Interpretation

Soil testing laboratories can interpret chemical soil test reports differently because they often use different data to generate the interpretative feedback. *Correlative*data compares laboratory recommendations (known fertilizer applied) with actual plant uptake. *Calibration* data focuses on the relationship between known soil test values and plant response after fertilizer application, providing an indication of how much fertilizer is needed to meet plant demands. Calibration data is more meaningful in ag where increased growth typically leads to improved yields.

Turfgrass responses are different and often more complex. Calibration data on different soils types and using quantifiable turfgrass (species and cultivar) responses remains limited. As a result, caution must be taken when interpreting soil test data from too many laboratories or from too few tests.

For example, laboratories may report two primary types of data to indicate fertilizer requirements. One involves the percentages of basic cations [calcium (Ca), magnesium (Mg), and potassium (K)] that occupy exchange sites, called the base cation saturation ratio (BCSR). This interpretation reflects the notion that basic cations (target Ca ~ 65-75%, Mg~10-15%, and K~2-5% as a percentage of total CEC) dominate soil exchange sites and therefore dictate the extent to which other nutrients,

including hydrogen ions (H^+ and therefore pH), occupy exchange sites and ultimately find their way *into solution*. Another approach is to determine the amount of nutrients to sufficiently meet plant needs now, called the sufficiency level of available nutrients (SLAN). This interpretation uses established sufficiency levels (based on calibration data) for all nutrients other than N and if soil test reports show they are low, a positive plant response from fertilizer added can be expected. In either case, an integrated approach works best where many factors are taken into consideration and used as rough guidelines but in combination with your direct observation and data from soil physical tests.

Soil tests reports will provide data used to make additional fertilizer applications including the remaining primary macro nutrients phosphorus (P) and potassium (K), secondary macronutrients Ca, Mg, sulfur (S), and micronutrients. The most efficient method to supply adequate nutrients for optimum growth and performance is through foliar feeding.

Manage soil pH and CEC using the correct fertilizer, soil amendment, and/or correcting irrigation water problems. Apply lime ($CaCO_3$) as necessary to increase pH, gypsum ($CaSO_4$) to supply Ca without changing the pH, and acidifying fertilizers such as ammonium sulfate, or those that contain elemental sulfur. Increase CEC by adding organic matter (i.e. humus, peat, or compost) or zeolite clinoptilolite, which can be tilled to a 4-6 inch depth before establishment or incorporated as topdressing during aerification until the desired CEC is reached. ■

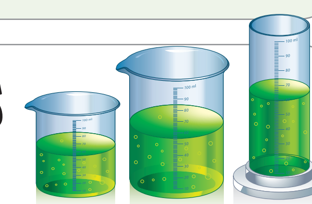
Dr. Gordon Kauffman III lives in State College, PA, coordinating university research for Grigg Brothers. He can be reached at gordon@griggbros.com.

BestManagement Practices

Best fertility management includes the use of soil tests, an understanding of the nutrient requirements for each turf species, careful observation, and balancing aesthetics v. function. Proper interpretation of soil tests will allow you manage both components and develop the best fertility programs. Meticulous recording keeping of soil test reports, fertilizer applications (rates, formulation, dates), and turfgrass responses are essential to developing a strong and consistent fertility program.

When observing turf responses look for turf color, growth, quality, recuperative capacity, establishment speed and consistency, wear tolerance, playability and responsiveness to fertilizers. Use soil tests to uncover underlying poor turf performance or overt and negative turfgrass conditions like nutrient deficiencies. Soil chemistry and microbiology are complicated; therefore keep it simple use soil tests as a rough guideline with strong consideration to basic agronomic principles, including subsurface and surface drainage, promoting the correct ratios of air, soil, and water, adequate fertility, and thatch management using frequent mechanical cultivation. ■

Common lab tests for sports turf



Exchangeable nutrient data/Nutrient sufficiency levels. Represents the amount of each nutrient present in the soil and the extent to which plant requirement are met (sufficiency) for optimum growth (lb/A). Usually expresses as low/optimum/high.

Extractable Nutrient Data (i.e., soluble paste extract). Represents the nutrients that are easily extracted from the soil and therefore the best indication of plant availability (ppm).

