CURRY RESPECTED AS "QUIET GIANT" IN SPORTS TURF INDUSTRY

By Eric Schroder

Bob Curry had an early start in the turf business. As a Toronto teenager in the late 1950's, he was one of the grounds crew who walked the turf track at Woodbine Racetrack repairing divots by hand after each race day. "We would check the Daily Racing Form each morning, hoping there wouldn't be any races on the turf that day," he laughs.

Ironically, Curry has come full circle from those early days of safeguarding turf to where he is today; the president of Covermaster, Inc., one of the worlds's leading suppliers of multi-use tarps and flooring systems to protect sports turf.

In January the Sports Turf Managers Association (STMA) presented Curry with the organization's most prestigious honor, the Harry C. Gill Memorial Founders Award, which recognizes long-time service and commitment to the organization. In STMA's lean early years, he paid board members' expenses to board meetings to help out the cash-strapped organization and played an integral role in the STMA headquarters transition from outside management to its own staff, devoting much of his personal time to making the transition seamless.

"I'm indeed honored to be recognized by receiving the Gill Award. I am proud to say I have personally known all the previous recipients of this award and it is a privilege to be ranked with them," Curry says. "Most important to me is all the friendships I've made through STMA.

"Looking back at those early years, there were challenging times for STMA. Then Steve and Suz Trusty became the management team," Curry says, "and some dedicated board members set goals and delegated responsibilities. Not long after that things started to take shape.

"I remember at my first board meeting asking Steve where to submit my expenses and he said commercial members were asked to pay their own," Curry recalls. "Those were the good days!"

Curry tees off in windy San Antonio at a past SAFE tournament.

Curry sat on the STMA Board for 4 years and continues to serve on committees today.

Curry began his career right out of high school when he went to work for Laidlaw Lumber as the office "go-fer." (Later he attended university at night.) He quickly climbed the company ladder with stops as a warehouse laborer, inside salesman, and outside salesman. "I'm not a natural salesman," he says, "but I enjoy meeting and talking to people. Getting feedback from customers is something I learned a long time ago."

Eventually he became a product manager in the marketing department; that's where he first involved himself in the tarpaulin and covering business. In the mid-1960's Laidlaw partnered with a Finnish company that manufactured tarps to start a "covering" business in Toronto and Curry was chosen to run this new division. At the time this Finnish concern was the only manufacturer in the world that was producing a 12-foot wide raw material for tarps.

"In North America at the time there was available only 5-foot wide material," he recalls. "The larger size's advantages included fewer seams and that it could be made faster and cheaper. We had a unique product that allowed us to fabricate larger tarps."

While he was filling divots, the young Curry dreamed of being his own boss, and says now this new division was a real challenge, "almost like having my own business." During this time, he travelled the world and brought concepts and ideas back to North America.

"Our first big order was for a 200,000-square foot tarp to protect the artificial turf during concerts in Montreal's Olympic Stadium, and then we sold 80,000-square footer to the Kansas City Chiefs," says Curry. "That's where I met George Toma, one of several STMA founders with whom I soon developed relationships.

"Gil Landry got me involved when he suggested in 1995 that I join the board as a commercial member," Curry says. "He said it was 'only a few meetings a year' and that I would greatly benefit from it.

"Gil greatly understated the meetings but he also really understated the benefits," says Curry. "The true benefit, and this is an important point with me, is the friendships I've made through the years. They are something I will never forget."

Curry says today STMA is on the right track for future growth. "Their purpose in the industry will be further recognized. I think the SAFE Foundation will play a major role in that growth," he says. "These efforts will enhance the association by attracting new members, the

"Bob Curry is definitely the 'Quiet Giant' in our sports turf industry. I could not imagine a more deserving recipient of this prestigious award. He has helped this industry to no end, but never seeks publicity for his generosity and time; so few know how much he has done for us. All the while, he has developed his business to be one of the most quality-minded, service-oriented businesses that I've come across during my 24 years in this industry. If you like the STMA, Bob is one of a few select individuals that you should thank personally. He's the kind of guy who will beat you on a golf bet for a cold drink afterwards, then buy it for you anyway before you have a chance (I speak from experience here). Thanks again, Bob. You have helped more sports turf managers than you will ever know."

—ROSS KURCAB, CSFM, DENVER BRONCOS

sports turf managers of tomorrow."

