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Field Science

end result? Poor water infiltration, air movement and root penetration. The reason only fine textured soils and soils with considerable organic matter are affected is because they have many negative binding sites (AKA cation exchange capacity) with which salts can react. For this reason, the structure of sand based rootzones with low cation exchange capacity will minimally be affected by Na.

If irrigating with a water source with very low salinity (pure water), ions that are present on the cation exchange site will leave the soil colloid and dissolve into soil solution. When this happens, there are fewer bridges keeping soil colloids aggregated. The end result of pure water application to soils is dispersion of aggregates and loss of pore spaces, very similar to changes in soil structure resulting from high concentration of Na. Soils compact easily and the loss of pore space results in poor water infiltration, air movement, and root penetration. In this scenario too, soil texture and the amount of organic matter present are important factors determining the extent of damage that can occur. The finer the texture and more organic matter present (thus greater CEC), the greater potential for dispersion. Coarse sands with low CECs are less affected.

MANAGEMENT OPTIONS

Both proactive and reactive management strategies can help you navigate any salt tempest. Monitoring both the salinity of your water source (EC) and the total dissolved salts (Ca, Mg, Cl, Na) within your soil are necessary to determine how to effectively manage a salinity issue, or prevent one from starting. If after you begin monitoring your water and soil, you determine that soil EC levels remain too high, whether due to water source, storm event, or excessive fertilization, there are a few steps you can take to manage the problem and reduce the risk of turfgrass damage. It is important to keep in mind that native soils will many times be different in texture and CEC than constructed rootzones, so make sure to sample all areas separately.

Grow salt tolerant grasses. If the irrigation water supply is salty and investing in alternative treatment/dilution methods is not viable, consider growing only salt tolerant species.

Apply a leaching requirement or reclamation requirement. In a nutshell, increase your irrigation volume to make sure that water (and salts with it) is always draining past the rootzone. A leaching requirement is used when there is not a problem, but you are concerned that you may start to have one (due to changing water quality, drought, etc.). A reclamation requirement is used when there is already a build up of salt within the soil. There are many ways to calculate these requirements, contact the authors if you need to determine one.

Monitor soluble salt levels in the soil. By monitoring soluble salt levels consistently you can adjust irrigation volumes to help compensate for higher salt levels, or decrease irrigation rates when salts have been flushed from the soil. Monitoring soluble salt levels also will determine if there is Na problem. Increasing Ca and Mg in soils or saline water can reduce Na-induced particle dispersion, and some of the more noticeable detrimental plant effects. (See

May 2012 issue about how to monitor; you can find article, “Is your turf under A-salt?” at www.sportsturfonline.com.)

Adjust fertilizer source and/or reduce fertilization rates. If irrigation water contains excess soluble salts, send a water sample to a soil-testing lab for an irrigation water analysis. This analysis will help to determine the ions that are readily available from the water source. Using this data, the nutrients supplied by the fertilizer can be reduced to account for those readily available from irrigation water. If adjusting fertilizer nutrient levels is not an option, simply lower the rate at which the turfgrass is fertilized (if possible) to reduce excess salt presence in substrate/soil. Especially for soluble fertilizers, since they directly contribute to higher salt levels, applying a lower rate with more frequency may also assist in ensuring that the soil is not overloaded with salt at any given time.

Apply an amendment. This is done ONLY when either (a) the water source is pure, or (b) Na has been identified as the main salt constituent. The most common amendment used is gypsum. It can be applied in a granular form or injected in line into the irrigation water. Gypsum replaces Na with Ca. Other Ca sources work as well. If adequate Ca is available in the soil, applying acid to reduce the soil pH and release the Ca may be effective. Look for a future article focusing on amendments. Contact the authors if you need assistance on determining options.

Blend “salty” with clean water. Whatever the source of high EC in water, if there is another source (whether municipal, pond, well, etc.) that can be used to dilute the “salty” water, use it to decrease the salt levels and reduce plant stress attributed to high substrate EC. For most turfgrasses, the target is to reduce to ≤ 2 dS m⁻¹. Contact the authors for additional help.

Change to a different water source entirely. If EC readings of current water are so high that it is not feasible to continue using a particular source, find an alternative source.

Install a reverse osmosis system. If no alternative or mixing source of water is available and growing turfgrasses at this particular location is critical, a reverse osmosis system may be the most viable method for producing quality water that can be used for irrigation purposes. These systems have improved greatly in the last few years; however, they tend to be expensive and the wastewater, a salt-rich brine, must be disposed of. With most reverse osmosis systems, once the water has been cleansed (desalinated), Ca and Mg are added back and or the water is blended with rain fed/storm water so the water is not too pure.