Cation Exchange Capacity (CEC). Represents nutrient holding capacity (target 4 cmol/kg soil).

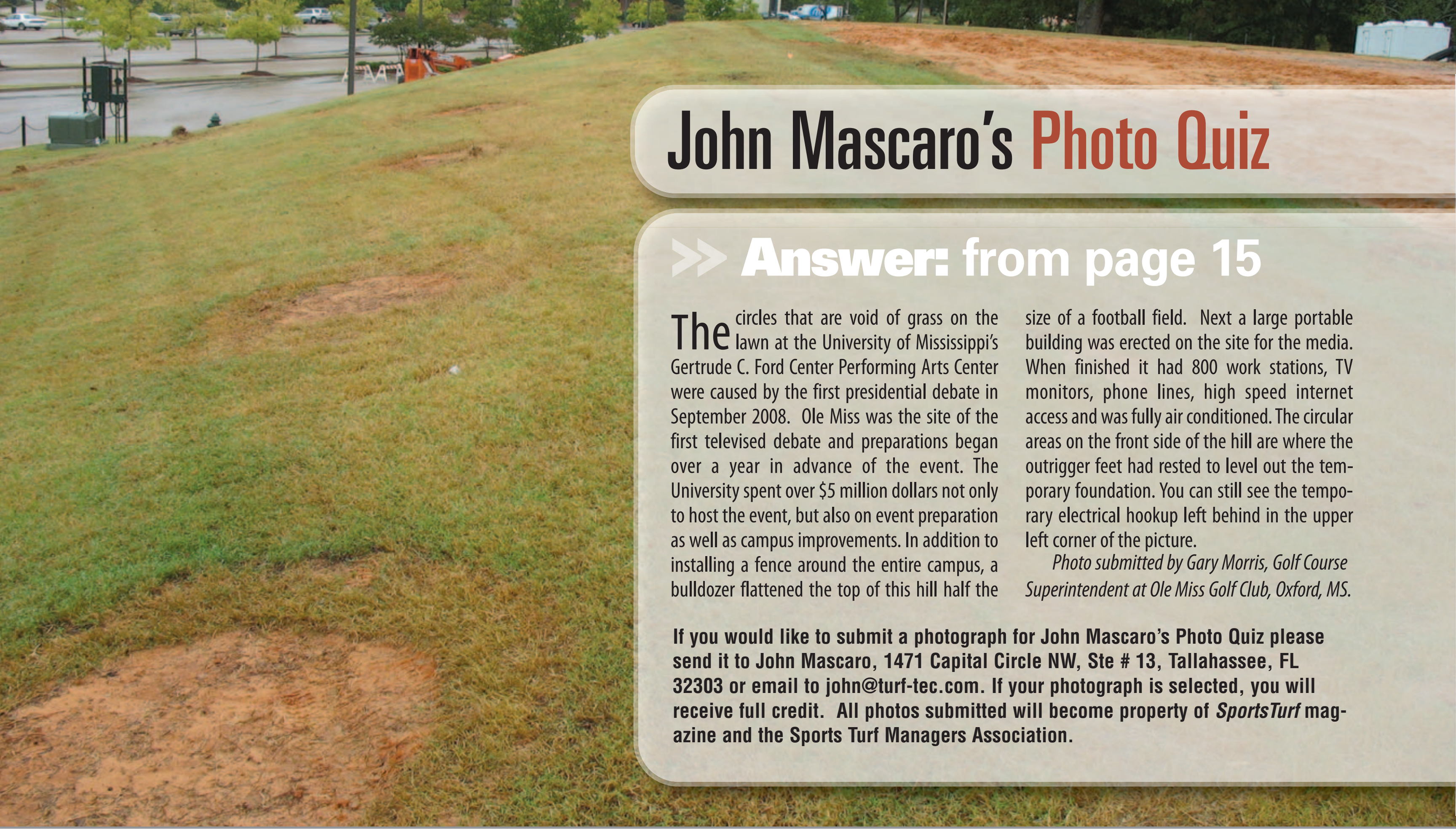
pH. Soil reaction affecting most notably nutrient availability and microbial activity

Organic Matter (OM) Percentage. Indicates degree of organic matter accumulation which can affect drainage, soil reaction, and presence/extent of localized dry spots (target ≤ 4%)

Soluble Salts/Sodium. Represents the level of salinity and sodium in the soil. High levels of salinity (various salts) will impact the soil reaction, infiltration in the top two (2) inches, and plant water relations. High sodium (≥ 3% of total CEC or sodium adsorption ratio > 2) will negatively impact soil structure and permeability. Salinity or sodium problems usually arise due to poor irrigation water quality or lack of rainfall, particularly in arid or semi-arid regions.