Ambition realized

In 1980 the Finnish partner decided to divest itself of the tarp business and Curry made them an offer. Covermaster Inc. was born and his ambition of being his own boss realized. With this change, Curry began to pursue the new market of large field covers, using his knowledge of new materials like polywoven fabric that could be used in wide-width applications. Covermaster was the first company to make covers from this material for sports turf applications, mostly baseball at first; it made the covers at one-third the weight and one-third the cost of old canvas or vinyl tarps. Today 90% of NFL and MLB teams use Covermaster products.

"Bob is truly one of the kindest, most generous, caring people I have had the privilege of knowing. He has been a backbone of STMA, carrying the organization's word throughout the world."
—MIKE SCHILLER, CSFM AND FORMER STMA PRESIDENT

"We reduced the cost to teams because they needed fewer crew members to handle these tarps. Before, minor league clubs would need to bring front office people down to help handle the tarps," Curry says. "It was a huge factor; now five or six people could roll up the tarps instead of a dozen."

It took time to infiltrate the market though; in those days rainouts were just an accepted part of the business, he says, and when these covers were introduced it was a sizable purchase for most clubs. But word-of-mouth spreads quickly and the referrals started coming.

A portable rolling device for covers marketed by Covermaster.

"Joining the STMA was the best move I ever made," Curry says. "Attending trade shows and meetings was the greatest source of feedback. I discovered what groundskeepers needed and wanted and what they didn't want. And spending time in warm Florida during spring training didn't hurt either!

"This kind of insight led to our developing a lightweight plastic roller, for example," he says. "It was a safety issue mostly; the galvanized steel rollers being used didn't have end caps and guys were forever cutting their hands."

David Frey, former Cleveland Stadium groundskeeper and a founding member of STMA, had built a portable rolling device with revolving tires that used a tractor's PTO system to roll tarps across a field—a one-man operation. Curry visited Frey numerous times and left feeling that a similar machine could be re-designed, manufactured affordably and then sold to any level stadium.

"Bob is a very successful businessman and his expertise has greatly benefited STMA. I don't know how he has been able to sustain such an active role in organization with his extremely busy schedule, but we greatly appreciate and have benefited from his involvement. I don't know anyone who deserves the Gill Award more than Bob."
—KIM HECK, STMA CEO

"We saw the market potential and asked Dale Getz, then the groundskeeper at Notre Dame, to try one on his baseball field," Curry recalls. "Dale said it worked well so we started marketing it for David and we are still selling them. In fact recently Andre Bruce of the Chiefs purchased one, as have numerous other teams."

Curry thinks every association has to grow to survive. "STMA continues to meet that challenge through Kim Heck and its current leadership," he says. "The dedication of volunteers, and the entire organization, makes the STMA a real success story."

Research and development

"The upside of this business is the time we can spend with R&D," says Curry. "Anyone can make a tarp, there are all kinds available. We've had success in product development and new material technologies and systems to handle materials more easily.

"Having served with Bob on several committees and the SAFE Board, I know he can be counted on to analyze a situation and provide a well thought out solution always, with the STMA and SAFE at the forefront of his decision."
—DALE GETZ, CSFM, STMA COMMERCIAL VICE PRESIDENT

"We see the chores turf managers face and input from them helps us come up with innovations."

Curry now is working on an inflatable tarp that can be operated by fewer people. "We're close now; we've been working on this for the past 6-7 years, conducted some trials, but there's been a lot of going back to the drawing board," he says.

Another innovation Curry mentions is Armor Kote, a clear-coat surface finish that is undetectable but makes for a much stronger abrasive surface and better seam strength.

"We're always looking at new things in this industry. Our mandate is 'What would work better?'" he says. "We face copycat competition and that is what drives our R&D efforts. We want to make more affordable and more lightweight products than anyone else." ■

Gillette Stadium, Foxboro, MA

Managing field surface temperature

By Dr. Deying Li

Surface temperature has recently been raised as an important issue for artificial turf. With more and more artificial turf installed, sports turf managers are expected to manage an array of new things, including surface temperature.

This article discusses temperature as one of the important quality parameters of sport field surfaces. Results from a study comparing water use and temperature regimes between artificial turf and natural turfgrass indicated that managing soil temperature is more than a safety issue; turfgrass quality and environmental qualities can also be affected. Very small temperature differences can have big impact on biological reactions and accumulative temperatures.

