

**UNIVERSITY OF MARYLAND**

As the winning 4-year school at the 2013 STMA Student Challenge, the University of Maryland used the \$4,000 award from SAFE to enhance student instruction for the lab component of PLSC 402 (Sports Turf Management).

Currently the University of Maryland offers a two-year academic certificate and a baccalaureate program in Turfgrass Management. The two-year program added a Sports Turf Management option in 2009. The major emphasis of the award was to develop two additional laboratory activities that centered on assessing sports field quality and safety. Equipment such as the Field Scout TDR moisture meter, infrared ther-

The commitment of SAFE to promote safe, playable, and sustainable athletic fields by awarding such grants has enhanced our sports turf educational program...

▼ **STUDENTS GATHERING VARIOUS PIECES OF MEASURING EQUIPMENT** such as the Field Scout moisture meters to determine soil moisture content of the practice football field.



mometers, soil temperature probes, sand sieves, a Kestrel pocket weather station, and soil textural analysis equipment such as hydrometers and bouyoucos cylinders were purchased from the funds provided by SAFE. Also other equipment was purchased using the leverage of the SAFE award to acquire a Clegg Impact Soil

Tester, soil infiltration equipment, and soil probes.

The commitment of SAFE to promote safe, playable, and sustainable athletic fields by awarding such grants has enhanced our sports turf educational program at the University of Maryland and we are extremely thankful for their support. ■

**Welcome to our Newest Dealers!**

- A-OK Turf Equipment, Coventry RI
- Bonneville County Implement, Idaho Falls ID
- Commercial Turf and Tractor, Chillicothe MO
- Show Turf, Boynton Beach FL
- Turf and Industrial, Santa Clara CA
- G.C. Duke, Ontario Canada
- Storr Tractor, New Jersey & Long Island



**864.225.3666**  
[www.stecequipment.com](http://www.stecequipment.com)

# Don't get salt stress from measuring salinity

**S**TOP! DON'T TURN THE PAGE! Living close to the coast is not the only place where a turfgrass manager needs to be concerned about salinity. Irrigation water and soils can be influenced by salts in more ways than you think: (a) in arid environments where there is not adequate rainfall to leach salts through the soil profile; (b) in cold climates where snow is melted from roads by salt deicers; (c) in the High Plains and in coastal regions, where water from naturally occurring saline aquifers is used for irrigation; (d) using treated effluent as a water source; (e) saltwater intrusion into naturally freshwater wells; and yes, (f) using irrigation water from tidally influenced creeks and rivers, or on the East Coast, from an intracoastal waterway. Convinced? Good! After reading this article you will be able to easily navigate the sea of salinity units that are commonly used. If want more information WHY you should monitor salinity, see **SportsTurf** May 2012 page 32.

Let's start off by defining "salinity." Salinity is a measure of the salts dissolved in water (or a soil). Before we get into the many reporting units for salinity, it is important to understand how salinity is typically measured.

## MEASURING SALINITY

You may have heard of using refractometers to measure salinity. Refractometers measure the change of direction or bending of the light as it passes from air to water. When we first began to measure salinity, it was common to use a refractometer. While still used, precise refractometers come with a hefty price tag. Furthermore, they are not automated, thus cannot be deployed to determine salinity continuously.

And that leaves us with the following two techniques commonly used to measure salinity:

1. The first involves using a conductivity meter to measure the electrical conductivity (EC) of a solution in the field. The electrical conductivity of a solution is a measure of the total dissolved solids (TDS) within the solution. These dissolved solids are generally made up of inorganic and organic compounds that have passed through a 2 micrometer ( $\mu\text{m}$ ) sieve. TDS is

Salinity Conversion Table
$\mu$ = micro, m = milli 1 $\mu\text{mhos/cm}$ = 1 $\mu\text{S/cm}$ 1000 $\mu\text{S/cm}$ = 1 $\text{mmhos/cm}$ = 1 $\text{mS/cm}$ = 1 $\text{dS/m}$
ppt = part per thousand, ppm = part per million 1 $\text{g/kg}$ = 1 ppt = 10,000 ppm = 1.0%
ppm = $\text{dS/m} \times 550$ (water with high proportion NaCl) ppm = $\text{dS/m} \times 700$ (hydroponic solutions, other salts dominant)

**THIS TABLE** makes it easy to convert reported salinity units to those you are familiar with:

typically a measure of the concentration of salts that have dissociated (split) in the water to form both positively (cations) and negatively (anions) charged ions. The idea behind using EC as a measure for salinity is that the more salts present, the more electricity conducted, and the higher the EC reading.

2. The second method, *measuring TDS directly*, can only be performed in a laboratory and is generally the method by which laboratories report your salinity value. To measure TDS, a specific volume of sample is weighed, filtered through a 2  $\mu\text{m}$  sieve to remove any particulate, gently dried until all water has evaporated, and the remaining salts/solids in the sample weighed. The dry weight of salts remaining divided by the original weight of the evaporated sample tells us the sample salinity.

## REPORTING SALINITY

How does TDS relate to EC and what can both measurements tell us about the salinity of a given water sample?

Salinity is discussed with many different units. It is common to see salinity expressed as a concentration (from the direct TDS measures) – such as 35 g dissolved salt / kg sea water = 35 ppt (part per thousand) = 35,000 ppm (part per million) = 3.5%. For irrigation purposes, many labs report salinity as TDS. Values below 500 ppm are generally not of any concern; values between 500-2000 ppm are considered an "increasing" concern and should be monitored, and > 2000 ppm are considered a severe problem.