Irrigation Water Quality. In general it is good idea to test the irrigation water to determine if problems exist. Potential problems including high bicarbonates (HCO_3^-), or high Na^+ and Cl^- concentrations compared to calcium (Ca^{2+}) and magnesium (Mg^{2+}). ■

Lab equipment illustration courtesy of istockphoto.com



John Mascaro's Photo Quiz

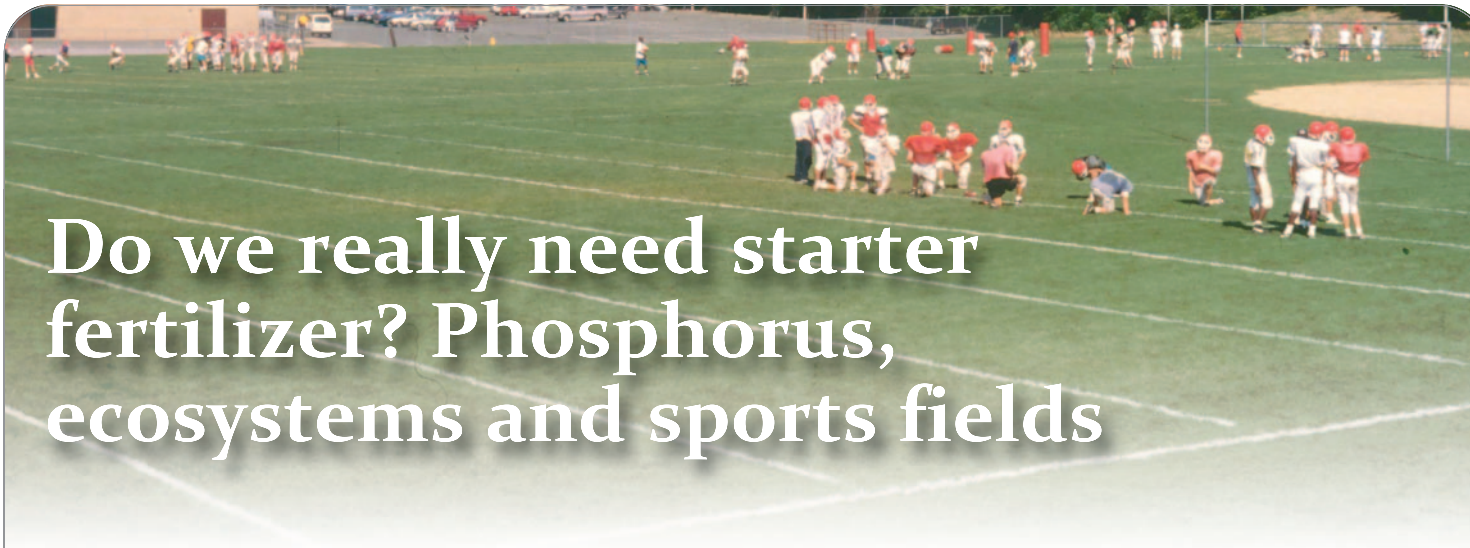
Answer: from page 15

The circles that are void of grass on the lawn at the University of Mississippi's Gertrude C. Ford Center Performing Arts Center were caused by the first presidential debate in September 2008. Ole Miss was the site of the first televised debate and preparations began over a year in advance of the event. The University spent over $5 million dollars not only to host the event, but also on event preparation as well as campus improvements. In addition to installing a fence around the entire campus, a bulldozer flattened the top of this hill half the size of a football field. Next a large portable building was erected on the site for the media. When finished it had 800 work stations, TV monitors, phone lines, high speed internet access and was fully air conditioned. The circular areas on the front side of the hill are where the outrigger feet had rested to level out the temporary foundation. You can still see the temporary electrical hookup left behind in the upper left corner of the picture.