Natural turfgrasses have many environmental benefits and functional attributes. With proper construction and maintenance, natural grass surfaces can tolerate reasonable use and provide a high quality playing surface for different games. Although the basic surface qualities for sports fields are stability, hardness, traction, and friction, other characteristics should never be overlooked including the ability to regulate temperature and humidity, and the ability of reducing dust and noise levels.

Sometimes artificial turf is preferred to accommodate larger amount of activities and prevent from fast deterioration. The advantages of artificial turf are at the cost of natural turf's environmental benefits. Some believe artificial turf requires no water or chemicals, but rather irrigation is needed for lowering the temperature and sanitation.

Temperatures building on artificial surfaces can become a concern during a warm day when surface temperature gets too high to play on safely. Under such situations, temperature is considered as one of the very important playing surface qualities. This is a good example that different parameters may dominate the surface playability under different circumstances.

Temperature has always been a very important factor of soil surface, too. Ironically, such is human nature that we tend to forget the most obvious and abundant, and we tend to take for granted the most essentials. The problem exposed due to the shift from natural turf to artificial turf is such an example; and thus, the debate of global temperature changes has spilled over to turfgrass management.

Thermal properties of rootzone media are very important physical factors that affect the energy balance and temperature distribution in rootzones used for sports turf applications. Understanding the patterns of soil temperature regime is helpful in making decisions as to when and how to apply water, fertilizers, and other chemicals. The information also is important in predicting infestations by weeds, diseases, and insect pests. The rational behind this is that plant growth, fate of chemicals, and microbial populations all are temperature dependent. Many turf management practices can affect the temperature and energy regime in the rootzones of turf. Some research has been conducted to investigate the effects of air and soil temperature on winter kill of turfgrasses. Topdressing turf with a heavy layer of sand, peat, bed coke, and other materials before winter for winter protection of turf has been successful in many cases. Physiological stress has been investigated on creeping bentgrass, Kentucky bluegrass, and other grasses under supraoptimal temperatures.

Jack Trice Stadium, Iowa State University

Direct heat stress has been reported when the internal crown tissue temperature was greater than 43°C. Until recently, little has been done to compare the temperature regimes of natural and artificial turf surfaces. Very little information is available on managing rootzone temperatures.

Temperature is a measurement of kinetic energy of molecules in a system. Heat flows along the temperature gradients, from higher temperature to lower temperature. The temperature of an object changes as a result of energy exchange. If it gives up more energy than it receives, it will be cooler; if it receives more energy than it gives up, it will be warmer. Three processes are responsible for heat transfer: conduction, convection, and radiation. Heat conduction is energy transfer from more energetic particles to less energetic particles of a substance due to interactions between the particles. Convection heat transfer is due to collective bulk motion of fluid. And radiation is energy emitted by matter at certain temperature.

Heat flow through soil involves the simultaneous operation of several different mechanisms mentioned above. Conduction is responsible for the flow of heat through the solid matrix, while across the pores conduction, convection, and radiation act in parallel. When soil is moist, latent heat of distillation adds an additional factor involved in heat transfer. This is why heat flow in soil system, therefore the temperature regime in a soil, is very complicated. Nevertheless, soil physicists developed different ways to study and describe soil energy transport and temperature changes.

Soil surface energy exchange causes the fluctuation of surface temperature. Temperature varies most on the surface and the changes damp off until at certain depth, where the temperature remains almost constant. Large temperature amplitude in the cyclical curve is a result of large amount of energy gain or loss. If the energy is not transferred downward (or upward for that matter) when thermal diffusivity is low, then the surface temperature tends to have large variations leading to bigger amplitude. The peaks and valleys of the temperatures in a lower layer will be at certain time behind that in an upper layer.

The lower the thermal diffusivity the longer is such time lag. The daily soil temperature changes, also called diurnal changes follow a similar pattern of annual cyclical temperature changes. We can use the amplitudes and time lags at different soil depths as indicators of soil thermal properties. Knowing that soil temperature regime is affected by thermal properties and that thermal properties are affected by soil types and water content, we can manage soil temperatures accordingly.

Experimental setup

The experiment was conducted in Fargo, ND. The plots were

Table 1. Daily surface maximum temperature and amplitude affected by turf type in the summer and fall of 2007.

