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http://www.ametekwater.com

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FOUNTAINS AND AERATORS
http://www.aquamasterfountains.com

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EASYSCAPE
http://www.bluebird.com

BOSS
IRRIGATION SYSTEMS
http://www.bossirrigation.com

Vermeer
http://www.vermeer.com

http://www.chevrolet.com

Data Industrial
http://www.dataindus.com

DIG
http://www.digcorp.com/asdig

Ditch Witch
The Underground Authority. WORLDWIDE
http://www.ditchwitch.com

DOGGETT
http://www.doggett.net

EWING
IRRIGATION PRODUCTS
http://www.ewing1.com

GLEN•HILTON
PRODUCTS•INC
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DIEHARD
Mycorrhizal "Cocktails"
http://www.hortsorb.com

HOT BOX.
http://www.hot-box.com

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http://www.hunterindustries.com

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http://www.husqvarna.com

Irrigation Supply Inc.
http://www.irrigationsupply.com

Irrigation Station
http://www.irrigationstation.com

K RAIN
http://www.k-rain.com

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http://www.deere.com

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http://www.turf.com

MAASDAM POW'R-PULL
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http://www.maasdam.com

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Native-Soil Field Management

by Dan Bergstrom

We continue to hear of new technologies for sand-based athletic field management: sub-surface heating systems, sand stabilization systems, remote-control irrigation, GPS tracking, and the list goes on. However, 80-percent of all sports turf managers still maintain native-soil fields.

Native-soil field management poses many challenges. Some of the biggest problems begin with a lack of adequate internal drainage.


University of Kentucky football field. Courtesy: Dan Bergstrom

Drainage

Drainage on native-soil fields is a major concern. The silt and clay particles that make up the largest fraction of native-soil composition are smaller than sand. The open pore spaces between these particles are smaller than those between sand particles as well.

Smaller particles and pore sizes translate to lower infiltration and percolation rates, and native-soil fields need to be crowned or sloped to allow heavy rain to run off the surface. Standard slopes tend to be between 0.5 and 2.0 percent.

Crowns on football fields can run the center of the field, or they can have a 'hipped roof' design. In the latter situation, the ends of the field fall toward the end zones.

Baseball field crowns should start at the pitcher's mound, and should slope out in all directions. Outfield areas should fall away from the infield at a rate of 1.0 percent.

Soccer fields usually have less of a crown; 0.5 percent is standard. A more pronounced slope threatens to interfere with play in the corners of the field, but sometimes it is necessary when heavier soils are involved.

The debate over drain lines in native-soil fields continues. The technique places two- to three-inch diameter drain lines at 15- to 20-foot intervals either perpendicular to the field's crown or in a herringbone pattern.

One of the biggest misconceptions about drain lines is that after they are installed, the native soil is used as backfill around the drains. Backfilling with the native soil will not help drainage problems, since water cannot percolate to the drain pipes any faster than it could on any other area of the field. Additionally, backfilled silts and clays can quickly accumulate in the drain pipes and render the system useless.

Drain lines need to be covered with uniformly sized gravel. The trench should then be backfilled to the top with sand that is tested to percolate water at a rate of at least five inches per hour. It's also a good idea to line the sides and bottom of the trench with a geotextile fabric to keep the native soils from finding their way into the drain line.

Another misconception about drain lines is that it is acceptable to sod over the top of the sand backfill. This defeats their purpose. The soil in the sod layer will not percolate at the same high rate as the sand below, and the line will effectively be capped.

On bermudagrass fields, instead of capping the lines with sod, allow the bermuda to spread and grow over the sand-filled trench. Cool-season grasses should be seeded into the trench, or you can use washed sod to cover the lines.

Even when sand-filled drain lines are properly constructed, they have a tendency to get desiccated during periods of extended dry weather. Fields that are irrigated regularly have few problems, but turf can struggle in sand drain lines on fields that are seldom irrigated.