Photo submitted by Gary Morris, Golf Course Superintendent at Ole Miss Golf Club, Oxford, MS.

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 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.

 By Kevin Trotta



Do we really need starter fertilizer? Phosphorus, ecosystems and sports fields

THE THINNING OUT of turfgrass is inevitable once fall sports practice begins. Here in New York State and other cool season areas, the wear and tear of soccer, field hockey and football extends into the latter half of fall when cooling temperatures inhibit seed germination and establishment. Spring seeding is usually the next option. Athletic field managers are familiar with the cycle of autumn sports damage and the need for spring reestablishment. Applications of starter fertilizers are often built into this annual cycle.

In recent times these high phosphorus-containing materials have become the subject of justifiable environmental concern because of the risks associated with phosphorus runoff in surface waters. Excessive nutrients can throw aquatic ecosystems out of balance, a process called eutrophication. Even low levels of phosphorus can be detrimental to water quality by stimulating overcrowded plants and algal blooms, making the water unsuitable for drinking and recreation. The subsequent death and decomposition of this accelerated growth reduces dissolved oxygen, killing fish and other organisms. Although eutrophication does occur naturally, it is often triggered by nutrients associated with human activities.

Obviously, as sports turf managers we strive to make the world a better place, not to contribute to environmental degrada-

tion. While research has shown that a dense stand of turf impedes runoff, our routine applications of high-phosphorus "starter" fertilizer may pose risks because we're applying when turf cover is thin or even non-existent. Nutrients applied to thin turf or bare soil can readily become mobile. Also, our fields are typically graded to promote good drainage. In addition, the likelihood of seasonal rain compounds the potential for runoff and threatens environmental quality.

Conventional wisdom

If soil tests indicate adequate phosphorus, do we need additional P in the seedbed? Pick up most any turfgrass textbook and take a look at the section on establishment. Odds are there will be something that reads like this: "It is important to use a starter fertilizer because seedlings need a lot of phosphorus to develop. This application is recommended even if soil tests show adequate P levels because the seedlings' immature roots must have P right there where they can access it."

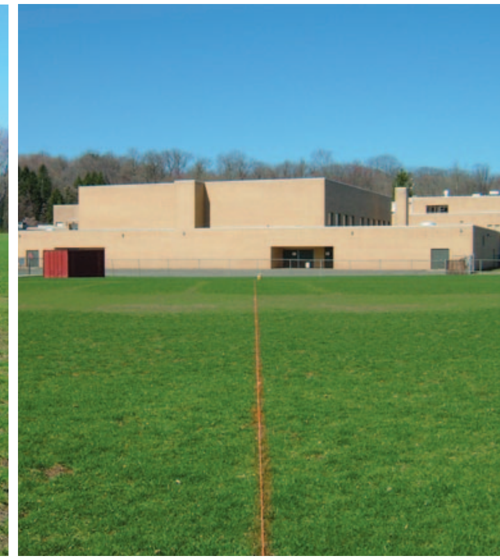
Some of us have always been skeptical of this last assertion. Two years ago I decided to test it.

Hash mark science

I designed and implemented a phosphorus study 2 years ago that was too complicated to be useful. I won't even bother to discuss it here. But it did clarify several issues for me, pointed the way to a better experiment, and gave me an early glimpse of what I would ultimately observe.

This past spring I had a better plan in mind that I wisely shared with turf guru A. Martin Petrovic, Ph. D. of Cornell. Marty was characteristically generous in his guidance, support and encouragement.

This second experiment would be simple. I had two football practice fields to work with. (These were no puny university test plots but a robust 2.6 acres of sports turf.) These bruised and battered practice fields were seeded in late March with a perennial rye blend at a rate of 10,000 lb/ft2. These fields would be need-



ed again for practice in August. Soil tests indicated existing P levels at 19 pounds per acre, by all standards more than adequate. I divided each field in half: one cross-field on the 50-yard line and the other lengthwise, goal to goal. On one side of each field I applied triple super phosphate at the substantial rate of 75 pounds of P per acre (8 LB 0-45-0 / 1000 ft^2) in early April, just before germination. The other side received no P. It had been apparent in the first study that applied nitrogen was absolutely essential for vigorous establishment so the entire 2.6 acre study area was fertilized with a controlled release 20-0-5 at a rate of 1 pound of N per thousand square feet just as the seed began to germinate.