Turf Type	Jun		July		Aug		Sept		Oct	
	Max	Amp	Max	Amp	Max	Amp	Max	Amp	Max	Amp
								°C		
KB	45.1	42.9	50.4	42.7	44.1	40.5	37.8	41.8	28.1	33.4
KB +FF	44.0	42.4	47.4	39.6	43.1	42.0	35.2	38.8	28.7	35.9
TF	40.9	37.2	41.1	30.0	38.6	37.1	39.0	42.0	28.4	35.0
FG Infill	54.8	50.6	52.2	43.0	50.0	44.8	46.4	46.5	34.5	39.4
Range	58.5	57.6	57.9	49.7	54.7	51.4	51.8	54.9	36.6	45.5

1.5 m by 2 m; rootzone is 30-cm mason sand on pea gravel with 10-cm diameter drain tiles connected to a lysimeter in each plot. Thermalcouple sensors at 0, 2.5, and 15 cm depths were installed in each plot. Soil moisture probes at 2.5 and 15 cm depth were installed in each plot. The treatment/materials are repeated three times in a randomized complete block design.

Three natural sports turf species mixtures were Kentucky bluegrass, Kentucky bluegrass/fine fescue, and rhizomatous tall fescue (Glenn Rehbein Turf). Forever Green with rubber crumb infill (ForeverGreen Athletic Fields) was one artificial sample, and Range turf (Synthetic Turf International) the other. All plots were sodded August 15, 2006.

Artificial turf clearly showed higher surface temperatures and longer durations of high temperatures compared with natural turf during the first growing season in 2007. Artificial turfs also showed larger fluctuation demonstrated by the higher amplitudes. As discussed above, the higher surface temperatures and larger amplitudes of artificial turfs were due to the lower thermal diffusivities of such materials. The time lags between the peak temperatures of surfaces and 15 cm depth in the rootzones also indicated that artificial turfs had slower energy exchanges between surface and sub surface than that of natural turfgrass. The results shown here are for the hottest month of July when grasses were established for only three months. As natural grasses grew more mature surface temperature extremes further decreased (data not shown).

During the experiment, the moisture levels of artificial turfs at 15-cm depth were either about the same or higher than that of the natural turfgrasses indicating that the lower thermal diffusivity at top 5-cm layer is more important for the heat dissipation. Since this layer of artificial turf tends to be more hydrophobic, more frequent watering maybe needed to maintain lower surface temperature because wetter soil has higher thermal diffusivity and larger heat capacity.

Soil properties as well as other environmental conditions can have great impact on surface temperatures. As little as

Courtesy of Lebanon Valley College

0.2 °C differences are biologically significant. The significance is reflected both in temperature thresholds for certain biochemical reactions and for degree-day accumulations. It is a good practice to monitor soil temperatures closely and use the information for irrigation as well as pest control.

To prevent overheating at the surfaces of artificial turfs, either frequent watering or using soil amendments to make the surface less hydrophobic maybe necessary.

In addition to irrigation, selection of soil textures (relative amount of sand, silt, clay, and organic matter) and managing soil structures and thatch levels (aeration, fertilization, topdressing, and mowing) are also useful tools to regulate soil temperatures.

Thermal properties can be tested by a soil physical laboratory for different soil types at different moisture levels. Such test is also useful if soil heating and cooling system is to be installed in the sport fields. ■

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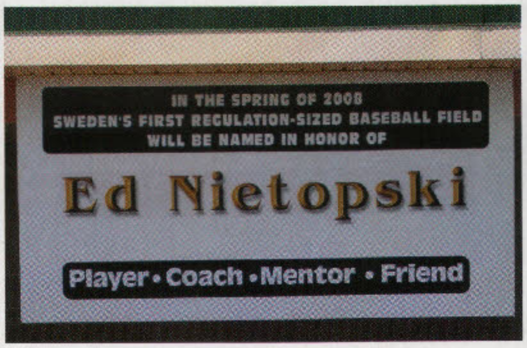
Making a seeding vs. sodding decision

By Mike Whelehan

"It" was in the planning stages for more than 2 years. "It" was greatly needed. "It" was now becoming a reality... quickly. "It" had the full attention of a group of dedicated community members. "It" was being partially funded by an anonymous donor.

"It" would soon become dedicated as "Nietopski Field" in honor of long time coach and educator Ed Nietopski of suburban Rochester, NY. "It", as we affectionately referred to often, would be the only regulation size baseball field in the ever-expanding Sweden Town Park in Brockport, NY that already included seven Little League size fields, four soccer fields, a disc golf course, and a skate park covering 156 acres of land donated by the



local university.

