Pac-12/Big-10 Challenge Tournament was quickly approaching. They wanted their regular warning track to be “waterless” just in time for games to start.

BACKGROUND

In the 80’s our company conducted research with the Massachusetts Institute of Technology (MIT) focused on moisture and soil interaction. The key breakthrough: no matter the structural composition of a surface, the mechanical properties will change across moisture contents. For ideal mechanical performance, the athlete needed between 4-12% moisture content, or a damp soil consistency. This was related to running track research proving proper firmness increased running speeds *and* reduced injury potential.

The research results showed that Stabilizer infield amendment helped maintain the mechanical properties of soil across varying moisture contents, thus “stabilizing” the soil. This was good news for groundskeepers who could till Stabilizer into their existing infields. We began engineering infield mixes with specific particle distributions; pre-blended with Stabilizer. Stabilized Infield Mix installations now include the American Softball Association Hall of Fame Stadium, TD Ameritrade Park, other collegiate and professional fields, and most Cactus League spring training complexes, including Surprise Sports Complex.

EVOLUTION OF WATERLESS

On a professional field like Surprise, the warning track takes most of the abuse and receives very little of the water. Removing water altogether seemed like a natural progression. Building upon our moisture research and soil engineering experience, we developed a process that coated soil particles with a waterless polymer coating. The numbers are compelling. Arizona Diamondbacks’ Grant Trenbeath calculated Hilltopper Warning Track saved 500 man hours a year. Our own calculations show him saving 200,000 gallons of water annually. Current users include the Angels, Diamondbacks, Yankees, and Astros. We’ve also seen rapid adoption in college softball infields as the Hilltopper does not freeze.

Usually installation is a much longer process. In this case, there wasn’t even enough time to excavate the existing warning track. Going over the top of the existing track was the ideal short term fix. The process began by removing ¼ inch of warning track using a box blade and grading the track towards the outside wall. Next we dripped polymer onto the track, worked it in with a nail attachment, and later soaked the track with water. We then topdressed with 65 tons of Hilltopper Warning Track Mix and mat dragged. Next we used our spike drum tool to relieve compaction from vehicles and completed a final mat drag.

The unorthodox process helped achieve a “waterless” warning track in just 3 days. Korean League teams training at Surprise have already used the stadium field for practice games. The warning track is performing without water and most importantly, there isn’t any dust, but that’s not really a *surprise*. ■

-Clay Hubbs, director of operations, Stabilizer Solutions, Inc., Phoenix

Tools & Equipment



Synthetic sports turf groomer

GreensGroomer's synthetic groomer is newly designed for 2014 with brush dimensions and angles to allow grooming in four directions, standing up turf fibers and leveling infill material. The unit has 16 blue brushes set at various angles to the direction the unit is being towed, with balance side to side and front to back, allowing for smooth brushing with no hops. The electric actuator provides almost infinite adjustment control, from wheels down transport to wheels up brushing. Works on all infill surfaces in wet or dry conditions.

GreensGroomer



Deere introduces 4M, 4R series compact utility tractors

"With compact utility tractors, it's all about finding the right machine to match customer needs," said Scott Schadler, John Deere product marketing manager. "Customers told us they wanted to spend less time installing and removing implements, wanted the ability to carry and store more tools, desired a more comfortable ride, and requested the ability to work in low-light conditions." The 4M and 4R models feature powerful, Final Tier 4 engines ranging from 43 to 66 hp to power through tough tasks. The 4M machines are equipped with a hydrostatic transmission with Twin Touch Pedals that provide operators with simple, comfortable-to-use hydrostatic controls to find the right speed for the job at hand.

John Deere



Software provides digital irrigation mapping

Groundskeeper Tech introduces their mapping software SprinklerMaps, developed by Mike D'Ascanio in response to a pressing need he identified while working as a head groundskeeper.

As an alternative to ineffective paper landscape maps, SprinklerMaps gives users the ability to plot their irrigation and utility systems with pinpoint precision on a live satellite map. Additional features include a square footage estimator, Sprinkler Radius Viewer, GPM tallies, and the ability to "flag" markers for repair. Coupled with the built-in communication tools that iPads already provide, SprinklerMaps is pioneering the future of technology in the landscape industry.