Then I watched.

There was absolutely no difference anywhere in the study area. The rye established equally well across the two fields. The entire area got equally beaten up by PE classes and baseball outfielders and showed no detectable differences in response. There was no discernible disparity in density. No visible variation in vigor. No observable benefit from the added P.

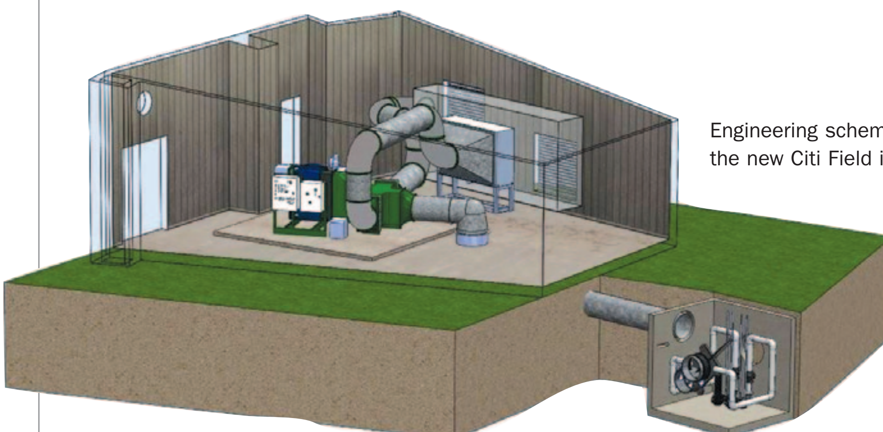
The potential for problematic phosphorus concentrations in runoff and the risks of surface water contamination with resulting ecological threat compel us to exercise caution in the use of high P starter fertilizers. As stewards and green industry leaders, we're obliged to be responsibly prudent in the management of all inputs, including nutrients. I'm hopeful that this experiment encourages further study (with other species, in different climates, soils, how much P is enough, etc.).

So, if soil tests indicate adequate phosphorus, do we need to apply additional phosphorus when seeding perennial rye? It does not appear that we do. ■

Kevin Trotta, BS, MA, is a sports turf manager, Global Sports Alliance New York Team Captain and principal proponent of Environmental Turf Craft.

By Eric Schroder

Rootzone tool less expensive than electric or hydronic systems



Engineering schematic of system at the new Citi Field in New York.

SUBAIR IS A TOOL that field managers use to better condition the turf's rootzone. The system can be used for temperature moderation, moisture control, and for gas exchange. The SubAir system is essentially a motor/blower assembly that is connected to the field drainage located beneath a playing surface. The field drainage network is subsequently composed of a matrix of perforated pipe.

This piping network is used by the SubAir system to move air through the subsurface layers. The operator can use the system to push air through the piping network (commonly referred to as the "pressure" mode) and into the rootzone or pull air through from the surface downward through the soil and through this piping network (commonly referred to as the "vacuum" mode). An airflow reversing valve, directly connected to the motor/blower assembly, allows the system to operate in either "Pressure" or "Vacuum" mode.

"Our SubAir proves to be very useful, both during concerts and the baseball season. It provides good air movement under the Terraplas flooring during shows that keeps our turf from going into too much heat stress," says Mike Boekholder, head groundskeeper for the Philadelphia Phillies' Citizens Bank Park.

"During the season, it provides us with a valuable tool to keep air exchange occurring during the hot summer months without having to do nearly as much aeration," Boekholder says. "The ability to exchange air through the rootzone daily really does help keep toxic gases from becoming a problem. The system also helps remove excess moisture during rain events much more efficiently than gravity drainage alone."