"It" was just about complete when the thoughts by those in charge turned to how could this new field be used in early this spring as per the plan some 2 years prior. With the cold and wet weather moving into this beautiful college town in mid-October Nat Lester, Sweden town supervisor and Jack Milner, chairman of the foundation overseeing the project, were looking for answers to when they could hear the words, "Play Ball!"

By late September, under the guidance of Fred Perrine, town highway superintendent, this 3-acre plot of land had been cleared, the native soil stripped and screened for re-use during the final grade, a "Multi-Flow" drainage system installed by Paul Fox of RM Landscape Inc. and irrigation installed through out the whole field was completed. Yet to be completed was the installation of the mound, setting infield material to proper grade, and the seeding of the native topsoil that would make up the turf portion of the playing field.

With the days becoming cooler in early October, discussion on seeding the field was a top priority as town employees finished up the final grade and the outline of the infield was finalized. The original specifications called for seeding the field with a blend of Kentucky bluegrass and perennial rye by drilling, covered with paper mulch blown on with a hydro-seeder.

As the placing of infield material in the skinned portions of the field began, a period of wet weather slowed progress for a number of days. It was eventually completed and showed some strong characteristics of the field so sorely needed but pushing the date into late October. Discussion again turned to a confirmed date to seed the field for the best chance of good germination yet in the fall to make play in May 2008 a reality.

In our part of the country it is best to seed in late spring or early fall. Irrigation was installed and ready to work so getting water to the new seeds would not be a problem what ever the season. With the option to seed in late October we determined that we were into a fall date that would allow for minimal or no growth of the new seedlings, with hopes for increased turf establishment once the warm weather took hold in mid-May. If needed a spring overseeding to combat any winter lose would be done when the weather permitted.

Another option was to wait for the first substantial frost and apply a dormant seeding. Lastly, waiting until spring when the soil temperature was more conducive to positive germination was a very good option. It was also pointed out that for the best results of any of these options in the Northeast's limited growing season that the establishment of the seeded turf should have a 9 to 12 month grow-in period before any heavy activity took place on the turf. During this grow-in period it was also important to formulate a maintenance schedule allowing for periodic feedings, overseedings, mowing, applications of weed control, and repairs to eroded or settled areas.

Low confidence

While all those options were part of the original plan for the field construction, none of them made the committee members confident that the field would be playable in May. As the date moved into late October, installing big roll sod was proposed for the infield and sideline portions of the field. Installing sod would give the infield immediate established turf that would allow for heavy traffic come spring and also eliminate the time-consuming hassle and cost of establishing the seedlings.

With seeding, the expected early high traffic that the infield would endure would only bring destruction and the probability of starting over, prolonging the completion of the project. Sod installation would also help control erosion that would surely develop over the winter season, causing additional maintenance and repair to the field once good weather arrived.

The feeling was that by installing sod we could also control weed problems since the sod was cultivated using high quality certified seed and was under a management program at the growers (CY Farms Inc/Batavia Turf) which eliminates weeds from their sod fields. With seeding, the grow-in period would no doubt go through a session where the weed seed in the soil would develop and take over, creating another maintenance issue with possible applications of chemicals to eliminate the weed problem until the seedlings became established. While the sodded infield would be less maintenance initially, it was emphasized that a strong PM program be established to insure frequent mowing and watering as well as a schedule for fertilizations, aerations and overseeding to keep the sod in a healthy state.

Since better than 80% of the game takes place in the infield it was decided to install the sod in the infield/sideline portion of the field and manage the outfield area as best as possible for its use this spring. The weather was still appropriate for establishment of the sod and its use come spring. The sod installation process took less than 6 hours including the trimming and blending in with the skinned areas.

At the sight of the instant, almost usable, dark green sodded infield grass, the committee members began to think that this long-awaited project needed to be completed now and guarantee that play could begin this May. With that sentiment and strong indications that the outfield would not be playable due to the lack of established seedlings, it was determined that the outfield area must be sodded as well.

The time frame was approaching mid-November when the decision was finally made to sod the outfield area of the field. The elements proved tough, but through wet and blustery weather the installation process was completed a week before Thanksgiving and most importantly, the first pitch is scheduled for May 10. ■

Mike Whelehan is president of RM Landscape Inc., Hilton, NY.