To get a TDS or concentration measure of salinity, you have to submit an irrigation sample to an analytical laboratory and wait for results. If you need a more immediate measure of irrigation water salinity in the field, using a conductance meter to measure EC is an accurate and inexpensive (once the meter is purchased) method. While there is not exact relationship between EC and TDS, there is an approximate relationship. In water with a higher proportion of sodium chloride (water typical to SC) to get to ppm multiply the  $\text{dS/m}$  reading by 550; for other water sources (like hydroponics solutions) multiply the  $\text{dS/m}$  reading by 670 or 700 to convert to ppm. For the most part, turfgrass managers would use the 550 conversion factor.

EC is generally reported in deciSiemens/meter ( $\text{dS/m}$ ), milliSiemens/cm ( $\text{mS/cm}$ ), or millimhos per centimeter ( $\text{mmhos/cm}$ ), which are numerically equivalent to each other. Here is a piece of trivia for you: as mentioned above, EC is a measurement of conductivity that is commonly measured in  $\text{mmhos/cm}$ . The opposite of conductivity is resistivity, which is measured in ohms. Ohms spelled backwards is mhos! When using an EC meter to determine relative salt levels, the recommended EC range of irrigation water is generally <0.75  $\text{dS/m}$  for seedlings, or propagation areas and 0.75 – 3.0  $\text{dS/m}$  for general irrigation purposes. If concentrations are less than 0.5  $\text{dS/m}$  or greater than 3.0  $\text{dS/m}$ , severe problems can occur. ■

*Dara M. Park is Assistant Professor, Turfgrass, Soil & Water Quality and Sarah A. White is Assistant Professor, Nursery Extension Specialist, School of Agricultural, Forest, and Environmental Sciences, Clemson University.*

# JOHN MASCARO'S PHOTO QUIZ

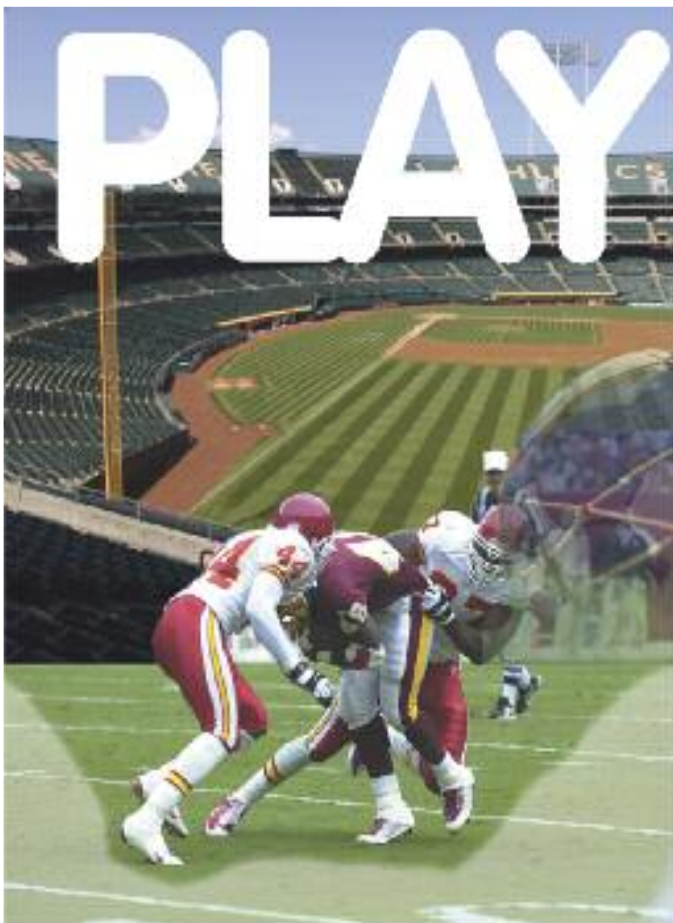
## Answers from page 17

**ALTHOUGH WEAK TURF** on softball fields can be caused by a variety of things, this weak turf is a result of too much silt in the soil. This seven-field fast pitch softball facility in North Dakota was built on a former lake bed in the famed Red River Valley and the park has dealt with flooding for many years now. This past spring as the winter snows melted, the river crested above flood stage, leaving about 14 feet of water on these fields and they remained underwater for about 2 weeks. The length of time the fields remain under water is directly proportional to the amount of silt that is left on the soil surface when the waters recede. Some years it is 1 inch or less and can be easily broken up. In 2009, the river was on the fields for almost a month and left 4 inches of silt behind. The parks department had to use skid steers to push the silt up and haul it away. This year about an inch of silt was deposited by the flood waters and they were able to break it up and re-seed into the soil with ryegrass to get a quick cover. This fall they will be interseeding the rye with bluegrass. After the facility was cleaned up, it was re-opened on July 8; the evening of July 9, they received 6 inches of rain and the storm drains filled this facility again with about 3 feet of water and it was underwater again for 5 days. They re-opened again on July 25. The city will start a levee project this fall which will protect four of the fields; the other three will be taken out of play as they are in an area that the new levee cannot protect. Next spring after the levee project, they are planning a major overhaul of the fields. ■

*Photo submitted by Rene' Smith, Athletic Field Coordinator for the Fargo Park District.*



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](mailto: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.



# BALL!

## FOOTBALL, BASEBALL, SOFTBALL, SOCCER

Any sport played on natural grass is a natural for TifSport Bermudagrass. If you're looking for a sports turf that can handle non-stop action, a transition zone climate and heavy overseeding, TifSport's your answer. It's ideal for intramural fields, practice fields and game-day venues, where everything has to be perfect.

Coaches and players love the way it looks and plays and you and your crew will appreciate how easy it is to manage. TifSport can only be sold as certified sod or sprigs and only by licensed members of the TifSport Growers Association. For more information visit us at [www.tifSPORT.com](http://www.tifSPORT.com), or call 706 552-4525.