The benefits of the SprinklerMaps solution includes greatly increased efficiency for maintenance workers who use the tool to locate and document repairs.

Groundskeeper Tech



New topdresser from Earth & Turf

Earth & Turf Products, LLC, announces its Model 60SP, an economical, very maneuverable, self-propelled topdresser, ideal for spreading dry or wet compost and sand, plus a variety of other materials. It features easy loading into its 6.7 cu. ft. hopper. Maximum load weight is 650 Lbs. (296 kg) Optional loading chutes will increase capacity for lighter materials such as compost. A wide-spread beater produces an even spread pattern up to 42 inches wide. The 60SP is powered by a 190 cc Briggs & Stratton, 875 series, 6.5 HP engine. Drive is by CV belt, forward and reverse. This extremely economical self-propelled topdresser is the latest example of Simple, Well-built Products from Earth & Turf Products, LLC.

Earth & Turf Products, LLC



Turfco's New Torrent blower & wireless controller

Turfco's new patent-pending Torrent Blower delivers high-velocity, high-volume airflow with a new level of control for year-round productivity. You now have greater command over air speed, air direction, noise management and fuel consumption. Turfco developed a new wireless, handheld controller to adjust blower functions and multiple air-speed settings. The controller allows the operator to dial in the exact nozzle direction for unprecedented precision. Faster nozzle rotation speed dramatically increases productivity, because operators won't need to slow down to wait for the blower at the end of each pass. The controller is also equipped with a unique idle/resume button enabling users to idle down the machine when bystanders are near and quickly resume operation at their original setting when the area is clear.

Turfco



Beacon tarp cart with tarp pin holders

This cart is a great addition to your grounds crew. Designed to store and transport up to four area tarps and your field weights or tarp pins. Conveniently keep rolled up tarps and pins together for easy transport and storage. Perfect for stowing area rain tarps, weighted tarps, infield protectors, sideline turf protectors, track protectors and growth covers. The cart may be manually pushed along in wheelbarrow fashion or towed by a utility vehicle

Beacon Athletics

Membership Application

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New Members*

As a new members, you receive a FREE conference registration, value \$375, to be used within 3 years! Just indicate your status on the conference registration form.

Did someone refer you to STMA? We would like to thank them, and reward them with an STMA \$100 voucher.

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*Not been an STMA national member since 2000. New student and affiliate memberships do not qualify for the free conference registration. However, all members are eligible to receive the \$100 voucher for referring a new qualifying member.

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*There must already be a national sports turf member from your facility or commercial member from your company before you may sign up in the Associate category.

Phone: 800-323-3875

www.STMA.org

For more on the latest news, please visit www.sportsturf.com and www.stma.org.

New educational bulletin highlights Environmental BMPs

STMA's Environmental Committee and Information Outreach Committee have collaborated to produce the technical bulletin "Best Management Practices to Reduce Stormwater Runoff and Pollution at your Sports Facility."

Stormwater runoff is generated from excessive irrigation, rainfall, or snowmelt that flows over land or impervious surfaces and does not infiltrate into the ground. As the runoff flows over land and impervious surfaces, it can accumulate debris, chemicals, sediment, and other pollutants that can negatively affect water quality if runoff is left untreated.

Stormwater runoff is a problem because of

its volume and rate from impervious surfaces, such as parking lots and other paved areas, and concentration of pollutants in the runoff. High volumes of runoff can cause changes in hydrology and water quality such as habitat modification and loss, increased flooding, decreased aquatic biological diversity, and increased sedimentation and erosion.

Sports and recreational areas can contaminate stormwater runoff with pesticides, sediment, fertilizer, and other pollutants. A simple change in behavior and maintenance practices can result in reduced inputs, cost savings, and cleaner, safer waterways. It is more cost effective and environmentally sound to put management practices

in place before aquatic systems are affected. Restoring a polluted water body is much more difficult and expensive than utilizing best management practices from the start. Reducing stormwater pollution can be achieved by implementing various management systems.