The salinity reduction strategies above can help reduce and/or alleviate salt stress, but keep in mind that each strategy is only as effective as the monitoring data from which you make your management decisions. ■

Dara M. Park, Ph.D. is an assistant professor, turfgrass, soil & water quality at Clemson University. Dr. White is the nursery extension specialist at Clemson.

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The importance of 2-year turfgrass programs

Editor's note: We asked some of the people in charge of 2-year turfgrass programs at colleges and universities across the country to update us on those programs. Here are the responses:

- What have been some significant changes in your program over the past 5 years?
- What are the biggest challenges facing 2-year programs in the next 5 years?
- How does your internship program operate?
- How can the sports turf industry best support 2-year turfgrass programs?

MT. SAN ANTONIO COLLEGE, Walnut, CA

From Brian Scott, Professor of Horticulture & Agricultural Sciences Department Chair:



▲ Brian Scott, Mt. San Antonio College

We offer a 2-year degree in Park and Sports Turf Management, which is a comprehensive program for both industries. Along with Park Management, Turf Management and Sports Turf Management classes, students also are required to take other courses including IPM, Landscape Design, Plant ID, Soil Science, Landscape Equipment Operations, Irrigation Design and Installation, Arboriculture and Landscape Construction, as well as work experience classes. The core course requirement is 46-49 semester units (we are on 16-week semesters).

We also offer a Certificate in Sports Turf Management which consists of 18 semester units (6 courses). These are Turf and Sports Turf, IPM, Soils, Irrigation Design and Installation and Irrigation Management.

I would say the most significant change has been overhauling our certificate system. Most of our certificates in the past have been 24-30 units (8-10 courses). Our Advisory Committee (made up of industry professionals) recommended that we make our certificates fewer units and more specialized. As a result, we went from offering 9 certificates to 12 certificates, all of which are 18 units (6 courses). They are all very specialized now.

Specifically in the Turf Program we are starting to see more students who are recently out of high school becoming interested in Sports Turf Management as a career. Up until about 5 years ago the majority of the turf students were already working in the industry and trying to increase their

knowledge base in order to promote to more prominent positions.

One of the biggest challenges in California is the Student Success Initiative. There has been a recent mandate to look at student success primarily on completion of certificates and degrees, which is reasonable. The issue for us is that many students tend to 'job out' one or two classes short and never come back to finish, but they have been very successful at meeting their educational goals. We also have students who finish certificates but do not apply for them for unknown reasons. We have been working diligently to do educational plans and orientations to make sure students complete and apply for the degrees and certificates they have earned.

The other challenge is always the budget, just like anywhere else. We are asked to keep students on the cutting edge of technology and information, which can be expensive. Updating tools and equipment on a regular basis is costly, and there is no ongoing budget line to replace aging tools and equipment. Therefore we have to be aggressive in pursuing outside sources such as industry partners, grants and donations.

One final challenge is how long it takes to get a new course added, or existing courses, certificates and degrees modified. Even if all goes well, it can take 2 years to get changes approved. That is an internal issue that will probably never go away.

[Our internship program] is where we can make big improvements. Currently we have no specific internships set up. Students sign up for work experience and then they work here on our sports turf lab or at our nursery. Recently several have gone to UCLA to work with Chris Romo at Jackie Robinson Stadium, but that is quite a ways from campus. I would like to develop more opportunities close to campus, or even on campus.

We get great support from our local STMA chapter who help students find part-time work and donate to the Turf Team. It would be great to have companies who could possibly loan us equipment for demonstration purposes for a semester or year at a time. This would keep our costs minimal and keep the most updated equipment available. Offering scholarships for students is another great way to support the program. Be available and flexible to start internship programs in order to give students hands on opportunities.

MICHIGAN STATE, East Lansing, MI

From Dr. John N. Rogers, III, Professor of Turfgrass Management, Department of Crop and Soil Sciences:

The 2-year Sports and Commercial Turf program at MSU is an 18-month, 54-credit program that is on campus only. Students attend classes for the first fall semester (15 weeks), then a short 10-week spring semester. From April through August they conduct an internship. The second year is the same as the first, with students graduating in late March.