**TIFSPORT**   
CERTIFIED BERMUDAGRASS  
[www.tifSPORT.com](http://www.tifSPORT.com)

► **GRADUATE STUDENT NORMA FLOR** screens zoysiagrass for large patch response in a growth chamber. Photo: Kevin Kenworthy, University of Florida



# The future of turfgrass research

**L**IKE MOST COMPANIES and individuals in today's economy, turfgrass breeders are expected to do increasingly more with less . . . more in the way of developing increasingly sustainable varieties in a climate that is *literally* changing . . . with less funding due to budget cuts in both public and private sectors. And it is clear that continued drought in some areas is having a lasting effect on how breeders view the future.

Given all of this, where will we see turfgrass breeding headed, how will it be funded and how will it affect turfgrass sod producers? To gain some insight, *Turf News*, the publication of Turfgrass Producers International, asked a number of turfgrass breeders in both public and private sectors a few questions. *Turf News* wishes to thank the following individuals for responding:

- Keenan Amundsen, University of Nebraska
- Ambika Chandra, Texas A&M
- Doug Brede, Jacklin Seed of the J.R. Simplot Co.
- Milt Engelke, Professor Emeritus, Texas A&M
- Bingru Huang, Rutgers University
- Melodee Fraser, Pure Seed Testing

- Kevin Kenworthy, University of Florida
- Brian Schwartz, University of Georgia
- Eric Watkins, University of Minnesota
- Joseph Wipff, Barenbrug USA, Inc.

## Where do you think we will see turfgrass breeding moving forward? Will it be focused on particular traits and, if so, which traits?

**Chandra:** A lot more needs to be done. The changing climate, including extreme temperatures and recurring droughts, as well as the shortage and increasing cost of potable water plus evolving pathogens and insects, require continued work for more sustainable turfgrass production systems.

Different turfgrass species have their unique sets of strengths and weaknesses. Depending on intended use, region of adaptation and consumer preference, breeders are focusing on improving different traits in different species. Ball roll, divot recovery, thatch management, shade and traffic tolerance, for example, may be of more importance to golf course superintendents whereas shade tolerance, drought and disease/insect resistance may be more valuable to homeowners.

Growing grasses in the transition zone presents

its own challenges, especially in dealing with extreme temperatures. Regardless, everyone wants a grass that looks and feels good, and that they do not have to mow as often. Therefore, dwarf varieties with higher establishment and recovery rates are very desirable.

**Engelke:** Consumers pay more for water on a per gallon basis than they do for oil. Therefore, we must focus on drought tolerance and low water consumption. The South already has been dealing with a long-lasting drought and some communities are reaching the stage where no watering will be allowed.

We also need to look at salt tolerance. Salinity becomes a problem when we do not have rain for extended periods. In this case, salt rises to the surface and concentrates in the crown of the plants and kills either the plant or the soil. Turfgrass then no longer has moisture or oxygen needed to grow. In these types of conditions, even halophytic plants can die.

At the same time, those who say that turfgrass uses too much water must be reminded of the many benefits of turfgrass, such as soil stabilization, cooling attributes, and the purification of water through grass's filtering effects.

**Wipff:** Water use efficiency; improved ability to use less than optimal quality water and effluent water; improved salinity tolerance; faster establishment; and reduced overall maintenance requirements will continue to be highly desired and sought after traits.

Another often overlooked trait and not widely considered by the end-user is the need for improved seed yields. Without higher seed yield and a strong dollar return per acre of seed production, the turfgrass seed industry will continue to find difficulty competing for production acres with food, forage, energy, and other high value crops.

**Amundsen:** The big traits of concern these days are based on water issues, especially given last year's widespread drought. Drought tolerance and water use efficiency are key. Other traits of interest include salt tolerance, cold and heat tolerance, disease and insect resistance, and nutrient use efficiency.

Breeding programs continue to focus on traits that are important for the turf industry (e.g. canopy density, color, uniformity, mowing tolerance, wear tolerance, recovery from damage), but there has been more focus toward biotic and abiotic stress tolerance over the past few decades and these traits will be at the forefront of breeding efforts in the next couple of decades.

I believe the next big advancement will come from the implementation of genetic tools that will allow us to evaluate and advance populations of plants more efficiently and cost effectively. This is not necessarily an advance in turfgrass breeding specifically, but new technology should allow us to maximize increasingly limited resources for turf improvement.

**Huang:** We will see more work on improving traits for stress resistance, and for more efficient use of water and fertilizers.

**Brede:** The plant breeding process is not linear.

We do not sit around a boardroom trying to imagine the next great trait. Instead, plant breeding is a random process requiring the breeder to be vigilant when something great comes along. We never really know what the next great thing will be. We have to wait for the plants to tell us.

Nonetheless, each breeder carries a mental list of the top 10 most wanted traits, such as bluegrasses that germinate faster, tall fescues that resist brown patch disease, bunch grass species that show a tendency to creep, grasses that need fewer inputs and anything that yields more seed per acre for the seed grower (and thus makes seed of that variety less expensive).

**Kenworthy:** I think that we will see more niche grasses developed for regions, with traits that have resistance to particular strains of the same pathogen, and more drought tolerance. My zoysia program, for example, is focused on large patch disease, and in bermudagrass, we are seeing more of a focus on tolerance or resistance to sting nematode.

**Schwartz:** I believe that turfgrass breeders will look at alternative species that fit niche situations and markets rather than a “one-size-fits-all” approach. You may see specific cultivars of popular species (like bermudagrass) that are developed for certain situations and not widespread adaptation. Specific trait development will probably depend on the application. But, we all are trying to improve drought tolerance.

