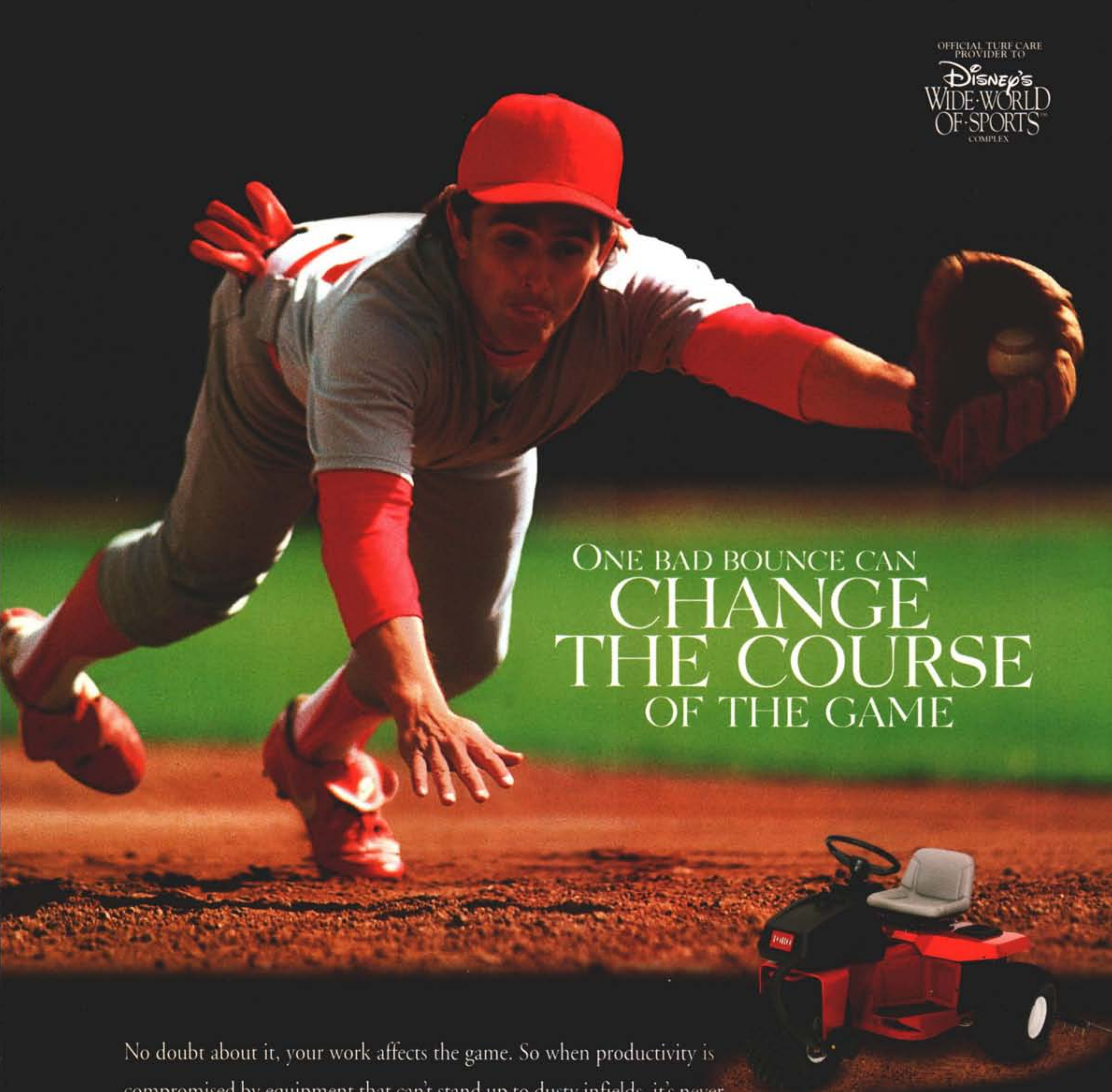
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APRIL 1999

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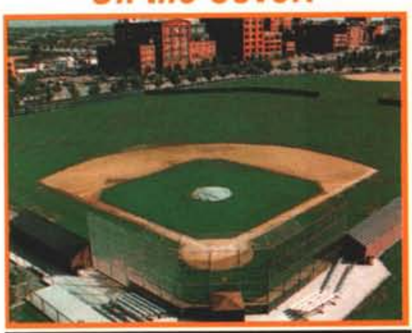

The STMA / BeamClay / *sportsTURF* 1998 College Baseball Diamond of the Year.

