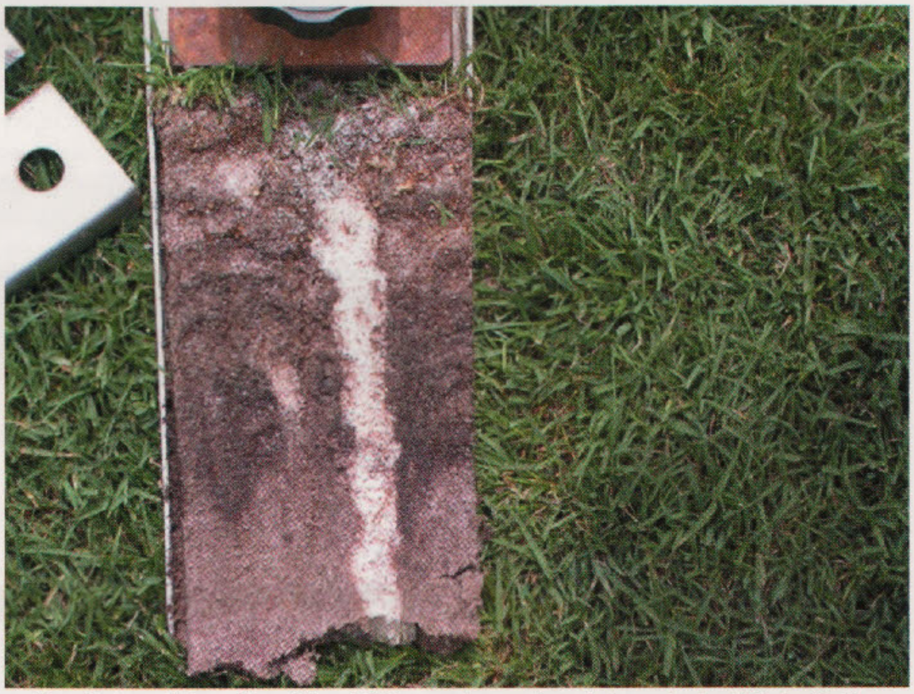
Managing sand-based athletic fields

By John Sorochan, Ph.D.

Rootzone selection and developing sound management practices are two important components to maintaining quality athletic fields. Specifically, constructing a sand-based athletic field and properly implementing the primary cultural practices of irrigation, mowing, fertilization, and cultivation will help maintain the most consistent turfgrass playing surface.

Generally, the rootzone of an athletic field is either native soil or sand-based. Native soil rootzones high in silt plus clay provide exceptional soil strength (soil stability); however, traffic from play often causes poor drainage and soil compaction. In contrast, sand-based rootzones provide smooth and uniform playing surfaces that resist compaction and have adequate drainage. However, sand-based rootzones typically have low nutrient and water-holding capacities. In addition, sands lack cohesion that can cause stability problems.

Variables to control stability problems associated with sand-based rootzones include: particle size distribution, average particle size, particle shape, soil density, and soil amendments.



Campbell used deep tine drill and fill to create a series of channels, backfilled with the original sand blend, for water infiltration.

A well-graded rootzone in which there is a significant distribution among sand particle sizes is preferred for sand-based athletic fields. Research by Dr. Jason Henderson (Asst. Professor, University of Connecticut) as a graduate student at Michigan State University determined that a sand-based rootzone with 10% silt plus clay will provide both soil stability and adequate drainage for athletic fields. The sand content root zone near maximum density will retain macro pore space (air-filled pores) for rapid drainage, and the addition of about 10% silt plus clay will provide the soil stability and the increase in nutrient and water holding capacity. Unfortunately, the high costs and the quality of available native soil to mix with the sand rootzone can often limit blending the two.

In contrast to athletic fields, the United States Golf Association specifications for putting green construction limit the amount of silt plus clay percentages (not more than 5 and 3%, respectively) that can be used in order to provide the desired infiltration (drainage) rates. In addition, very fine sand can not be more than 5%, and the very fine sand and silt plus clay can not be over 10% of the total rootzone mix.

Because the expectations for the use of an athletic field playing surface are extremely different than that of a putting green surface, it makes sense that Dr. Henderson's research recommends slightly higher percentages of silt plus clay. The higher silt plus clay percentages reduce soil infiltration rates, but provide firmer and more stable playing surfaces.

In addition to building a sand-based athletic field properly, implementing the primary cultural practices of irrigation, mowing, fertilization, and cultivation will help maintain the most consistent turfgrass playing surface. Typically, sand-based athletic fields require more frequent irrigation compared to a native soil athletic field because of the low water holding capacity.

Turfgrass water requirements will vary depending on the time of year and weather conditions. Actively growing turfgrasses will generally require about 1 to 1 1/2 inches of water per week. The water used by a turfgrass plant is predominantly absorbed by the roots from the soil and can be supplied via natural rainfall events and supplemental irrigation.