Saving your field

By Bill Nolde, MS, CPAg

Environmental stresses (heat, wind, cold, mowing, aerification, irrigation, fertilization, and pesticide application) coupled with on-going physiochemical reactions within the soil of sports fields will continually change the soil condition. More often than not these changes are not beneficial. If they were there would be no turf loss and no need to renovate or rebuild a sports field.

Heat, wind, and cold obviously cannot be controlled by the sports turf manager. But the turf manager must be knowledgeable enough about the damage that can be caused by these stresses to be able to reduce or repair the damage they cause. At the very least the turf should be healthy enough to be able to repair itself quickly after it has been damaged.

Mowing (height, duration, mower condition) and aerification (frequency, type of tines) are definitely causes of stress to turfgrass and should be reduced to help prevent adding to turf stress during times of high heat, high wind, and intense cold. Aerification that is commonly recommended to relieve soil compaction can also cause subsurface compaction (i.e., cultivator pan) and damage to rootzones. The benefit of most aerification processes is relatively short-lived and is hardly worth doing on expansive, high-clay content soils. Subsurface compaction seriously diminishes soil hydraulic conductivity and is one of the main causes of black layer in sports turf.

Fertilizer and pesticide applications can be helpful if the products are applied judiciously. However if over applied, these products can damage turfgrass roots and destroy beneficial microorganism populations. Try to manage your soil to encourage a robust population of beneficial microorganisms. Turfgrass is primarily a bacteria-dominant ecosystem that can effectively combat turfgrass fungal pathogens if the bacteria populations are high enough. There are also strains of beneficial fungi, including micorhyzzae, in turfgrass soil systems. Populations of these beneficial organisms can be increased by an annual topdressing of a good quality compost.

Sodium Adsorption Ratio (SAR) and Electrical Conductivity (EC)

SAR/Salinity Hazard of irrigation water

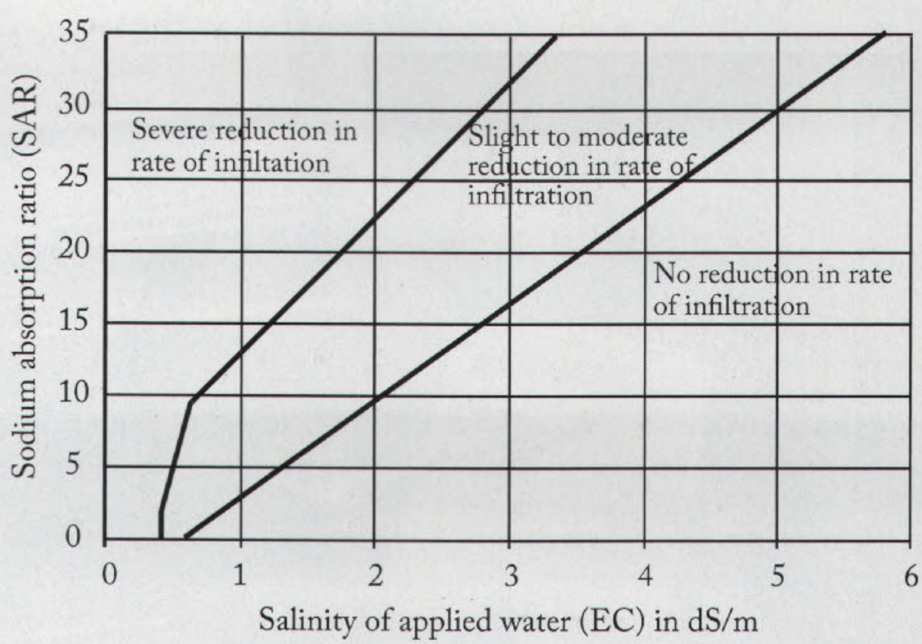
If SAR is:	0-3	3-6	6-12	12-20	20-40
and EC (dS/m) is:					
None	>0.7	>1.2	>1.9	>2.9	>5.0
Slight	0.7	1.2	1.9	2.9	5.0
Moderate	0.2	0.3	0.5	1.3	2.9
Severe	<0.2	<0.3	<0.5	<1.3	<2.9

Irrigation water woes

A sports turf manager has practically no control over the quality of his irrigation water. If the irrigation water source is from a holding pond, fine particulates of clay and silt commonly find their way into the growing medium and plug pore spaces, even on a high sand rootzone field. Many sports fields are irrigated with treated effluent water that is very high in sodium and other salts. Even potable water in many states has levels of salts that are high enough to be damaging to turfgrass soils.