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sportsTURF (Reg. U.S. Pat. & T.M. Off.) (ISSN 1061-687X) is published monthly by Adams Business Media.

SUBSCRIPTION RATES
ONE YEAR $40 TWO YEARS $65
FOREIGN (ONE YEAR) $65 • $130 Airmail or Single Copy $5

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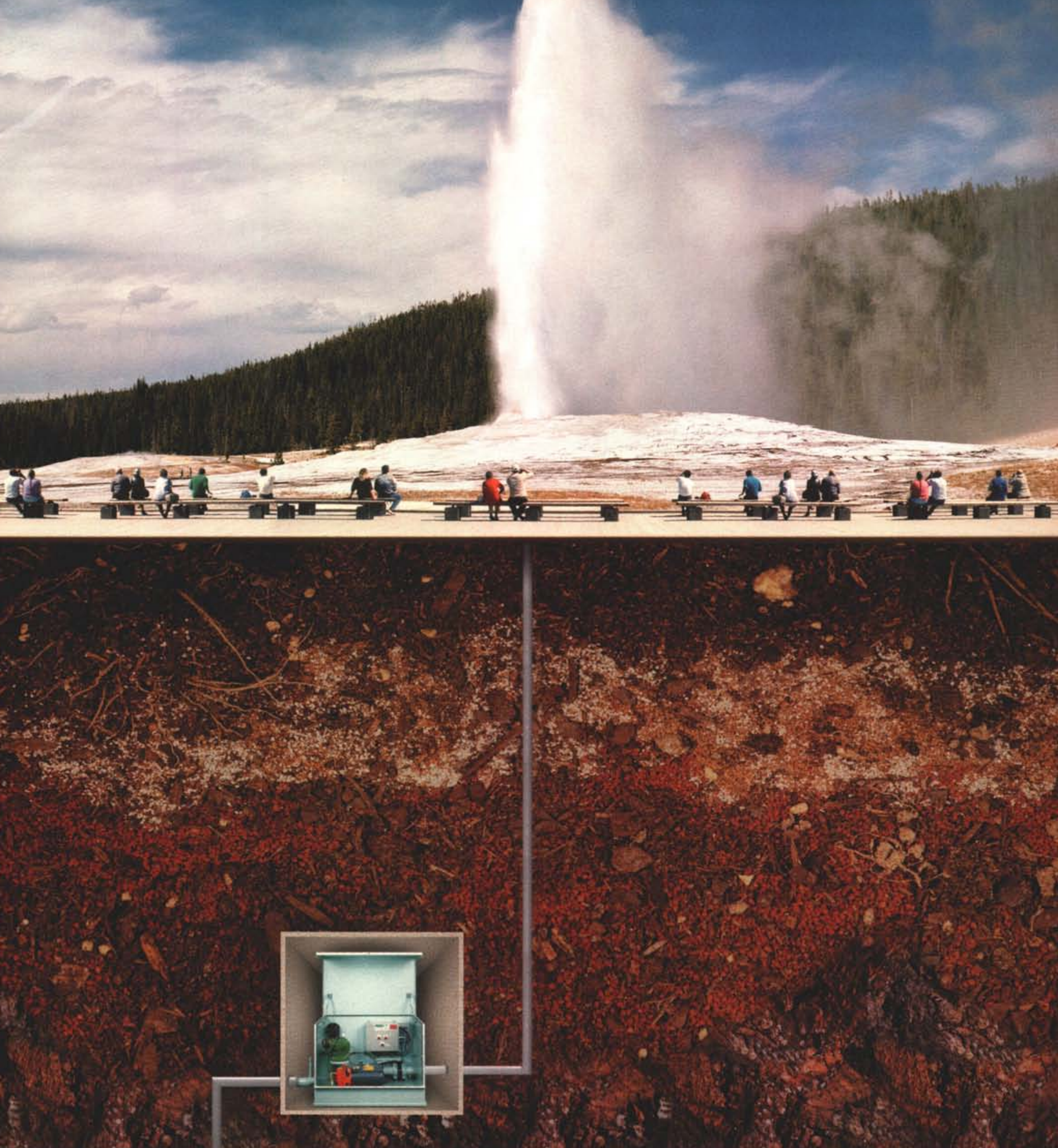


sportsTURF THE FRONT OFFICE

Unwelcome Guests

In February, I ventured into the chilly winter morning rain to cover a local story that hit closer to home than I would have liked. A short walk from my apartment in Chicago, the City was beginning an unfortunate phase in its aggressive strategy to exterminate the destructive Asian Long-Horned Beetle.