Check out STMA.org to read the full bulletin and get more information on BMPs for bare soil, spill response and prevention, good storage practices, materials management, fueling areas, property and equipment maintenance, irrigation, fertilizers, pesticides/IPM, stormwater runoff collection areas, and educational outreach.

Destination Denver! Mile High City memories await in 2015

Denver, CO is one of America's most eclectic, exciting cities. Founded in the mid-1850's by gold prospectors who hoped to strike it rich, similar to those lucky few in California only 9 short years earlier, this "...log city of 150 dwellings, not three-fourths completed nor two-thirds inhabited, nor one-third fit to be" (as described by newspaper editor and politician Horace Greeley) nestled in the foothills of the Rocky Mountains quickly grew to become the bustling metropolis we know today.

STMA heads to Denver for its 26th Conference & Exhibition and conference planning communities are gearing up for the experience to be one of the most rewarding

ever: a record number of submissions were received during our Call for Presentations and our conference tours are sure to stop at some must-see facilities.

Denver's unique neighborhoods feature a cuisine, attraction, or interest for every taste. According to the Denver Convention and Visitor's Bureau, these are the ones to see:

All information courtesy of the Denver Convention & Visitors Bureau located at denver.org

LODO / LARIMER / RIVERFRONT

Denver's hip, historic district, with a huge independent bookstore, brewpubs, Western

wear, Coors Field, and dozens of dining and nightlife options.

CHERRY CREEK

Denver's premier shopping destination, with 320 independent shops, restaurants and galleries and Cherry Creek Shopping Center's 160 name brand stores.

GOLDEN TRIANGLE MUSEUM DISTRICT

Explore the spectacular Denver Art Museum and a neighborhood brimming with galleries, restaurants, music venues, theatres and remarkable architecture.

UPTOWN

One of Sunset Magazine's "hippest 'hoods," thanks to Restaurant Row, and proximity to City Park, Denver Zoo and Denver Museum of Nature & Science.



All information courtesy of the Denver Convention & Visitors Bureau located at denver.org



HIGHLANDS

Panoramic patio dining, art galleries on Tennyson St., and Victorian homes highlight the Highlands, one of Men's Journal's top neighborhoods.

ART DISTRICT ON SANTA FE

Join fellow art lovers during The Art District On Santa Fe's popular monthly First Friday Art Walk, with galleries, shops, and restaurants open late.

FIVE POINTS

Rich in African American culture, head to this neighborhood for authentic BBQ joints, the Five Points Jazz Fest, and the Black American West Museum

RINO / RIVER NORTH

RiNo is "where art is made" — a hotspot for creative types, with a renovated dry ice factory providing artists with space to create cutting edge works.

CAPITOL HILL / CONGRESS PARK

The gold-domed Colorado State Capitol anchors this hilltop neighborhood, which

features art galleries, brewpubs and restaurants lining 6th Ave.

EAST COLFAX

Here, music lovers flock to the Fillmore Auditorium and Ogden Theatre, bookworms browse the expansive Tattered Cover, and foodies find eclectic eats.

OLD SOUTH GAYLORD

Just blocks from Washington Park, kick back with locals in this pedestrian-friendly 'hood sipping brews at pubs, sampling sushi, and browsing shops.

SOUTH BROADWAY

South Broadway buzzes with activity year-round. Experience hip rock clubs, Antique Row, an arthouse movie theater and plenty of raved-about eateries.

SOUTH PEARL

Relax in bistros and browse shops, offering 37 different beers, 24 types of sushi, and Denver's oldest folk music center.

STAPLETON / NORTHFIELD

Stroll trails linking this "new urban" neighbor-

hood's parks and shops. Catch the Colorado Rapids play soccer at nearby Dick's Sporting Goods Park.

GOLDEN

Golden bursts with Wild West flavor, thanks to an old-fashioned downtown, the Colorado Railroad Museum, Coors Brewery and the Buffalo Bill Museum & Grave.