John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Tent on athletic field
Turfgrass area: College stadium
Location: Corvallis, Oregon
Grass Variety: Infill artificial turf

Answer to John Mascaro's Photo Quiz on Page 33



Background illustration courtesy of istockphoto.com



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Classes are oriented to a career in turfgrass management, covering all aspects of turf (13 classes with turfgrass in the title). All ancillary subjects have direct preparation for the career as well, such as computers, Spanish, botany, and soils.

There have been no real program changes in past 5 years; most changes were in place before that. However, this year we began to allow students to take the online course offered at MSU taught by David Gilstrap (CSS 202 World of Turf), to better prepare them for school and introduce them to the subject. This may help stoke a passion but it is too early to tell results.

The challenge is having enough students to fill demand. This is still a very hands-on vocation that you cannot know if you like until you get experience. The beauty of this vocation is that you can get entry level jobs to begin to explore the business. It is here and only here where you will gain heart and passion for the job. School is interesting and fun at this point, as the students are quite successful. The issue is finding the people at the beginning and employing them so they catch the passion

Re internships, our students work closely

with advisors to determine their needs and then we find the right spot for them. We stay involved the whole way. We visit the student during the internship and this gives us valuable information to pass on to the next classes as well as forges relationships with employers.

The industry can best support 2-year turfgrass programs by employing young people to give them the heart; 15-20 hours per week, as this is often all the time they can and will give. Contact athletic directors and coaches and let them know you are willing to hire and mentor. This will go a long way.

HORRY GEORGETOWN TECHNICAL COLLEGE, Conway, SC

From Ashley Wilkinson, Professor, Golf & Sports Turf, and Golf Course Management:

HGTC has had a 2-year associate degree program in turfgrass since 1972. Our initial goal was to offer an education for the expanding golf course market here in Myrtle Beach and the



▲ Ashley Wilkinson, Horry Georgetown Technical College

Carolinas. The Golf Course Management program quickly found favor with employers which led to students, like me, coming from around the United States and other countries. Today, our alumni can be found around the country and world.

We have placed a strong emphasis over the past 10 years in

the expanding market of sports turf. HGTC created a new major, Sports Turf Management, to ensure that our students who desire a career in sports turf will receive the knowledge and experience needed to quickly be successful in this rapidly expanding market. Our graduates have found excellent opportunities in numerous major league sports facilities, which only excites the next class of incoming students. Our graduates can also work on dual turf degrees while at HGTC. We can modify the curriculum to help students pursue both degrees in golf and sports turf with minimal disruption to the goal of finishing in 2 years.

Perhaps the greatest strength of HGTC is the amount of on the job training that can be found in the area. We have excellent relationships with both golf and sports turf facilities along the Grand Strand. This is something that brought me here as a student and what so many of our graduates say has given them an edge in the work place. To be sports turf specific, we have classes at the Myrtle Beach Pelicans facility, a Texas Rangers affiliate. The Sports Turf Manager and adjunct faculty member, Corey Russell, shares both introductory and advanced field management strategies with HGTC students. Being part of the real deal helps HGTC students in ways that classroom lectures can't mimic.

Our biggest change at HGTC has been the opening of a new state of the art building for turf study that allows us to expand both scientific and collaborative learning outcomes. We have also invested in new turf specific technology to expand the students understanding of how advances in technology will improve management strategies. Things like geothermal cameras, advanced salinity and moisture monitoring devices, and GIS technology are just some of

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the new gadgets that students will be exposed to in an effort to put them at the front of the line come hiring time.

Our biggest challenge, simply put, is awareness. As a high school graduate I had no idea I could find a 2-year program that could teach me so much in a specific field. I took classes at a university not knowing where to turn. Luckily, I found a summer job in parks and recreation that exposed me to turfgrass and later HGTC. There are so many excellent 2-year programs but we need to get the word out to the high school students that a career in what they love can be found without amassing tens of thousands of dollars in debt. And we can create better success for students interested in 4-year institutions due to the level of intense study at the 2-year level. I found that my Bachelor's degree was a cakewalk after 2 years of intense study in turfgrass and horticulture at HGTC. That's probably why I was so honored to get back here after a career in turf management. I knew I could change students' lives whether they wanted to go straight to work or if they wanted to get ready for more education.