The amount of water that needs to be applied by supplemental irrigation will depend on how much water is available in the soil and how much the turfgrass demands. For example, irrigation applications will be more frequent during sunny days with high temperatures, low humidity, and high winds then during cloudy days where humidity levels are high and temperatures are cool. Thus, any factor that contributes to the turf transpiring more (using more water) and the soil losing moisture via evaporation would warrant increased irrigation scheduling. Therefore, it would not be accurate to suggest irrigation once, twice, or three times per week because weather patterns change frequently. Instead, irrigation requirements should be monitored daily for turf watering needs.

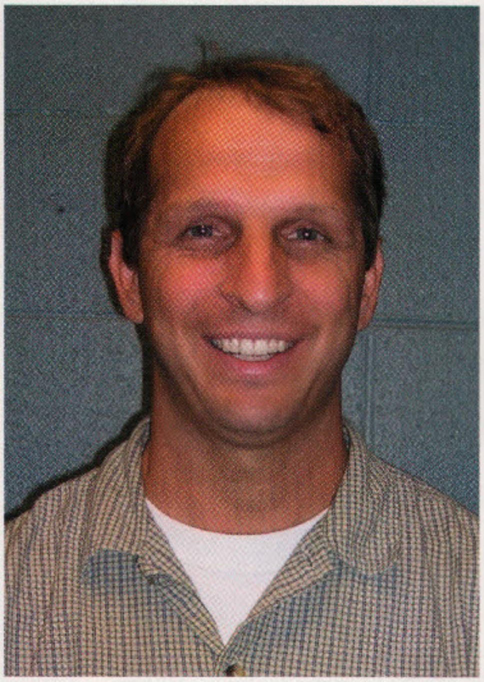
Soil nutrient tests should be conducted regularly and subsequent fertilizer applications should be done for any nutrient deficiencies that occur. Nitrogen fertility for sand-based rootzones should be more light (low N) and frequent if using water-soluble nitrogen fertilizers because of the low nutrient holding capacity. Using slow release nitrogen fertilizers such as polycoated urea can reduce application frequencies and allow for increased nitrogen rates.

Mowing should be done regularly enough to not exceed the one-third rule. This rule states that no more than one third of the leaf material should be removed at any mowing. Optimal mowing heights for cool-season athletic fields (Kentucky bluegrass and perennial ryegrass) are between 1 and 2 1/2 inches and 3/4 to 1 and 1/4 inches for warm-season athletic fields (bermudagrass and zoysiagrass). In addition, regular mower maintenance including reel or blade sharpening will assure that the highest quality of cut.

TYPICALLY, SAND-BASED ATHLETIC FIELDS REQUIRE MORE FREQUENT IRRIGATION COMPARED TO NATIVE SOIL ATHLETIC FIELDS BECAUSE OF THE LOW WATER HOLDING CAPACITY.

Turfgrass vigor increases with the proper implementation of irrigation, fertility, and mowing practices; therefore, as turfgrass vigor increases, irrigation, fertility, and mowing requirements also increase. Sand-based athletic fields typically do not become compacted; however, layering problems as a result of organic matter accumulation often occurs over time. Regular cultivation practices of aerification and topdressing are required to dilute organic matter accumulation and potential layering problems that buildup.

Whether it is Kentucky bluegrass or bermudagrass, organic matter accumulates as a result of decomposing roots, rhizomes and/or stolons, and clippings contribute to an increase in organic matter at or near the rootzone surface that can over time impede infiltration rates. This problem is especially pronounced on overseeded bermudagrass



Dr. John Sorochan, professor turfgrass science, University of Tennessee

athletic fields in the transition zone and southern climates where turfgrass growth from both cool and warm-season turf occurs 10 to 12 months of the year.

For example, Shields Watkins Field at Neyland Stadium in Knoxville was constructed with a sand-based rootzone that had 0.5% organic matter by weight. Over a 10-year period, even with regular core aerification and sand topdressing, a 4-6% organic matter layer by weight formed in the top 5 inches of the 12-inch rootzone.

For Bob Campbell, University of Tennessee Athletic Field Manager and past president of STMA, the increase in organic matter was not high enough to significantly cause drainage problems, but infiltration rates decreased from the original rates. Because Shield Watkins Field is an overseeded athletic field, organic matter accumulation for the two turf species being used accumulates for 10 months of the year. Compounding the problem is the fact that core aerification was only be done during the early summer and regular sand topdressing amounts and frequencies are limited due to the fall football season.

Since the organic matter accumulation occurred over a 5-inch depth, conventional core aerification can not penetrate deep enough to break up the layering profile, but coupled with sand topdressing the percent organic matter accumulation is diluted. In order to address the layering issue, Campbell used deep tine drill and fill to create a series of channels, backfilled with the original sand blend, for water infiltration. The increase in organic matter was not necessarily a major problem, but was an issue that needed to be dealt with in regards to water infiltration. Conversely, the increase in organic matter by weight over time has helped increase the nutrient holding and water hold capacities of the rootzone.