LITTLETON

Littleton's Main Street is lined with turn-of-the-century buildings and shops. The city also features two living history farms, perfect for family outings.

OLDE TOWN ARVADA

Grab a gourmet pizza on Arvada's turn-of-the-century Main Street, and see a smash Broadway musical at the Arvada Center for the Arts & Humanities.

BELMAR / LAKEWOOD

Belmar's 22-square city block pedestrian district hosts a European-style market during the summer, as well as the Festival Italiano every September. - By Shant S. Thomas, Sales & Marketing Manager, STMA

5 Years of membership

STMA recognizes and thanks the following members for being part of the association since 2009:

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Mathew Grosjean, University of Minnesota-TCF Stadium, Minneapolis, MN
Marty Guettinger, Washington State University Student, Pullman, WA
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Joel Hunt, Green Bay Packers, Green Bay, WI
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Rob Johnson, Waupaca Sand & Solutions, Waupaca, WI
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William Mast, Aer-Core, Inc., Pottstown, PA
David McCaskill, Accusweep Services, Inc., Columbia, SC
Brent McEwen, Laserturf Southeast, Inc., Watkinsville, GA
Mitchell McVicker, Papillion, NE
Kenneth Merrell, Ford Park Event Center, Beaumont, TX
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Luke Mudd, Truman State University, Kirksville, MO
Jason Mueller, Kirkwood School District R-7, Kirkwood, MO
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Christopher Romo, Student, Chino, CA
Greg Salyer, Maplewood, MO
Miguel Sarabia, University of Texas at El Paso, El Paso, TX
Troy Schader, Tualatin Hills Park & Rec District, Beaverton, OR
Matthew Schiller, Vernon Hills Park District, Vernon Hills, IL
Brian Schools, Medfield Parks & Recreation, Medfield, MA
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Sean Shaw, LCSD #1, Cheyenne, WY
Justin Shirley, J & D Turf, Noblesville, IN
Zach Simons, Benedictine University, Lisle, IL
Michael Smith, Student, Elkton, MD
Connor Snide, Student, Keene, NH
Michael Soper, Frederick Keys, Frederick, MD
David Spacone, Niagara Falls School District, Niagara Falls, NY
Donald Spier, Precision Laboratories, Inc., Waukegan, IL
Alexander Steinman, University of Maryland-Campus Recreation, Hyattsville, MD
Brian Stokes, Fairfax County Public Schools, Alexandria, VA
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Ken Sutton, Appoquinimink School District, Middletown, DE
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Kevin Taylor, CSFM, College of Charleston-Patriots Point Athletics, Hollywood, SC
David Thompson, City of Foley, Foley, AL
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Daniel Weiss, Toledo Public Schools, Toledo, OH
Bill Wolsfeld, Wheaton College, Wheaton, IL
William Woods, Student, Starkville, MS
Matt Wynne, Prairieville, LA

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://irmstma.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:
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F ☐ Sports Complex G ☐ Athletic Field and/or Park Architect/Designer
T ☐ School, College or University P ☐ Park
H ☐ Other (please specify) _____

2 Which of the following best describes your title? (check ONLY ONE)

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C ☐ GOVERNMENT OFFICIAL — Government Commissioner, Agent, Other
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D ☐ SPECIALIST — Architect, Designer, Consultant, Agronomist, Horticulturist,
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F ☐ COACH
E ☐ Other (please specify) _____

3 Do you have the authority to buy, specify or recommend products and/or
services for your business or organization?

Y ☐ Yes N ☐ No

4 Yearly operating expenditures (excluding salaries)

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From the Sidelines

Continued from page 6

may warrant not verticutting as planned so be flexible as with any cultural practice,” Bergdoll wrote. “On native soils, irrigate the field before verticutting to soften the soil allowing the blades to cut into the soil easier. The material that is removed from verticutting can be used to sprig bare or thin areas.”