Our internship is an integral part of our education. We expect, and help, students work while in school. Our students must work while in school for at least one semester. This helps us study the student's strengths and weaknesses and allows us to build on what they need. We also have a summer internship where students work for industry leaders around the country and world. We try to help the student work in an area that may interest them upon graduation or for mentors who will continue the student's education. I personally monitor all internships. The internship program requires numerous reports involving soils studies, management strategies, chemical awareness, and irrigation methodology just to name a few. By the time our students are finished with their internships they have a new appreciation of the business of turf management and the time management that is required to reach the pinnacle of the profession.

The best support comes from the local associations. It's all about mentoring. We are blessed in South Carolina to have a very involved and dedicated group of sports turf professionals. Our sports turf professionals and industry leaders are welcoming to the many times I call upon them for a tour, lecture, or facility visit. Whenever I attend a meeting I always feel the energy the association has. If I can get students involved with the association then I know they will continue to grow professionally and person-

ally. What I can teach may not always resonate as well as what I can show. A strong local STMA chapter can show the students the excitement, camaraderie, and fun that can be had in sports turf. For that, I am thankful to our STMA association partners.

PENN STATE, University Park, PA

From John Kaminski, Associate Professor, Turfgrass Management, and Director, Golf Course Turfgrass Management Program:

The Penn State 2-Year Turfgrass Program involves four 8-week terms and a 6-month internship. In class, students learn the basics of agronomy and turfgrass management, but we also focus a great deal on the business and communication side of the industry. We don't feel we can teach a student everything there is to manage turf, but we strive to give them the tools to become successful turfgrass managers. Our goal is not to teach students how to grow grass; it is to teach them how to become successful managers and leaders.

Re changes: Aside from hiring me, there haven't been any significant changes in the pro-

gram. Penn State has been a leader in producing successful turfgrass managers since the late 1950's. While we are always trying to stay ahead of industry trends, we also don't think that it's necessary to reinvent our successful program.

The biggest challenge facing all turfgrass programs is the declining numbers. Some schools with few students or limited faculty will likely be gone in the next 5 years. However, I think that this presents an opportunity for 2-year programs. As the cost of a 4-year degree increases well into six figures, 2-year programs have the ability to attract more students. When the salary



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differences between managers with 4 year or 2 year degrees are marginal, it just makes sense for people to consider that as a factor in their decision of choosing a turfgrass program.

Penn State's 2-year program has four 8-week terms on the University Park campus. Students take a series of classes ranging from Botany, Soils, Turfgrass, Entomology, Pathology, Weed Science and others typical of an agronomic program. They also, however, take classes in math, communication, human resource management, business and even etiquette. A major part of the program is also the 6-month advanced internship. Students prepare during classes in the semester and then spend March through September learning the ins and outs of managing a sports facility or golf course.

In addition to the traditional classroom and internship experiences, students complete a lot of hands on projects related to construction, irrigation and others relevant areas. They are also exposed to numerous networking opportunities with industry professionals through conferences, turf bowl competitions and field trips.

How can the sports turf industry best support 2-year turfgrass programs? Good question. I think that one of things that the sports turf industry can do is to provide scholarships to assist students pay for the increasingly high cost of higher education. These scholarships not only provide financial assistance, but they also allow the students to build their professional resumes. Another critical area is the development of solid internship programs that look to train and mentor young people interested in turf as a career. Too often we see facilities that use interns as general summer labor. While we

appreciate the need for this, the role of a supervisor should more in line with that of an educator and mentor. If supervisors keep this in mind they are usually able to attract the best students each year and help form the foundation for a student's success in his or her career.



▲ **Troy McQuillen,**
Kirkwood Community College

KIRKWOOD COMMUNITY COLLEGE, Cedar Rapids, IA

From Troy McQuillen,
Golf Course and Athletic Turfgrass
Management Assistant Professor:

The golf course and athletic turfgrass management program at Kirkwood involves 68 credits of hands-on technical training to prepare students for a career in the golf course, athletic field, or lawn care industries. Students enrolled in the program have interest in a specific sport, working outdoors, and working with their hands. Following graduation most students find employment with-in the turf management industry or transfer onto a 4-year degree option.

Some of the most significant changes to the program have been adopting the Irrigation Associations educational resources for our Turf and

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Landscape Irrigation Class. This class also carries a dual credit, where it can be transferred onto a University.

The second biggest change has been articulation agreements between the 2-year turf management programs and the state universities. These 2+2 agreements allow students to create a seamless transition after the hands-on 2-year experience into their bachelor's degree. Third, more hands-on lab spaces have been developed for the students involved in the program. Our Athletic Field Maintenance class works on the college's baseball and softball fields, along with maintaining the newer Intramural Field.