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Synthetic turf maintenance gets closer look

By Eric Schroder

Nate Patrick, business development manager for Redexim Charterhouse, spoke recently about the increased attention being paid to maintaining the synthetic infill surfaces proliferating around the country. The Synthetic Turf Council (STC) says there will be about 1,200 installations in 2006. Patrick said though many buyers may view their fields as "no maintenance" the fibers do get matted down, and the infill gets compacted, which can cause drainage issues if the rubber compacts. So "no maintenance" is out the window as companies such as GreensGroomer, Bannerman, Sisis, Parker Minuteman, as well as Redexim Charterhouse now market products specifically for this purpose.

The Verti-Air machine blows high-speed air deep into the synthetic turf carpet, then a rotary brush picks up the dislodged infill material and debris and throws it on a filter, which returns the cleaned infill to the field.

All the carpet manufacturers that stitch these synthetic fields together have become members of the STC and agreed to use the same Gmax parameters, Patrick said. He and Redexim Charterhouse Vice President Paul Hollis (congrats to your Cardinals!) are members of STC's new maintenance committee that currently is re-writing the organization's maintenance standards. These standards when available should be "must-read" material for synthetic turf managers.

Nate Patrick, business development manager for Redexim Charterhouse

Patrick has talked to a lot of turf managers with synthetic fields. "One big question I hear is 'Is using this machine going to void my warranty?'" he said. Patrick said his company's machines (and others) have been approved by all the synthetic field manufacturers. When asked, "What do I need to do to maintain my synthetic turf field?" Patrick says there are three important maintenance practices that will prolong field life: 1. Keep all surfaces free of debris, 2. Routinely use a grooming brush to vertically stand the field's fibers, and 3. Use a tool that can agitate and fluff your rubber infill so it doesn't become compacted.

Tom Moore, national sales manager for GreensGroomer, said some of the top synthetic manufacturers approached his company more than six years ago about making a machine for their products. "We had a reputation from the golf grooming market and we were fortunate to be asked by the manufacturers to get involved," said Moore. He agrees with Patrick and said it is absolutely necessary to have a machine to stand the fibers upright ("They have a long nap that wants to lay over"), and that the sand and rubber infills will compact and need leveled out.

"We have a lot of sales through our dealers but even more from recommendations from manufacturers or architects," Moore said. Some synthetic marketers include equipment packages as part of the deal, and that some architects are now specifying certain equipment to be used on their fields, he said. "For example, Sportexe installers use our equipment, and then train the field staff on this equipment after the installation," Moore said.

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Hardness testing is essential after construction

By Sam Ferro

When constructing a new artificial turf surface there are, of course, many items to consider. While most construction related matters should be dealt with during contract negotiations or during construction, one very important factor needs to be taken care of right after the field has been installed. Field hardness testing (Gmax) is recommended by the Synthetic Turf Council, manufacturers, and turf experts for all new artificial turf installations. Hardness testing should be performed on-site after the infill has been added to the turf system.

Maximum allowable Gmax results or an acceptable range of results should be part of the architect and/or manufacturer specifications. Hardness testing is one of the final steps in the approval of a newly installed field. Results from another field or lab test results should not be used. Testing procedures must use the equipment and techniques detailed in ASTM method F 355A. A Clegg hammer is not acceptable for hardness testing on a synthetic field.

max measurements provide an indicator of the shock attenuation or hardness of a surface. While this test measures field performance, it can also be related to safety. The impact from a fall is either absorbed by the player, equipment, or the field. Fields that are too hard can present an elevated risk of injury to the users. Fields that are too soft can present player performance problems.

Studies, including one by Northwestern on impacts to the head of a middle linebacker, show that a Gmax value of 200 should be the maximum threshold to provide an acceptable level of protection to users.

The turf industry has in general accepted a Gmax value of 200 as the maximum acceptable reading for an older synthetic field. New fields, however, should have much lower readings. Typical acceptable values are in the 90-150 range. These Gmax ratings are comparable to those obtained from good quality natural turf, and they allow for gradual hardening of the field over time.

Hardness testing performed immediately after field installation does not just provide a performance indicator. It also shows that you are performing due diligence to provide an acceptable playing surface for your athletes. This can be very important in case of an unfortunate accident. Annual or routine maintenance testing after construction provides data for determining warranty compliance and for diagnosing or preventing problems. Proper construction, maintenance, and testing are all essential pieces of the puzzle for providing a safe, high performance field.

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Interestingly, Moore said GreensGroomer sells their synthetic maintenance equipment by the container full to overseas customers.

FieldTurf's recommendations

Troy Squires, VP Marketing for FieldTurf Tarkett, says his company provides a maintenance manual to all clients, and that by following the maintenance procedures outlined in that manual, their fields will be kept in optimum condition and playing characteristics will be maintained longer. Squires says there are two key areas when it comes to maintenance: litter removal and fill displacement.

FieldTurf leaves an estate sweeper with each field sold, which is designed for litter removal, e.g., peanut shells, paper, confetti etc. This kind of sweeping activity should be done on an "as needed" basis, but generally once a week during heavy use.

FieldTurf has a very heavy fill of sand and rubber that is unlikely to float, even in heavy rain, says Squires, but routine grooming of the field will assure that the infill is uniformly distributed at all times over the entire field surface. Intensive and repetitive use of certain areas of the field such as the kicking action of the players may cause the infill material to be displaced. ■