Crews from the Department of Streets and Sanitation's Forestry Bureau converged on the city's Ravenswood neighborhood to begin clear-cutting trees that had recently become infested with the pest. Trees that had stood watch over the community for decades fell in seconds, and chippers pulverized their remains to a fine mulch, shredding much of the neighborhood's beauty and character at the same time.

This may seem extreme, but it was the most viable solution to a problem that started making news last summer.

The Asian Beetles are native to China. Their migration to the United States can be credited to the globalization of the world economy. Despite aggressive deterrents initiated by the U.S. Department of Agriculture, the pests have managed to travel to this country in wooden crates aboard shipping vessels.

Scars from the insects' entry holes alerted City officials to the infestation in Chicago. The beetles lay their eggs under the bark of live hard-wood trees. When the larva hatch, they burrow deep into the wood to feed on the tree's soft tissue as they mature. The new adult beetles chew their way out of the tree, leaving extensive damage behind. After mating, the beetles often reinfest the same tree until it can no longer survive. Then they simply move on to the next tree in line.

Asian Beetles are not as selective as most diseases. They feed on any and all hard-wood tree varieties, and there is no known pesticide that kills them. The City's drastic clear-cutting solution was the only way to protect healthy trees from the menace.

Chicago is not the first American city to fall victim to the Asian Beetle. New York has been battling its own infestation since 1996. The 450 trees scheduled to be removed in Chicago sounds like a staggering number, but New York has already lost over 1,000 trees to the pest.

To date, these represent the only known beetle infestations in the U.S., but the insects have been detected in shipping warehouses in several American cities. Government regulatory agencies are doing their best to keep the pests out, but the threat remains.

The best defense against the Asian Beetle is early detection. Trees are an important fixture in our landscapes. We often take them for granted, but we certainly notice when they're gone.

No doubt, most of you have trees on the grounds you maintain. If you haven't already, incorporate regular inspections as part of your maintenance routine.

Steve Berens, Editor
(773) 755-4611

Tip o' the Month

String Trimmers

According to Mark Michaels, senior forestry product manager at Husqvarna Forest and Garden Co., there are five main points to consider when buying a string trimmer:

- How will the trimmer be used? Will you be doing mostly trimming, or edging, or both? Evaluate a trimmer's versatility, and look for models that can accommodate various cutting attachments.
- Look for a trimmer that offers high power to weight ratio (0.15 - 0.21 kw/kg) and low exhaust emissions.
- Consider ergonomic issues. A loop handle that's adjustable can provide balance and comfort for a variety of users. Look for a unit with low vibration; a good design separates the engine and shaft vibrations from the handle.
- Always test drive your leading candidates. Most servicing dealers will allow you to take trimmers for a spin.
- Buy from a company that offers a good warranty on the shaft and ignition. Make sure your retailer will service or repair your trimmer in a manner that's convenient and affordable.

A number of optional blades and heads are also available to help with your trimming needs:

- For light to heavy weeds, nylon line will do the trick. A smaller diameter line will cut fast, but will wear quickly. Thicker line requires a more powerful trimmer, but it will cut heavier grass, it's better for edging, and it will last longer.
- For heavy grass, brush, and dense weeds, look for multi grass and brush blades. Loop-handle trimmers require an additional safety kit to adapt them for use.
- For cutting saplings and small trees, use the saw blade recommended by the manufacturer.

STMA MESSAGE

Sports Turf Managers Association

In Busy Times
Stay Connected

Spring is a busy time of year for all of us. It's important that we all get on top of our work and take advantage of the warming trend during the next few months.

It's also a busy time for your STMA committees and for STMA Headquarters. The Conference Committee is already hard at work on the details for our next Annual Conference (Jan. 12-16, 2000; St. Louis, MO). The Committee, Headquarters, and the STMA Board of Directors issue a big THANK YOU to all who provided feedback on the 1999 Conference. Your input is a major factor in planning the 2000 Conference.

• The STMA Board of Directors met in San Diego in mid-March. Their meetings bring the results of all the work of all the committees to the table for consideration and input from all board members.

Part of the meeting focused on the 1999 and 2000 Conferences. Another key agenda item was the long-range strategic planning initiative taking shape under the direction of a new committee chaired by President-Elect Rich Moffitt.

The Board's review and monitoring sessions are extremely important in managing the growth and direction of your association. Your comments and ideas on any area of the association are always welcome and do make a difference.

• Also hard at work are the 1999 Membership Recruitment Committee, chaired by Kurt Nilsson; and the 1999 Chapter Relations Committee, chaired by Abby McNeal and composed of the presidents of all STMA affiliated chapters. They will work closely with Executive Director Steve Trusty and President-Elect Rich Moffitt to lay out the future outline for membership definitions, and the role of the chapters as part of the long-range strategic planning initiative. If you have ideas along these lines you'd like to share, please don't hesitate to contact them.