Some of the biggest challenges facing 2-year programs will be overall student numbers. When I started 8 years ago we had a turf student population of 60 and now our program is just over 45 full-time and part-time students. The delivery of education has changed. Students want more education delivered in online formats or hybrid coursework (class that are part face-to-face and part online). This online transition is difficult for hands-on programs, but we have been making unique curriculum changes to encourage more students into the turf management program.

Students are required to perform an internship between their first and second years. Internships start in early April and run through the summer until August. About 50% of the students will pursue out-of-state internship of all kinds and the other 50% in state or local. Students are required to complete daily logs, skills worksheets, and employer evaluations. When the students return to class they will give short presentations about their internship experiences to their peers.

The sports turf industry has already been an outstanding supporter of the 2-year turf programs, especially with the conferences, turf bowls, and education resources for all students. I would encourage the sports turf community to reach out to younger generations about the possibilities in this career field.

MINERAL AREA COLLEGE, Park Hills, MO

From Chad Follis, Horticulture Instructor:

Our program is typical of most community college (cc) programs. Heavier on plant and soils courses and lighter on general studies courses. We have 65 credit hours required for degree completion, with three specific courses.

[5 years ago] the program existed on paper but had no support; fundamentally it didn't

exist. Getting this part of the hort program off that mat was part of why I was hired. We are making progress but [not yet] to the level I want in another 5 years.

Perception. We need to make it more clear that cc's are a viable hiring alternative and that our students are potentially more emerged in plant growth since two-thirds of their courses are in the world of plant growth and less in general studies. We also have a more diverse student population than most universities from a pure socio-economic perspective.

We require two internships, one in the summer the other during one of the four semesters. Students are responsible for finding their own internships with help as needed. We do a couple spot check follow ups during the internship and students have 30-hour reports. We try to get students into multiple locations so they can see various perspectives.



▲ **Chad Follis,**
Mineral Area College

Support. We are not doing research like a land grant so our students may have less exposure to cutting edge research since we don't have research centers, etc. So support comes in the form of in-class speakers and field trips. Help us put demo turf plots on campus; many cc programs manage their campus sports fields and need basic supplies (tools, fertilizer, etc). Think of your local FFA program, that is what your local cc is with deeper educational concepts. We need the same types of support. Make sure to invite the cc's to the summer and winter field days. Since most cc students are from lower socioeconomic backgrounds maybe the registration fees could be adjusted. In Missouri the Gateway Chapter of STMA and the state turf council have registration for \$30 for students. This allows me to take all our students to winter conference instead of just a few. ■







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Editor's note: Ian McCormick is business development manager, The Farley Group.



▲ Two full field seasonal domes (Downsview Park, Toronto, ON). All photos by Ian McCormick, The Farley Group

A synthetic turf field is an ideal playing surface for a wide variety of sports and activities—when it's not covered with a foot of snow. Fortunately, there's a building system that can allow for a synthetic turf field to be used during all seasons. Air-supported structures are lower cost alternatives to traditional buildings, particularly for facilities that require large, open, clear span interior space. But the most unique feature of these structures is their ability to be taken down and put back up seasonally. Many domes have been installed to cover sports facilities for the winter months and are taken down to allow for outdoor activity in the summer months. Of course, a dome can also be constructed for use as a permanent, year round facility.

With the exponential growth in participants in soccer and other field sports and the evolution of the synthetic turf industry, the past decade has seen a significant increase in the number of installations of synthetic turf fields with no signs of slowing down anytime soon. Unfortunately many of these fields are in areas that are affected by the cold and snow that winter

weather brings, rendering them unplayable for several months every year. So, what's the solution for a field that can't be used during the winter months? Well, you can "bubble" it.

When air structures were first introduced to North America in the early seventies by industry pioneer Ralph Farley, covering a single tennis court for the winter season was an ambitious endeavor. The technology had already been established in Sweden, and Farley saw an opportunity to make use of these "bubbles" in areas in Canada and the United States where long, cold winters made it impossible for outdoor surfaces such as tennis courts to be played on after the warm season was over. So he teamed up with a tennis club in Toronto and imported one of these fabric structures from Sweden, specifically patterned and manufactured to cover one tennis court. The fabric membrane was attached to an anchoring system around the perimeter, an electric inflation fan pressurized the interior of the bubble, and that winter people played tennis on the same court that they enjoyed their favorite pastime on in the summer months. The dome was deflated the next spring,