The SubAir system is completely automated, but can be controlled locally by a pushbutton. The control panel is located in an equipment room and

A shot by Bret Baird of his system at Dick's Sporting Goods Park in Denver.

remote operation via the SubAir AirWave Monitoring and Control system is available at any internet connection. The AirWave system is an internet-based program that allows the user to control his/her system from any location in the world via the SubAir website. Once the system is installed, the turf manager has complete control over the system and operation schedules. The turf manager can operate the system manually (at his/her own discretion), can place a timer on a system, or can create an operational schedule for unit operation.

Bret Baird, head turf manager for Dick's Sporting Goods Park in Denver, says he uses his SubAir system early spring through late fall for three main tasks: jump-starting the turf's spring "wake-up" from dormancy; "vacuuming" moisture out of the rootzone; and enhancing oxygen exchange in the summer. "We have a furnace hooked up to our system so we can blow hot air through the soil profile," Baird says. "But we don't try to heat our field through this system because we don't play during the winter.

"After heavy precipitation we put it in vacuum mode to help get moisture out of the rootzone," Baird says. "It doesn't dry out the field completely but it helps speed up the process."

Baird says when he hosted a concert he was able to blow air into the soil profile for 2 days to help keep the temperatures down underneath the Terraplas covering.

"I try to run the system for about 15 minutes every day to enhance oxygen exchange," Baird says. "You can smell the musty air from the rootzone."

SubAir provides customers with a recommended maintenance schedule. These schedules are typically incorporated into the stadium's routine maintenance on other equipment, with maintenance typically performed by stadium/facility employees or outsourced through stadium ownership. SubAir also provides support for all products and provides support for equipment operation, repair, and upgrades. With the advent of the AirWave technology, SubAir also has the ability to monitor equipment remotely and make recommendations routinely if so desired by the field manager.

SubAir can be implemented in both existing as well as new construction facilities.

SubAir is currently researching and testing new technologies and methods for modulating subsurface soil conditions, the company says, and they are currently seeking "green" technologies to increase operational efficiencies while decreasing energy and water usage. The company is also constantly upgrading and investigating the use of wireless turf sensor technology and how to provide this technology as a valuable tool for the field manager to increase efficiency and root quality. ■

Tools
& Equipment

At the Show

These are among the products that will be on display at the 20th annual Sports Turf Managers Association Conference and Exhibition this month in San Jose:

Timeless verticutting

Art Lewis, president of Turf Specialties, Inc., has exhibited at every STMA Conference since it debuted in Vero Beach, FL. Thatch-Master verticuts are designed to give trouble-free service for many years. Since first introduced 18 years ago they have been chosen by athletic field professionals across the country. They are now used by Professional Fields, Municipalities, Universities, and High Schools. Thatch-Master now uses Carbide tipped blades on all models and we have found that they outlast non-tipped blades by a factor of 10. The thin blades do a neat job and allow healing in one week.

New turf covers

Covermaster will be exhibiting their new Terraplas and PortaFloor covers that are designed to protect both natural and artificial turf. Terraplas is a simple system of specially engineered, interlocking panels that readily converts any stadium into a multi-use venue to accommodate staging as well as seating for thousands of spectators. PortaFloor is an ideal and versatile roll-out solution in a turf cover that consists of rolls of hinged panels for quick and easy installation and removal. Visit their booth #609.

Barenbrug innovations

Stop by the Barenbrug booth (#1121) and learn more about our revolutionary SOS system. SOS is an over-seeding product that can revive your sports field during the season. This summer SOS saved an Alaskan football field with only 4 weeks to grow in and temperatures in the forties and fifties! You can also learn more about our Yellow Jacket seed coating that provides better germination while using less water. Come see us and find out why top facilities like the Rose Bowl and the Philadelphia Eagles trust Barenbrug seed.

YELLOW JACKET®
ENHANCED SEED COATING

Kromer offers synthetic turf version of SFM

The B200 is designed to be the only machine you'll ever need to maintain all your natural turf athletic fields. A self-propelled riding unit that applies dry lines, wet lines, grooms, paints, conditions, sprays and will cut and paint a line at the same time. Available with 32 attachments means you can customize the unit to meet your needs. ALSO available in a Synthetic Turf version – the SFM is specifically designed to meet the unique needs of today's synthetic turf fields. Make your fields look and play great with a Kromer.