Aerification

Aerification is the most important cultural practice for maintaining a field's infiltration rate.

University of Kentucky baseball diamond. *Courtesy: Dan Bergstrom*

Native-soil fields are subject to compaction much sooner than their sand-based counterparts because of the size of the particles and pore spaces that make up the soil.

Pore spaces allow water and oxygen to infiltrate the soil to reach turf roots. Aerification loosens the soil enough to allow trapped carbon dioxide to escape the root zone, while opening pore space for oxygen and water to diffuse into the root system.

There are several options when it comes to aerifying native-soil fields. Hollow coring times vary in diameter from 1/2 inch to one inch, and they vary in depth from one inch to 18 inches. Solid tines vary from 1/4 inch to 1 inch in diameter, and the range of depths offered is similar to that of hollow tines. Slicing tines open a narrow slit in the surface to depths ranging from 1/2 inch to 7 inches.

How does an athletic field manager know when to use which tine?

• **Coring tines** alleviate soil compaction most effectively. Pulling cores and dragging them back into the field produces highly productive results.

Holes opened by hollow tines allow water and oxygen to reach turf roots. The turf usually responds immediately with growth.

Hole spacing is an important factor with this type of aerification. With a 3/4-inch hollow tine, use 30 holes per square foot as your benchmark. More holes translates to more compaction relief, and over-aerifying a field is nearly impossible. Aerifying four to six times per year is not unreasonable by any means.

Unfortunately, core aerification

creates the most severe surface disruption of the different techniques. The procedure requires a field to be taken out of use for at least a couple of days. Crews need enough time to effectively aerify, drag in the cores, and irrigate the turf to ready the field for play. Also, soil moisture must be near field capacity before aerating, so the tines can effectively penetrate the soil to remove uniform cores.

- **Solid-tine aerification** allows turf managers to aerate more frequently, since the procedure produces less surface disruption. Turf areas in soccer goal mouths, in front of the pitcher's mound on a baseball field, and between the hash marks on a football field can benefit greatly from weekly 1/4-inch solid-tine aeration.

Solid tines larger than 1/4 inch in diameter open turf to allow water and air infiltration, but the process compresses displaced soil downward and to the sides. This actually increases soil compaction around newly created aerification holes. Repeated solid-tine aerification with larger-diameter tines can create a hardpan at the aerating depth.

- **Slicing tines** can have the same effect as solid-tines on heavy-wear areas. They can also stimulate turf growth by cutting turf rhizomes and stolons.
- **Deep solid-tine aeration** can alleviate hardpan with little surface disruption by opening the soil profile to depths ranging from four to 18 inches.

Deep hollow-tine aeration is generally not recommended on native-soil athletic fields. Pulling cores from deeper than four inches usually brings poorer-quality soil to the surface, and defeats the purpose of the original soil modification effort.

No matter which aerification technique you choose, be sure to vary the depths of the tines over the growing season to avoid forming a hardpan layer.

Topdressing

A common fallacy of native-soil athletic field management is that topdressing with sand will improve soil structure and drainage. Most soil fields have high concentrations of silt and clay. Adding sand to this mix will only decrease a field's percolation and make it harder.

Consider the ingredients used in concrete: sand, silt, and clay mixed with water! Over time (10 to 30 years), topdressing will gradually build up sand concentration in the soil and improve the field in the long run. However, in the short term, adding sand actually makes a native-soil field worse. The sand fraction of the soil must reach 60 to 70 percent in the top three to four inches before topdressing with sand will help drainage and infiltration characteristics.

There is a better way to modify a problem native-soil field with sand. Harvest the cores after a hollow-tine aerification. Then topdress with enough sand to completely fill the holes.

This method allows water to better infiltrate the aeration holes. Over time, much more of the problem native soil can be replaced with sand, as opposed to simply being mixed with the sand.

This method is not without its

drawbacks. Depending on the size of the field and the diameter and number of holes, up to 60 tons of sand could be needed to completely fill the holes.