• The Certification Committee is meeting again in mid-April in Chicago. They continue to move at a steady pace in final preparation of test questions and fine-tuning of the program's format and details. All of you involved deserve a lot of credit for your commitment and dedication. Thank you.

• If you haven't heard, one of our finest has been hired to manage Tiger Stadium. Congrats to Heather Nabozny, the first female head groundskeeper in Major League Baseball. Stepping in to replace Heather as head groundskeeper for the West Michigan Whitecaps is Raechal Sager, the 1997 STMA undergraduate scholarship recipient.

No one in this industry needs a reminder to work hard. But do take the time to stay connected with your peers and your association during this busy season. We're all stronger when working together.

Stephen Guise, STMA President
(714) 704-0403

Vacuum-Assisted Drainage

by Guy Prettyman and Dr. Ed McCoy

There are two principal objectives in the design of natural-turf athletic fields. The first encompasses playability concerns. Fields must provide a smooth and firm, but resilient surface that is free from water ponding.

The second objective involves agronomic concerns. Fields must provide the appropriate soil environment to support a dense, uniform, and wear-tolerant turfgrass stand. A high-quality turf provides superior playability for a given soil condition.

It is well documented that sand-based root zones are ideally suited to meet the playability and agronomic objectives of athletic fields. Yet, even with sand-based root zones, a field will perform poorly if the overall system design does not provide rapid drainage of excess water.

In fact, athletic fields should not be designed to normal or average rainfall conditions, but rather to avoid the occasional catastrophic occurrence of a heavy rainfall during an athletic event. Periodic high-rainfall events create wet and muddy soil conditions, which lead to poor-quality play, injury to players, and slow turf recovery.

Three factors

Subsurface drainage depends on three factors. The first is permeability of the soil. Soils with high permeability drain faster and more completely than soils with low permeability.

The distance water must travel to reach a drain line is another important factor: the further water must travel to reach a drain line, the slower the drainage.

The third key factor is the driving force acting on water movement. Under normal conditions, the only force that influences drainage is gravity.

Vacuum power

Dr. W. H. Daniel, a turf specialist at Purdue University, developed a technique that uses vacuum power to assist drainage on athletic fields. He called this system Prescription Athletic Turf, or the PAT system.

The rational behind the PAT system is quite simple in theory. Essentially, a vacuum is applied beneath the soil through special drain lines. The vacuum increases the driving force for water to infiltrate and move downward through the soil.

This vacuum-assisted drainage is intended to enable fields to remain playable even after or during rainfall that would rendered other natural-turf fields unfit. Since its introduction in the early 1970s, more than 40 fields across the world have included the PAT system in their installation.

Study

An Ohio State University study attempted to determine the effectiveness of vacuum-assisted drainage in a PAT field. We constructed a model to simulate a section of a PAT field (see photo). The 12-foot by four-foot model contained a 12-inch, coarse-sand root zone placed over an impermeable barrier. A round, two-inch, slitted drain pipe rested in a trench in the middle of the unit, oriented perpendicular to the long axis.

Ohio State University constructed a model of a section of PAT field to determine the effectiveness of vacuum-assisted drainage. *Courtesy: Ken Chamberlain*

A collection tank adjacent to the model with a vacuum pump fitted to the tank measured drainage outflow. Soil moisture probes at five locations and three depths in the root zone provided a total of 15 soil-moisture measurements. Probes were installed three, six, and nine inches from the surface at five locations: over the drain line, 2-1/2 feet from either side of the drain line, and five feet from either side of the drain line. The field model supported a stand of Kentucky bluegrass maintained at a 1-1/4-inch height.

To test the system, we created an artificial rainstorm over the model through an overhead array of spray nozzles. For a given test run, we applied rainfall to the unit under gravity drainage until steady outflow was achieved. At each of the 15 probe locations, we measured the outflow over a 10-minute interval and recorded the soil water content.

We then applied a 0.5-psi vacuum to the drain line. Again, when the system reached a steady state, we measured drainage outflow and soil moisture. We repeated this procedure for the 1.0- and 1.5-psi vacuum levels. Three repetitions at each rainfall rate provided a total of nine experimental runs.