With regard to golf greens, I am looking for nematode tolerance and reduced maintenance requirements. For home lawns, I am looking for reduced maintenance requirements.

**Speaking of alternative species, will we see more work being focused on them?**

**Chandra:** There is potential in exploring native grasses that have evolved to be genetically adapted to their native environments and associated stresses.

But, they may not necessarily have desirable turfgrass quality traits such as high tiller density, dwarf stature, dark green color and so on. Texas bluegrass, bahiagrass, curly mesquite and blue gramas are just a few examples of the grasses on which breeders are working.

**Engelke:** Existing breeding programs have limited resources to fully exploit the existing genetic diversity available in any one species. Too often, because of those limited resources, we tend to see major efforts in any one species be limited to a fairly narrow genetic base. Subsequent varietal releases tend to look alike without fully exploiting a broader genetic base.

Going to an alternate species, while it may present opportunities for “low hanging fruit” to be harvested, is not as likely to have long-term ramifications as more in-depth scientific endeavors with major species already being studied. We must look for greater diversity, as well as discourage the idea that grass must be green all year long at any cost.

**Amundsen:** As the buffalograss breeder at the University of Nebraska, my view is certainly biased toward the use of non-traditional species. I think there are opportunities for buffalograss, poverty oatgrass, the gramas, salt grass, alkali grass, prairie junegrass, some of the wheatgrasses and other natives.

There may also be opportunities for non-conventional uses of traditional species, such as using alternative bentgrass species for lawns. With many of the native species, regional adaptation is a distinct advantage, so the market will likely be tailored to certain species in certain regions.

**Schwartz:** I can only speak for warm-season grasses. There is currently a big push to develop new zoysiagrasses. Seashore paspalum has really taken off, especially in the international market. Some breeders are selecting turf-types out of species that are often considered weeds. These types of projects are usually very long-term and require a lot of work and patience.

**Brede:** There is always some breeding work going on with new species, but

See us at STMA 2014 booth #537

**SportsTurf**  
MANAGING ASSOCIATION

**Koro Field TopMakers**  
Remove unwanted surface matter

**Imants Shockwave**  
Linear decompaction

**Raycam Speedressers**  
Bulk high-volume drop spreaders

**Perfecting Play**

info@campeylimants.com  
www.campeylimants.com

**Campey imants**  
Perfecting Play

the track record for novel species over the last 25 years has been dismal. The typical response most breeders get when they present a brand new species to a salesperson is “But my customers aren’t asking for that.” I think we will see a handful of novel turfgrasses hit the market in the next decade, but none will gain a sizable market share nor will they be around very long if salespeople do not actively promote them.

### What do you see as the next major breakthrough?

**Chandra:** The use of major advances in molecular biology, such as genome sequencing. The development of trait-specific molecular markers in marker-assisted breeding will enhance the speed and efficiency of progeny selection and, thus, the cultivar development process.

Turfgrasses are genetically complex and are challenging to manipulate since they are perennials and, in most cases, open-pollinated and have higher ployploids.

Several new and powerful tools of molecular biology have been developed and are available to us. The adoption of these tools in turfgrass genomics research is in its infancy (unlike major agronomic crops) mainly due to the lack of or limited funding. The turfgrass industry’s interest and future funding would significantly enhance our ability to tap into the advances of molecular biology for turfgrass research.

**Schwartz:** Because some mutations happen spontaneously in nature that can lead to herbicide resistance, I think we may see non-genetically modified herbicide resistant turfgrasses.

**Kenworthy:** I think we will see improved drought tolerance and pest tolerance in varieties. This will help to make the turfgrass manager’s job easier and make the turfgrass industry more sustainable (by reducing some use of pesticides, for example).

**Amundsen:** We continue to see significant, albeit incremental, gains in overall turf performance. Recent advances, such as rhizomatous tall fescue are interesting, but the major breakthroughs will likely come from host resistance or tolerance to stresses. The quality we have is pretty good and the challenge for most breeders will be developing new varieties that can maintain that quality with fewer inputs.

**Wipff:** There is great need for improved turfgrasses for the renovation and improvement of high use ‘park and rec’ fields. These characteristics would include faster germ and establishment, significantly improved traffic tolerance and recovery.

**Brede:** For several years now, there have been several vegetatively propagated varieties designed specifically for sod production. We have not seen a similar phenomenon with seeded types, but I believe we are close to seeing some specialized for sod production.

### Will we see some warm-season grass varieties becoming more cold tolerant?

**Huang:** I am collaborating with Chinese scientists to perform mutation and genetic transformation work to improve cold tolerance in warm-season species. This work is in progress, but we cannot share details at the moment.

**Chandra:** Absolutely. As long as warm-season turfgrass breeders have access to a germplasm source with cold tolerance in the gene pool/germplasm collection, they can work on improving cold tolerance. There is increased interest in the use of warm-season turfgrasses in northern states mainly because of their enhanced wear tolerance and higher water-use efficiency (compared to cool-season turfgrass species).

One effort in this direction is a USGA-funded project where Texas A&M AgriLife Research, Kansas State University (Jack Fry and Megan Kennelly) and Purdue University (Aaron Patton) are collaborating on the development of cold-tolerant zoysiagrass cultivars with large patch disease resistance. There are also a few bermudagrasses being tested on golf courses as far north as Pennsylvania.

**Schwartz:** I believe that the breeding programs in Oklahoma and North Carolina will continue working on grasses that can be grown farther north. In Tifton, GA, this is a difficult goal to reach on our own. But, we

have established plots in central Illinois and Indiana during the last year that will hopefully allow us to identify warm-season grasses that do well in both northern and southern locations.