Daily said, “Don’t be afraid to do it. The first time I verticut, I thought I had killed the plant with all the thatch and vegetation that

was pulled up. Two weeks later the plants were in incredible shape, growing vigorously and healthy. Also, try and get down into the thatch layer at least once to help control the organic matter the natural grass produces.” ■





Q&A with Dr. Grady Miller

Professor, North Carolina State University

Questions? Send them to Grady Miller at North Carolina State University, Box 7620, Raleigh, NC 27695-7620, or email grady_miller@ncsu.edu. Or, send your question to David Minner at Iowa State University, 106 Horticulture Hall, Ames, IA 50011 or email dminner@iastate.edu.

The importance of research

Can you provide an explanation of why research is important to Field Managers?

— North Carolina

This was a request I had from one of our region's most respected turf industry representatives. He wanted me to develop my response into a presentation for a meeting he was hosting. For this Q&A, I thought I would "reverse-engineer" the talk to cover some of the high points for this forum.

When I think about research results I think about change. The focus of research is evaluating "unknowns." If these unknowns pan out, then we often look for ways to incorporate them into the everyday. Of course the area of fastest change we commonly experience probably revolves around the internet. For instance, online every 60 seconds, there are 72 million Google searches, 204 million emails sent, 41 thousand Facebook posts, 15 thousand songs downloaded from iTunes, and 571 new websites created.

Turfgrass research and discovery probably does not result in change as fast as some internet applications but it has been every bit as important. Turf research is responsible for discovery of new information and development of new products. Most turf research studies are focus on validating performance of an unknown compared to a control. During the research process there are often discoveries (new products, uses, rates, etc) that bring about change.

You may think that the turf management has not changed much in your career, but all you need to do is look back at field pictures or videos taken between the 70s and today to realize that there

have been enormous changes. One of my favorite examples of change in our turfgrass management is depicted in this 1933 picture of a football field at a NC College. The field has at best 50% turf cover. And the grass that is growing must be at least 10 inches tall. Even with players standing next to wooden walls and bleachers one would more likely guess they are standing on a cattle pasture than a college football field.

So, how has research directly influenced a change in turfgrass management? Consider the development of the iconic Tifway bermudagrass. Or products such as 2,4-D, glyphosate (Round-Up), or chlorothalonil (Daconil). We all now understand the importance of the core aerifier and we appreciate the availability of automatic irrigation control. These were all transformative for turfgrass management.

For more recent examples, consider how you would answer your common, everyday questions without research. Questions such as: What pesticide controls a certain weed? How long will I see a response from this fertilizer? Should I cover my field tonight to protect it from cold? Will my field hold up during this tournament? The answers to these questions and thousands of others are often discovered through controlled research studies. And I would also add that knowledge gained through experience is research. So considering that statement, you may be your own best researcher.

We often talk about a research cycle. This is a more elaborate version of what is known as the "scientific method". The steps include: 1) having a concept or hypothesis, 2) design an experiment to test the hypothesis, 3) fund the experiment, 4)

implement the experiment, 5) analyze the collected data, 6) disseminate the results, 7) evaluate and recommend based on the results, and then 8) formulate a new hypothesis based on knowledge gained. So, step 8 is the same as step 1 providing the cyclic nature of research.

I purposefully mention funding because research can be very expensive and is typically the most limiting factor in conducting research. For example, the expense of discovery, development, and registration to bring a new pesticide active ingredient to market has been estimated to be about \$180 million over about 10 years. While this is not all research expenses, a big portion of that will be directly or indirectly tied to research. On a positive side, studies have estimated that for agriculture research, there is a \$19 return for each \$1 invested.

In terms of University research, there are very few expenses covered with state or federal funding outside the salaries of faculty and an investment into basic infrastructure. There are almost no state-funded technicians or graduate student assistantships left at universities. Most all research conducted is now paid by a private sponsor via grants or gifts.

Looking back over the years, I am not sure if turf quality has driven us to higher expectations or if higher expectations has increased our quality. Either way research is central to our present-day fields to look and perform better than those of previous times. So, get to know your researchers, provide them concepts to test based on your experiences, support their work in whatever way you can, and help them evaluate results by implementing their recommendations. In the end your contribution will bring about positive change and the entire industry will benefit. ■

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