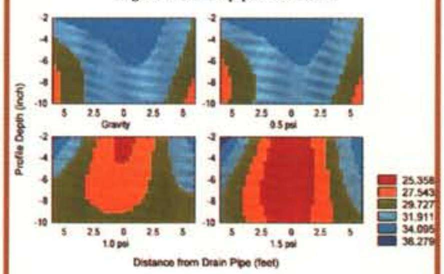
Findings

Data for the five-inch h-1 (+/- 1/4-inch) rainfall rate is presented here. Lower rainfall rates follow the same general behavior, but they aren't shown here.

Under gravity drainage at the five-inch h-1 rainfall rate, the apparent infiltration of the unit was two inches in h-1. As vacuum increased to 0.5-, 1.0-, and 1.5-psi, the infiltration rate increased to 2.6, 3.6, and 4.1 inches in h-1, respectively.

Though the highest vacuum level failed to totally infiltrate the five-inch h-1 rainfall, this vacuum doubled the infiltration rate observed under gravity drainage.

Figure 1. Round pipe with trench



Soil moistures for the given vacuum levels appear in **Figure 1**. This figure represents a cross-sectional view of the root zone. The vertical axis represents soil depth in inches, and the horizontal axis represents distance from the drain line in feet. The different colors represent different moisture levels in the root zone, expressed as percent volume.

As seen in this figure, vacuum aids in drying the root zone. This effect is concentrated over the drain line; much higher soil moistures occur five feet from the pipe.

This suggests that vacuum-assisted drainage benefited the system tested. It increased infiltration, but the soil moisture reduction was limited to the region immediately over the drain line trench.

Study 2

After reviewing the results, we decided to repeat our study using Advanedge pipe and eliminating the drain line trench. This approach mimics the current method used to build a PAT field.

We cleared the experimental model of turf and root zone, and removed the drain line trench. We placed a 12-inch Advanedge pipe flat on the impermeable barrier, and connected it to the collection tank.

We filled the unit with very coarse sand, as is currently used in PAT field construction. Again, we established a bluegrass cover, and maintained a 1-1/4-inch height.

Findings

As before, only data for the five-inch h-1 (+/- 1/4-inch) rainfall rate is presented here.

The unit's infiltration rate under gravity drainage measured 4.4 inches in h-1. The addition of a vacuum showed no noticeable effect on the already-high infiltration rate. This may be due to either the coarser sand or the Advanedge pipe.

The vacuum did, however, effect water redistribution within the soil profile. **Figure 2** shows the soil moisture distribution at the different vacuum levels.

As seen in this figure, the drainage

pattern is not concentrated over the drain line as before. The drainage front elongates to the ends of the unit. This suggests that this newer approach to building a PAT field using coarser sand and Advanedge pipe serves to drain the soil profile more completely than the system that uses slightly finer sand and round drain pipe located in a trench.

Discussion

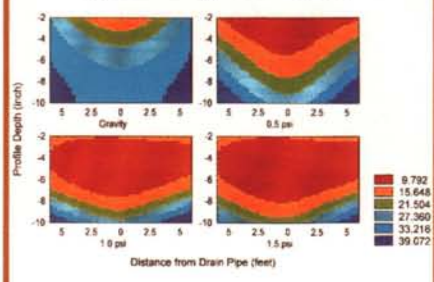
In both systems, the vacuum effected root zone drainage. In the system that used coarse sand and round drain pipe, vacuum contributed to an increased infiltration rate proportional to the vacuum applied. However, the vacuum assist preferentially drained the root zone just over the drain pipe, while the area away from the drain pipe remained wet.

Applied to a uniformly wet root zone, a vacuum first removes water from the profile just above the drain line trench. Once this area is drained, the vacuum draws air from above the turf surface. This air flow results in a rapid pressure drop in the vicinity of the pipe, and reduces the suction applied to soil water at further distances from the pipe. Thus, soil water that is laterally distant from the drain line does not sense the effect of the vacuum application.

In the system that used Advanedge pipe and very coarse sand, vacuum's impact stretched farther from the drain line. Perhaps the 12-inch Advanedge pipe laid flat on the subgrade allowed a wider vacuum distribution and less short-circuiting by air. Of course, the very coarse sand may also have contributed to the overall improved drainage.

Vacuum assisted drainage does beneficially impact removal and redistribution of water in a soil profile. It's important to remember, however, that drainage is but one factor that contributes to a successful natural-turf athletic field. Proper cultural and management practices contribute most to maintaining a high-quality grass field.

Figure 2. Advanedge pipe without trench



Guy Prettyman is a graduate student in soil science at The Ohio State University. He is conducting research on sports turf and golf green drainage. Ed McCoy is an associate professor of soil science at The Ohio State University. He teaches and conducts research on golf and sports turf soils.