**Amundsen:** I think we will continue to see gains in cold tolerance of warm-season grasses and heat tolerance of cool-season grasses, but there are limits to the range of adaptation of most species. As you move away from the zone of adaptation for a species into environments less favorable, some outliers will survive and tolerate a given stress. Since these outliers represent only a small fraction of the diversity for the species, there are genetic limitations to further advancing the species in less desirable regions.

The best approach probably lies with inter-generic hybridization to move certain turf traits into more widely adapted species, or move adaptation traits into better performing turf species. This is a challenge because there are limits in compatibility among species which would require a sizeable investment to make significant gains.

**Fraser:** While improvements in cold tolerance or winter survivability are goals for warm-season turfgrass breeders, one objective is to increase the portion of the year that those grasses are green. A warm-season turfgrass may have very good cold tolerance and winter survivability, but that may be because it has long winter dormancy. Cultivars that green up earlier in spring and have good fall color retention, along with winter survivability, will help expand the use of warm-season turfgrasses.

**Wipff:** There are a number of warm-season grasses currently available that are significantly cold tolerant. But, with colder climates typically come longer winters, shorter days, reduced summer temperatures and significantly longer winter dormancy. Prolonged winter dormancy generally precludes warm-season grasses from being used on a widespread basis. Most sod producers already seek out varieties that offer reduced dormancy and early spring green-up.

### There is some concern that dwarf turfgrass varieties are unable to adequately compete with weeds. What are the pros and cons of dwarf varieties?

**Fraser:** The advantage of dwarf varieties is that their growth habits are very well suited for turf. A very low, very dense growth habit can be beneficial for many uses. Some disadvantages could be that some dwarf plants might have shallower root systems or slower growth rates. Plants with these characteristics might be less tolerant to drought stress, establish more slowly, recover more slowly from injury or be less competitive with weeds.

The good news is that there is usually variation in these traits which allows us to select plants that have beneficial characteristics that we can use in the development of new varieties.

**Chandra:** Dwarf varieties are generally slow to grow and spread. Therefore, during the establishment stage, weeds may have a competitive edge. Recovery from damage (mechanical, disease/insect, drought, etc.) in dwarf varieties may be slow, again allowing room for weeds to emerge.

Once fully grown-in, however, dwarf varieties are actually better than non-dwarf varieties. In addition to reduced mowing requirements, dwarf varieties have superior turfgrass quality, especially in term of higher shoot density that makes it difficult for weeds to creep in.

Dwarf varieties retain more leaf tissue below the low mowing height. This is the machinery for photosynthesis and, therefore, dwarf varieties maintain higher carbohydrate reserves, making them stronger than non-dwarf varieties.

There is a trade-off between dense, dwarf varieties and their rate of establishment/recovery. Some species respond better to trade-off manipulations than others, and turfgrass breeders work to balance these attributes.

**Schwartz:** Dwarf warm-season grasses (specifically bermudagrasses) are currently the only option for maintaining acceptable golf greens. While less aggressive, I have never seen a non-dwarf Bermudagrass variety make a putting green.

In the future, there may be dwarf zoysiagrasses that can be mowed low enough to be planted on golf greens and also have shade tolerance and dense rhizomes that would allow them to grow successfully off of a golf green.

## It seems that more breeders are submitting materials to the Grass Variety Review Board than for Plant Variety Protection (PVP). What are the advantages and disadvantages of doing this?

**Chandra:** The purposes of the Grass Variety Review Board (GVRB) and the Plant Variety Protection Act (PVPA) are very different and should not be confused. The GVRB provides a third-party screening process which is administered by the Association of Official Seed Certifying Agencies (AOSCA) to evaluate the scientific merits, genetic purity and novelty of new varieties based on adequate data provided by plant breeders.

The GVRB ensures that new varieties meet the eligibility requirements of AOSCA's genetic seed certification standards. Recommendations made by the GVRB are considered by the state seed/plant certification agencies, permitting inclusion of the new variety into their state certification program.

Plant Variety Protection (PVP), on the other hand, provides plant-patent type protection to sexually-reproducing varieties for 20 years from the certificate's date of issue. This gives the breeder/company rights to exclude others from sexually reproducing the variety; or selling or distributing it without any prior agreement/contracts in place with the breeder/company. To be eligible for a PVP certificate, the breeder/company must show that the new variety is unique (new and distinct), uniform and stable.

Some companies/breeders decide to apply only to the GVRB. This is a decision each company makes based on the market and utility of the new variety.

**Wipff:** Many newer entries are not capable of meeting PVP standards for exhibiting distinctive turf characteristics whereas the guidelines for GVRB approval focus on seed certification only. Unfortunately, the GVRB does not evaluate the merits/distinctiveness of the entry and many "look alike" varieties will flood the market.

Ultimately, the disadvantages to the industry are the reduction and hindrance of turf innovation. At a time when significant gains in turf research are required to sustain a healthy, vibrant industry, GVRB paves the path towards mediocrity and similarity.

## How is patenting varieties (vs. PVP) going to change the future of turfgrass breeding?

**Engelke:** Breeders must be able to protect their varieties with intellectual property rights. If others do not respect these rights, we will not have turfgrass breeding programs with any kind of stability or longevity. And, if intellectual property rights are not respected, we will not see continued funding to support turfgrass development.

**Chandra:** Plant patents and plant variety protections should not be confused. PVP provides protection to sexually-reproducing varieties (seeded turfgrass varieties). Plant patents, on the other hand, provide protection of asexually reproducing varieties (vegetatively propagated sod or apomictically produced seed).