Topdressing this much sand at one time can be prohibitive, and it can produce a sand layer on top of the soil if the sand is not properly dragged into the holes. A sand layer on top of native soil leaves turf susceptible to divoting and shearing-type injuries, because the sand layer can slide off the top of the soil layer under athletes' cleats.

Diatomaceous earth or calcined clay products are often a good alternative. These materials increase pore space within the soil profile if worked into the soil during aerification. Of course, these options are considerably more expensive than topdressing with sand.

Aeration cores make the best topdressing for native-soil fields. When you drag cores back into the field, most of the soil will fall back into the holes, but some of it will topdress the turf in the process.

Take a physical soil test of each of your fields. This will reveal the respective fractions of sand, silt, clay, and loam. If you're going to initiate a regular, heavy topdressing program, your mix should closely approximate the test results.

Even with a proper crown, good aerification and topdressing strategies, and properly constructed drainage, there are times when a field is simply too wet to allow play after rain. When play threatens to severely damage and compact the soil, field managers must work with the coaches to relocate field activities. Wisely using a field every day is as important to the life expectancy of a native-soil field as construction considerations.

Dan Bergstrom is athletic field manager for the University of Kentucky in Lexington.

UC-Davis Softball Field

by Bob Tracinski

1998 STMA College Softball Field of the Year

When you don't have the funding, you've got to have heart. Of course, you also need initiative, commitment, ingenuity, and the ability to see a problem, visualize the solution, and tackle the challenge.

Judges selected the University of California (UC)-Davis Softball Field as the 1998 College Softball Field of the Year because of all of the above. The excellent condition of this facility is a tribute to its sports turf crew: Turf Specialist and Crew Leader Roger Adamson, Irrigation Specialist Matt Forrest, Equipment Operator Ted Richards, and Laborer Cutberto Santana. They share the credit with their supervisor, George Ortiz, and with Grounds Division Manager Sal M. Genito III.

Facility

The softball facility is approximately 30-years old. It includes the field, two bullpens, two field-level dugouts, portable restrooms, and seating for approximately 600 spectators.

Softball-related events occupy the field seven months of the year. The primary field user, the UC-Davis Women's Softball Team, finished third in the Division II National Championships in 1993, 1996, and 1997. The field also hosts UC-Davis staff games, kid's camps, the Northern California Girl's Softball Tournament and Championship Game, Little League play, and Davis community activities.

History

In the early 90s, statewide cutbacks forced UC-Davis to scale down its grounds division program. The university eliminated the sports turf team, and a generic crew handled field care.

During this period, the sports fields received little maintenance other than mowing and irrigation. The softball field's common bermudagrass turf was invaded by weeds. Minimal maintenance on the skinned areas was handled by Athletics.

Genito came on board 3-1/2 years ago. He explains, "In the fall of 1996, the Grounds Division began a comprehensive turf program on the softball field which included aerification, fertilization, weed control, and overseeding. The field has a native sandy-loam soil in the turf areas and underlying the skinned areas. Our water source has a high pH level. Regular soil tests were taken, and the pH of the soil was changed from 8.1 in July of 1996 to 7.1 in July of 1997.

"A little over a year ago, I asked George Ortiz to take the helm." continues Genito. "Through sheer determination and initiative, he got educated in sports turf, took the challenge to heart, and built the management program."

Genito offered Ortiz support from the grounds division and the resources to implement a solid, well-developed plan of action within budgetary restraints. Ortiz explains, "When Sal asked me to step in, I first assessed existing conditions, then chose to start upgrading the softball field because it presented the biggest challenge."

Courtesy: UC-Davis Grounds

Budgeting the project

In planning the upgrade, Ortiz always looked at how much each step was going to cost Athletics and how much it would cost Grounds. This added incentive to consider all the options and be more creative.