Sodium is the one salt in irrigation water that is most damaging to soil structure. There is no physical or chemical way to remove these sodium ions from water. Therefore, their threat to soil structure must be combated after they have entered the soil matrix. Soils with a measurable amount of clay in them are most at risk from sodium absorption onto clay micelle cation exchange sites. When large numbers of monovalent sodium cations (Na^+) adsorb onto these sites the physical attraction between micelles is exacerbated. This results in a phenomenon called clay dispersion, which is not good.

As seen in Table 1, for extremely low salinity irrigation water, even low SAR water should be avoided. High salinity water (EC1.50-3.00) with SARs above 4 needs to be carefully managed. It is recommended that once a year the soils should be subject to testing in order to assess possible sodium problems.



Graphs by LennTech

The higher the salinity, the higher the SAR index in order to cause infiltration problems. On the other hand the lower the salinity, the greater the risk of infiltration problems independent of the SAR value.

Rainfall can reduce the soil salinity and consequently increase the SAR index and reduce water penetration into soils (see Figure 1).

Reversing clay dispersion and causing the clay micelles to repel each other will result in flocculation. Flocculation will result in the reestablishment of soil pore spaces, which in turn, will improve soil hydraulic conductivity. Flocculation will allow water, air, and roots to find their way deeper into the soil. A well flocculated soil needs no mechanical aerification and will eliminate the threat of black layer formation and other diseases. With air in the soil pore spaces aerobic bacteria will become dominant and the environment that would favor turfgrass fungal pathogens will no longer exist.

Flocculation happens after introduction of high levels of divalent calcium cations (Ca++) into the effected soil. Calcium sulfate and calcium chloride, to a greater degree, have been used to do so. Up until now science has not been able to provide sports turf managers with a product that will do all that has been described so far and then keep it that way for a long time. That has, perhaps, changed.

Research from Texas A&M ("Gypsum and Polyacrylamide Soil Amendments Used With High Sodium Wastewater") tested the idea that gypsum applied after disking versus a polyacrylamide (PAM) applied in solution can reduce soil crust formation and improve the infiltration rate of water into soil irrigated with water high in salt and sodium. The results showed that the damaging effects of wastewater irrigation water can be effectively ameliorated using PAM and that it lasted many weeks after the last application of PAM. Gypsum was found to be not as effective as PAM and there was no longevity associated with gypsum.

Another research paper, "Aqueous Polymer Effects on Volumetric Swelling of Na-Montomorillonite (Clay)," was published by researchers at the University of North Carolina in 2005. This research analyzed the effectiveness of three types of products that might flocculate soils and stabilize them after flocculation: sodium carboxymethlycellulose (CMC), polyacrylamide (PAM), and polyethylene oxide (PEO) were tested as stabilization agents against Na-montmorillonite clay upon irrigation application.

Instruments were used to measure the volumetric swelling ratio (VSR), an expression of the clay volume at any time relative to the amount of water it has absorbed and not drained causing swelling. The results showed that PAM reduces the VSR by as much as 40%. Test results for CMC and PEO show that clay swelling is not significantly reduced. This result shows that creation and maintenance of soil pore spaces in clay soil can successfully be accomplished without tilling the soil. The study's conclusion is that PAM can be used as an effective soil stabilization agent for clay soils.

The US Department of Agriculture (USDA) has done extensive research on the use of PAM as an effective material for stabilizing soils in farming. USDA studies have shown that furrow irrigation, soil erosion, water infiltration into soil, and sprinkler irrigation have all been improved by the use of PAM.

Knowing how to properly groom and prepare a sports field for play is what builds a sports turf manager's reputation among his peers. Generally speaking, his employer expects him to know how to do that. What solidifies a sports turf manager's reputation in the mind of his employer is his problem-solving skills. If you can turn around a sports field in decline and make it a showplace again, your job will be secure and you will take great pleasure in such an accomplishment. It is hoped that science can deliver to you here a nugget of knowledge that you can put to use to salvage a problem field you might have or prevent a field from ever becoming a problem.

There are only a few non-agricultural sources of water soluble polyacrylamide, the type used in the research studies, at this time. They can be bought and shipped to you with good instructions on how to use them. One product is Soil Drain that can be reviewed at www.bettertopsoils.com or the product Remedi-Cal Plus at www.soillogic.com. ■

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