**Schwartz:** Plant and utility patents definitely change what and whose plant material you can or cannot use as parents in your breeding program. It will likely lead to individual programs collecting or breeding their own germplasm pools or, in some instances, may lead to collaborations where a turf breeder licenses a patented variety from another breeder for use in their program. Time will tell.

**Wipff:** Patenting a turfgrass allows that the unique, distinctive characteristics of a variety are protected from theft, whereas with the current PVP system of registration, only the name is protected. At five times the monetary cost of a PVP, patented turfgrasses readily identify those research programs that are focused on proven innovation, true improvement and the willingness to protect them.

## Is there anything else that you would like to share with turfgrass sod producers about your particular research interests or about turfgrass breeding in general?

**Schwartz:** I am not only looking for grasses that have end-user benefits,

but also work with several sod producers in my state to conduct the final stage of research at their farms to look for grasses that they can profitably grow. By giving them enough of a potential future release, we have been able to determine if the establishment, lifting, sod strength and regrowth are satisfactory. If we can save money on the production side, we can increase farm profitability even if prices fall to the level of older varieties.

**Chandra:** We have several ongoing breeding projects, including the development of St. Augustinegrass cultivars with improved drought and disease resistance (funded by the Turfgrass Producers of Texas); development of seeded zoysia grass varieties (USGA funded); and development of cold tolerant and large patch disease resistant zoysiagrasses (USGA funded).

We also are developing hybrid bluegrasses (Texas bluegrass x Kentucky bluegrass) adapted to the southern US (funded by NGTurf; funding expired April 2012); and a multi-state project for the development of drought and salinity tolerant grasses for suitable turfgrass production in the southern US (funded by USDA-NIFA Specialty Crops Research Initiative).

We work closely with producers to help find solutions and develop cultivars that meet their needs and generate profits in their businesses.

**Wipff:** Ultimately the market needs to bear the cost of innovation. Unfortunately, most professional and non-professional end-users are not willing to pay for innovation or investigate the advantages gained by purchasing improved turfgrasses. Be it a penny a square foot or a nickel a pound, far too many end users are willing to 'go cheap' and bear the consequences.

Whether seed or sod, the amount of planning, effort, installation and planting dollars, water, fertilizer, etc. required to grow and establish a square foot or a pound is virtually the same regardless of the quality of sod or seed. For both situations, the only extra cost to be incurred is the investment in quality, innovation and long term performance. ■

**The Best Dressed Sports Fields Start Out In Our Hands.**

Major League Baseball, National Football League, Major college programs, High School teams. America's leading sports fields use America's best field marking paints and custom stencils. When great teams choose to decorate their fields, they turn to World Class.

**WORLD CLASS**  
athleticsurfaces

We Make The Games Look Better • [www.worldclasspaints.com](http://www.worldclasspaints.com) • 1-800-748-9649

**SEE US AT BOOTH #237**

## PRODUCTS ON DISPLAY IN SAN ANTONIO



### TempLine removable synthetic turf paint

TempLine water based paints are easy to apply and remove, with outstanding brightness, opacity, play durability and weather resistance in between. TempLine paint is available in three grades, depending on your need for extended durability versus short term utility and ease of removal. All three grades come ready to use in a broad range of colors formulated to dry fast and stay flexible without binding together turf fibers or infill granules. TempLine paints are valued for the brightness and durability they provide without creating heavy build-up.

**Eco Chemical, Inc.**



### Streamliner dryline marker

The Streamliner is simply the best dryline marker in the business. With its variable flow control, field testing has proven the Streamliner is the best for the quality of the chalk line while using less chalk than its competition. A heavy-duty steel frame, pneumatic tires, rugged molded plastic hopper, flexible brush agitator, accurate string-line guides, and a one-button retractable handle for easy storage set the Streamliner apart. Available in 2-, 3-, and 4-wheel models with optional Double-Play aerosol paint attachment.

**Beacon Athletics**

### App measures relative greenness

The FieldScout GreenIndex+ Turf app allows users to measure turf health via relative greenness using a smartphone camera. The app quickly and conveniently captures images from a smartphone, calculates the DGCI (Dark Green Color Index), and correlates to visual ratings. Users can customize the visual rating calculation for different species of grass and specific plots of land. Measurements can be compared to identify variability or trends in turf health across sports fields and golf courses, providing valuable data for decisions regarding fertilization and irrigation. All data is logged and geo-referenced, and can be emailed to a personal computer for further analysis.

**Spectrum Technologies**



### Hunter announces I-Core 3.0 Solar Sync

The controller now has built-in compatibility with the Hunter Solar-Sync climate sensor, allowing automatic self-adjustment for changing weather conditions. The new version of the I-Core controller features a Solar Sync dial position, and allows all sensor setup functions from the main control panel. The controller also permits a Solar Sync Delay feature, allowing the installer to specify a number of days before the controller switches to automatic adjustment mode. Version 3 I-Core controllers need only add a Solar Sync Sensor, or the increasingly popular wireless version of the sensor, to take full advantage of automated water saving technology. Each of the controller's 4 irrigation programs may be set to use the weather adjustment, or to run individually without automatic adjustment for special applications.

**Hunter Industries**



### Pro-Stripe Extreme White marking paint

Whitlam Paint offers a wide range of athletic field marking paint including Pro-Stripe Extreme White. Our exclusive formula is environmentally friendly, has higher solids and a low VOC content. It also contains Optiwhite optical brighteners for better reflectance under UV stadium lights and sunlight. Making it the brightest and most durable field paint we manufacturer. Dilution rates vary up to 3:1 for better savings. Extreme White can actually stimulate root growth and development allowing grass to remain vibrant and healthy.