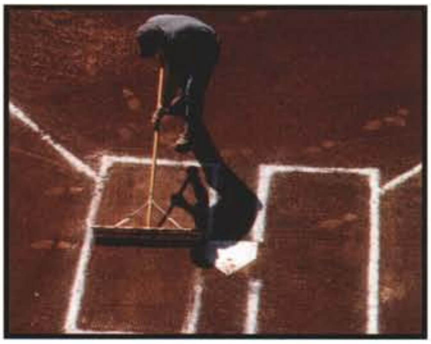
The crew did much of the work as volunteers. Members worked around their families' weekend schedules, basically saying, "I can put in a few hours to finish this," or "I'll help you with that."

Genito explains, "We looked at it as: 'What are the results of having a higher standard, and what are the benefits?' Once you can demonstrate field quality, the facility wants to keep it.

"Then the job is helping them understand why funding is needed. The field is important to UC-Davis not only from the public relations aspect, but also from the playability and recruiting aspects. This field and winning this award have helped us achieve a greater level of support and funding."

Field upgrade

The field upgrade began in earnest in February 1998. The dugouts were rebuilt, leveled, and clay was added. The area around the scoreboard was cleared and topped with decomposed



Courtesy: UC-Davis Grounds

granite to reduce maintenance and make a cleaner look.

To combat continuing lip issues, a row of turf surrounding the infield skinned area had been cut away. However, because of time and budget constraints, it wasn't replaced. With wear, a lip had developed again.

The crew cut and removed two rows of sod circling the infield, leveled the area, and re-laid the sod. To bring the infield back to its proper dimensions, they brought in a row of sod from along the outfield fence. Ortiz wanted to create a warning track, and this was a perfect opportunity to recycle the sod.

The crew sprayed to eliminate weeds and any lingering bermudagrass in the area where the sod had been removed. They raised the outfield fence line surface to prevent ball roll-outs, which had previously caused problems during play.

Next, the crew spread a mix of 80-percent red cinder and 20-percent clay in that area. They rolled it, hard packed it, and watered it in to create a narrow warning track.

Two weeks later, they applied glyphosate and a pre-emergent to ward off any weeds. They also placed some of the cinder-clay mix in the area where the outfield turf meets the infield. Since this meant disrupting part of the field surface, they opted to rework the irrigation system at the same time. In the existing system, a single zone delivered water both inside and outside the outfield fence, reached onto the infield area and bullpens, and even watered the dugouts.

Irrigation reconstruction

"All of our sports turf crew members have had some irrigation experience," explains Ortiz. "In our initial crew meeting on the field, Matt Forrest, our irrigation specialist, had volunteered to come up with a plan. Once he had that developed, we all got together again, provided input on things we'd seen on other systems and field problems we wanted to eliminate, tweaking it all together in the final plan that gave the flexibility we wanted."

The crew trenched all along the back warning track and down the center of right field where the main connection was located. They moved existing pipe to establish irrigation lines all the way around the warning track and to move the heads in from the fence.

They installed new Hunter I-40 and I-80 heads on swing joints for safety and uniformity. Two new irrigation valves split the outfield turf and areas outside the fence into separate zones.

The crew trenched to a main valve on the outskirts of the facility to set up a separate manual irrigation system with a series of portable sprinklers for the clay areas. They installed new quick couplers on the foul area edges and hose bibs on the outfield edges to allow hand watering.

Re-leveling the skinned area alleviated puddling problems. Added clay helped sheet off water, and a calcined clay application improved the play area.

Left to right: Grounds Division Manager Sal M. Genito III; STMA President Steve Guise; and Supervisor George Ortiz.
Courtesy: STMA

Maintenance schedule

"Field use starts in mid-September with our Aggies team softball practice, which lasts into the early part of November," says Ortiz. "This gives us a maintenance window until the early January practices begin. These last up to the start of the game schedule in February. Play ends with the mid-May playoffs.

"There's another window for maintenance until June, when all our other field users become active. They contin-

[1400 lbs*]