**Whitlam Paint Company**



### Got geese?

Do you have geese at your facility? If yes, then it's important that you know about our line of [www.geeseproblemsolved.com](http://www.geeseproblemsolved.com) products that can and will solve your geese problem. Solar powered, maintenance free, easy to install, no harm to geese or your environment. Guaranteed to work or your money back. We also provide a no cost/no obligation "Placement Survey" to assure the right product and placement. Shipping is free.

**Geese Problem Solved**



### A-Turf Titan has 12-year warranty

A-Turf Titan is the ultimate synthetic turf surfacing system, featuring the best combination of A-Turf's blended Mono & XP fiber design, creating an amazingly plush, natural looking surface with outstanding performance, durability attributes and backed by an industry-leading 12-year warranty. When installed with a resilient ShockPad (with a 25-plus-year life cycle), Titan has the industry's best safety rating, resulting in less severe and fewer concussions from surface impact, throughout the system's life. Featuring optimal footing, true ball roll and ideal shock absorption, A-Turf Titan can be engineered for optimal play of a specific sport or multiple sports played on one field.

**A-Turf**



### New Smithco Super Liner

The new SMITHCO SUPER LINER offers precision lining, ease-of-operation and superior agitation and features front- and side-mounted marking boxes for straight or circular lining and a 16 hp Vanguard engine. Hypro-diaphragm pump provides pressure ranging from 0 to 150 PSI. Easy operation hydraulic wheel motors for smooth transitions for starting and stopping and hand control for constant speed.

**Smithco**



## Sports field assessments

Evaluate field conditions. Demonstrate fields meet industry standards. Be Proactive. Use Turf Diagnostics for your sports turf testing. We specialize in site investigations of synthetic turf fields. Testing includes Gmax field hardness, turf and infill depths measurements, and seam and inlay observations. We also perform laboratory analyses of base stone used in field construction to help ensure stability and drainage. Our accredited laboratory is the heart of our natural turf testing capabilities. We perform soil drainage assessments, compaction evaluations, rootzone mix design, and baseball/softball skin testing. All testing is performed to current ASTM standards.

**Turf Diagnostics**

## Shear Strength Tester

Turf-Tec International introduces the new Turf-Tec Shear Strength Tester/shear vane apparatus. This is a specially designed tool to test the stability of natural grass athletic field turfgrass root systems. In addition, the Turf-Tec Shear Strength Tester can also test the types and depth of cleats that will perform best in your particular turfgrass root system and environment. Knowing the shear strength and correct cleats to play in will not only insure proper footing during play and may also create a safer playing environment for athletes.

**Turf-Tec International**

## All seasons Ultraplex 4-0-3 +2% Fe

Ultraplex 4-0-3 +2% Fe & micros is a sophisticated combination product containing Grigg Brothers exclusive Elicitor Technology and is designed for use in all seasons. Ultraplex now conveniently includes the following six components: effective natural biostimulants, amino and organic acids; sea plant extract; water buffering agent; macro nutrients (N & K); fully organic chelated micronutrient package including Iron (Fe), Magnesium (Mg), Manganese (Mn), Zinc (Zn), Copper (Cu), and Boron (B); natural, non-ionic and organic surfactant for improved leaf coverage and absorption. Many years of research data highlight the many uses and value of Ultraplex®.

**Grigg Brothers**

## NewRider 1700 HP

The NewRider 1700 is the economical ride-on high pressure airless striping machine for marking athletic fields. The NewRider 1700 is designed to quickly spray straighter, brighter looking lines and the 25-gallon paint tank will stripe numerous fields without having to be refilled. Additionally, the fully adjustable spray pump saves money by spraying just the turf and not the dirt with any paint. The on-board purge tank eliminates clogging of spray tips and makes clean-up a snap. This model features a hydrostatic drive and a 10.5 hp OHC engine with electric start, and removable gun with 25' hose for stencils.

**Newstripe, Inc.**

## Revolution soil surfactant

Revolution is a unique soil surfactant technology that is scientifically proven to balance air and water in the rootzone. Revolution's patented formulation allows water to move in a thin continuous film through the soil profile, perfectly balancing air-to-water ratios and increasing the performance of turf under stress. By maximizing the growing environment, Revolution allows your turf to function more efficiently and perform at consistently higher levels. Users often report significant reductions in costs related to irrigation and other expensive inputs. Revolution reduces the impacts of daily stresses on turf health and promotes faster recovery when stresses do occur.

**Aquatrols**

## EVERGREEN turf blankets keep practice fields 'Game Shape'

EVERGREEN Radiant turf blankets from Covermaster Inc. have protected the length of the field between the hash marks of the San Diego Chargers' practice fields since 2011 with great success. So much so, that they ordered additional blankets to cover both their natural turf fields on an alternating schedule. While one field is covered, the other is used for practice. That way both fields will remain very playable and allows practice to continue on good quality fields well into the playoffs. Additionally, the Chargers rely on Covermaster's TARPmate rollers and the unique TARP MACHINE for easy handling of the covers with a limited crew.

**COVERMASTER Inc.**

## Pro Mound packing clay

Fortify your mound and batters' boxes with Pro Mound packing clay. Pro Mound alleviates common wear problems by forming a solid subsurface under the mound and batter's boxes, keeping them resilient and easy to manage, season after season. Made from a unique blue gumbo clay, Pro Mound is highly durable and remains firmly intact while reducing maintenance and providing solid footing for athletes. The packing clay allows pitchers and batters to "dig in" and establish footing without leaving large holes. Pro Mound is easy to install and requires only a shovel, rake, tamp and water. Approximately forty 50lb. bags (1 pallet) of Pro Mound are needed to resurface and maintain the mound, batters' and catcher's boxes.

**Pro's Choice**

## Water removing machine

The BowDry is a water removing machine that can remove water from and sport field as well as indoor playing surfaces, tennis courts and/or pool decks. The thick foam roller absorbs water and then it is pressed off and sheeted into a 16-gallon holding tank at the rear of the machine. The holding tank and rear of the machine is supported by four large wheels so, even full, the BowDry never loses its outstanding maneuverability. The BowDry removes the water from any surface and transports it to the drain. BowDry is fast, quiet and efficient.

**Seago International, Inc.**





## New Jacobsen TurfCat out-front mower

In 2014, Jacobsen will update its legendary TurfCat out-front mower. The new mower will feature a Tier IV final Kubota engine, foldable ROPS, and less maintenance thanks to new hydraulic deck drives (gone are the belt and pulley drives). The TurfCat is popular with sports field managers because it's the only mower that offers a 60" flail deck, which discharges grass and debris down into the turf, significantly reducing the danger of thrown projectiles and providing a more attractive after-cut appearance. In addition to the fine-cut flail, the TurfCat offers five other deck configurations, including 60-inch, 63-inch and 72-inch hydraulic-drive rotary decks. Other attachments include a brush, plow, snow blower and debris blower.

**Jacobsen**



## Athletic field materials from Game Time Sports Systems

It Ain't Just Dirt" ... Louisville Slugger/Game Time Sports Systems offers quality athletic field materials that help create a uniform appearance and enhance the playability on all fields. These products are all safe for the environment. From the best quality field conditioners, to the right tools, Game Time can provide you with all the resources to make your fields the field of dreams. Game Time Sports Systems offers a full line of products.

**Game Time Sports Systems**



## Toro Sand Pro 2040Z infield groomer

The new Toro Sand Pro 2040Z is the industry's first zero-turn infield groomer. With a unique design that enhances maneuverability and productivity, the SP2040Z is powered by a 12.2 hp Kawasaki gas engine, and is outfitted with a specially designed nail drag/flex groomer attachment. The nimble SP2040Z will save you valuable time in your workday, improving infield surface playability and consistency.

**The Toro Company**



## New Pro League Champion Brown infield conditioner

New Pro League Champion Brown, a superior infield conditioner with a rich brown color, joins Natural, Red, and Heritage Red in the Pro League line up. Champion Brown, like the other colored Pro League conditioners, features an improved coloring process and a color-fast dye for long-lasting field aesthetics. The patented Pro League particle size ensures the ultimate fielding and sliding surface to keep skinned infields safe and playable. Pro League absorbs its weight in water to prevent puddles on the infield and provide sure footing. That absorbed moisture will later release to keep the infield from becoming hard and cracked.

**Profile Products**



## Double-sided home plate

Professional size and quality home plate weighing 40 lbs. and made of 3" of solid rubber. Its double-sided design allows for an extended life of the product which reduces equipment and labor costs. New 2013 product, currently being tested with various professional baseball teams and universities. Introductory price \$225

**Bulldog Field Equipment Booth**



## Aerate, topdress, amend in one pass

DryJect/Maximus are the only machines in the world that aerate, topdress, and amend in one pass. DryJect is a revolutionary service which, when added to your maintenance program, can reduce the need for core aeration and greatly amplify the benefits of sand amendments by distributing them into the ground more completely. DryJect/Maximus high-pressure, water-based injection system blasts aeration holes through the rootzone to fracture the soil, while its patented vacuum technology simultaneously fills holes with amendment. Relieve compaction, increase water filtration, reach the root zone with oxygen and amend your soil all at the same time, leaving the surface smooth and playable.

**DryJect Inc.**



## Harper TV30 self propelled sweeper/vacuum

Equipped with a 44HP Kubota turbo charged diesel engine & a 3.25 cubic yard hopper, the TV30 offers unmatched performance and maneuverability, making for quick and efficient cleanup. The patented dust control, re-circulating air system makes the operation of the unit clean and quiet as well as causing minimal disturbance to bystanders and the operator. A variety of attachments make the TV30 effective on many types of surfaces; turf, artificial, hard surface, while picking up most any type of debris; clippings, leaves, goose droppings, litter, or aeration cores. The hopper lifts to a height of 6ft 3in to dump directly into a cart or waste dumpster, eliminating the need to handle the material twice.

**Harper Industries**



## Vipol Matrix Mesh by Aer-Flo, Inc.

Just over 7 years ago, Aer-Flo, Inc. introduced Vipol Matrix Mesh to the sports turf industry. Our BP Zone Turf and Bench Zone Sideline Turf Protectors, as well as Tuffy Windscreens are made with our exclusive Vipol Matrix Mesh. Vipol is the strongest, longest lasting mesh in the industry! Found at virtually all levels of turf management, NCAA baseball and football (to include all football and/or baseball teams with natural fields in the SEC), 15 NFL fields and numerous Major and Minor League Baseball fields. We have over 21 colors to choose from. Custom sizes and shapes available. Add Chroma-Bond imprinting for that "home field" touch!

**Aer-Flo, Inc.**



## Fastest Verti-Drains yet

The Redexim Verti-Drain 2220 and 2216 (also called the Bullet) are the fastest Verti-Drains yet. The Bullet gives you the ability to aerate both fast and deep, penetrating 9 inches into the soil at speeds up to 3.5 mph. With the hydraulic option on the Bullet depth adjustments can be made easily from the tractor chair by adjusting the front and rear rollers. Additionally the three point hitch on the Bullet is offset which makes the machine more efficient by reducing the chance of tracking over previous passes. The Bullet is a tough and fast Verti-Drain that is setting a new standard in the aeration industry.

**Redexim North America**

Continued on page 45